How to Build a Climate of Quality in a Small to Medium Enterprise: An Action Research Project

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How to Build a Climate of Quality in a Small to Medium Enterprise: An Action Research Project

by

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Business Administration
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Introduction

Quality Management (QM) in one of its many forms has become an integral part of contemporary business. Since its mainstream introduction to the United States in the 1980’s, it has become more than a strategy or a competitive differentiator. QM has now become a customer expectation. Most of the voluminous research done in this field was conducted by large business for large business. However, most businesses in the United States and the world are small to medium enterprises (SMEs). These organizations that serve as the backbone of the world economy have been largely ignored by the quality movement in terms of academic research. The surprising truth has been that proven QM practices, policies and models were abundantly available and yet they were still not in wide use in the SME community.

Traditionally, there have been many competing definitions of quality offered by a variety of sources including experts, novices, academics and practitioners. Crosby (1979) defined quality as conformance to requirements. That of course assumes that there are existing requirements which is not always the case. Juran, (1999) defined quality as fitness for use. This definition is more customer focused which can be helpful at times but not at others. The most obvious question is, do customers always know what they want? Modern businessmen such as Steve Jobs, Bill Gates and Mark Zuckerberg have argued that they don’t. W. Edwards Deming (1986), who is often referred to as the father of quality, seemed to combine the ideas of standards and customer focus when he defined good quality as a predictable degree of uniformity and dependability with a quality standard suited to the customer. The American Society for Quality (ASQ), the leading global community of quality professionals which boasts
approximately 80,000 members, seems to agree with Deming’s definition when it describes quality as an excellence in goods and services, especially to the degree that they conform to requirements and satisfy customers. For the purposes of this dissertation, the author will use ASQ’s definition. No matter how it is defined, the management of quality, in one of its various forms (Total Quality Management (TQM), Six Sigma, ISO 9000 etc.), has received intense academic and practitioner focus for nearly 40 years. A few of the more popular methods are discussed below:

- Total Quality Management (TQM) is a term or methodology first used to describe a management approach to quality improvement. Since its introduction in the 1970’s it has come to have many different meanings. In its most fundamental form, TQM is a management approach for long term success through the use of customer satisfaction. TQM is based on all members of a company, group, team, or community being actively engaged in the improvement effort by improving processes, policies, practices, products, services, and the culture in which they operate. The methods used in the improvement effort are based on the teachings of Deming, Juran and Crosby among others (Westcott 2013).

- Six Sigma is a multifunctional, organization-wide method to improve process effectiveness and customer satisfaction. It was originally developed as tool to reduce the variation in processes at Motorola in the 1980’s by engineer Bill Smith. Its focus on data and bottom line results have made six sigma a popular quality improvement program globally (Juran 1999).

- ISO 9000 is an international quality management standard developed to help guide companies to effectively document the quality system elements that should be
implemented to maintain an efficient quality system. It was created in 1987 by the
International Organization for Standardization (ISO) and is not specific to any
particular industry, product or service. It was an effort to standardize the many
competing national standards that were in use at the time. ISO 9000 is quite popular
in practice and many companies use this standard as evidence of an effective quality
management system. As a result, the ISO 9000 system is often contractually flowed
from prime organizations to smaller sub-tier suppliers. Currently, there are over
100 countries that use the ISO system (Jaffrey 2004).

Prior research on quality was often started by and tailored for large organizations. In
comparison, there has been relatively little research related to the application or implementation
of QM in SMEs. This lack of attention is quite surprising when one contemplates that the vast
majority of workers in the United States and the world are employed by SMEs. In fact,
according to the United States Small Business Administration, 99.9% of American businesses
consisted of SMEs with fewer than 500 employees and employee approximately 48% of the
American workforce (United States Small Business Profile, 2018). With SMEs representing
such a large percentage of the American and global economy, an explicit focus on how to make
these organizations more competitive, resilient and successful could potentially be of significant
value to both the practitioner and academic communities.

Recently, researchers from across the globe have recognized the opportunity and have
begun to take a concentrated look into this very problem. Murphy (2016a) published a review
of the extant literature in this space from the years 1990-2014. Most of the studies he reviewed
centered on whether SMEs were embracing QM; the critical to success factors (CSF) that were
thought to be associated with that effort; and gaps or barriers remaining to those SMEs that
chose the QM route. Bishop (2018) built on the work of Murphy and identified gaps in the current research. These gaps included an under representation of qualitative research in the SME QM literature, a scarcity of recent SME QM studies in the United States and a shortage of action research projects in this field. Specifically, Bishop proposed to narrow the gap by conducting an investigation into the process of how a SME laid the foundations to build a climate of quality management within an organization. In this instance, he recommended the action research method.

Action research was first introduced by Kurt Lewin in the 1940’s to denote a pioneering approach toward social research which combined generation of theory with changing the social system through the researcher acting on or in the social system (Lewin, 1946). The act itself is presented as a means of both changing the system and generating critical knowledge about it (Susman and Evered, 1978). Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework (Rapoport, 1970). This type of research is particularly well suited to the DBA (Doctor or Business Administration) model because the engaged scholar is typically a working professional imbedded in the organization under study and seeks to make some change to propel the organization forward (Van de Ven, 2007). This project will attempt to narrow the gaps in the literature by conducting a action research project in the United States of a SME that has the goal of building a climate of quality.
Literature Review

The literature review includes articles published in the last twenty-eight years which builds on the fifty-five articles reviewed by Murphy (2016a) and adds eighteen articles that were published from 2014 to 2017 for a total of seventy-three articles. The author used the same search terms and database employed by Murphy. Specifically, Google Scholar was searched with the following terms: TQM, QM or ISO 9000 accompanied with SME, Small Business or Medium Business. The literature review is intended to review the following topics:

1. Explore QM’s applicability for SMEs;
2. Discuss possible critical to success factors for QM implementation
3. Explore possible barriers to implementation
4. Deliberate on the universal nature of QM
5. Expose a gap in the present literature and propose a method to narrow that gap

Quality Management's Applicability for SMEs:

One of the most pressing questions for the past few decades has been whether QM is applicable to SMEs based on their unique set of circumstances. As Welsh and White (1981, p.18) point out, “A small business is not a little big business”. SMEs have their own set of unique strengths and weaknesses. Ghobadian and Gallear (1996, 1997) clearly articulate these differences which is the culmination of in depth case studies conducted in the UK. These differences were primarily concerned with the structure, procedures, behavior, processes, people and external contacts of the organization. The goal for SMEs is to minimize the effects
of the disadvantages such as inferior resources, know-how and training budgets while fulling optimizing the advantages such as the flat management structure, short decision-making chain and low resistance to change. The author adapted Ghobadian and Gallear’s work in Table 1.

Based on the literature from 1990-2014, Murphy (2016a) unequivocally stated that “There is near consensus among QM researchers that QM is both possible and right for SMEs”. However, Murphy did not explicitly state which articles were for or against QM implementation. As a result, the author gathered the data to show what a near consensus looks like (Table 2).

**Table 1- A comparison of the characteristics of large organizations vs SMEs - Source**

**Adapted from Ghobadian and Gallear 1997**

<table>
<thead>
<tr>
<th>Category</th>
<th>Large Organizations</th>
<th>SMEs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizational Framework</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hierarchical. Several layers of management</td>
<td>Flat. Few layers of management</td>
<td></td>
</tr>
<tr>
<td>Rigid framework and information flows</td>
<td>Flexible framework and information flows</td>
<td></td>
</tr>
<tr>
<td>Top management away from point of delivery</td>
<td>Top management close to point of delivery</td>
<td></td>
</tr>
<tr>
<td>Top management’s visibility limited</td>
<td>Top management highly visible</td>
<td></td>
</tr>
<tr>
<td>Multi-sited possibly multinational</td>
<td>Single-sited</td>
<td></td>
</tr>
<tr>
<td>Low innovativeness</td>
<td>High innovativeness</td>
<td></td>
</tr>
<tr>
<td><strong>Systems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High degree of standardization and formalization</td>
<td>Low degree of standardization and formalization</td>
<td></td>
</tr>
<tr>
<td>System dominated</td>
<td>People dominated</td>
<td></td>
</tr>
<tr>
<td>Data centered decision making</td>
<td>“Gut feel” decision making</td>
<td></td>
</tr>
<tr>
<td>Rigid processes</td>
<td>Flexible processes</td>
<td></td>
</tr>
</tbody>
</table>
Table 1 (Continued)

<table>
<thead>
<tr>
<th>Culture</th>
<th>Cultural diversity</th>
<th>Unified culture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Departmental/functional mindset</td>
<td>Corporate mindset</td>
</tr>
<tr>
<td>Cultural inertia</td>
<td>Fluid culture</td>
<td></td>
</tr>
<tr>
<td>Meritocratic</td>
<td>Patronage</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Processes</th>
<th>Long decision-making chain</th>
<th>Short decision-making chain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Formal evaluation, control and reporting procedures</td>
<td>Informal evaluation, control and reporting procedures</td>
</tr>
<tr>
<td></td>
<td>Control-oriented</td>
<td>Results-oriented</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Human Resources</th>
<th>Personal authority mainly low</th>
<th>Personal authority mainly high</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dominated by professional</td>
<td>Dominated by entrepreneurs</td>
</tr>
<tr>
<td></td>
<td>Individuals usually cannot see the results of their work</td>
<td>Individuals usually can see the results of their work</td>
</tr>
<tr>
<td></td>
<td>Ample resources (human, capital, financial)</td>
<td>Modest resources (human, capital, financial)</td>
</tr>
<tr>
<td></td>
<td>Specified training budget</td>
<td>Non-specified training budget</td>
</tr>
<tr>
<td></td>
<td>Resistance to change</td>
<td>Negligible resistance to change</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Focus</th>
<th>Extensive external contacts</th>
<th>Limited external contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large customer base</td>
<td>Small customer base</td>
</tr>
<tr>
<td></td>
<td>Wide span of activities</td>
<td>Narrow span of activities</td>
</tr>
</tbody>
</table>
Table 2 – A comparison of the usefulness of quality management in SMEs

<table>
<thead>
<tr>
<th>Finding</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>QM in one of its various forms has no effect on small business performance</td>
<td>Chittenden 1998, Goh 1994, Rahman 2001a, Sitki 2012, Sun 2002</td>
</tr>
</tbody>
</table>

Appiah, et al. (2008) conducted a study of 200 small businesses in Ghana and found that QM had a significant positive impact on firm performance. Further, his findings suggest that QM improves organizational performance in both large and small organizations. A similar study was conducted with 141 SMEs in the Turkish textile industry that showed a strong positive relationship between the level of TQM implementation and organizational performance (Demirbag et al, 2006). Later that same year, another study of 500 SMEs in the Turkish textile industry found that there was a strong positive relationship between TQM practices and nonfinancial performance with only a weak relationship between TQM and financial performance (Demirbag et al. b, 2006). Eisen (1992) refutes the Demirbag et al. findings when he conducted a study of 338 SMEs in Australia that found that SMEs who implemented QM practices received higher financial performance. Nearly a decade later, a study was conducted with 500 SMEs in the United States that suggested those companies that invested in quality initiatives receive significant returns across a variety of measures both operational and financial (Beheshti, 2003). Although there is overwhelming evidence that QM does impact performance...
(see Table 1) it is not all positive. Sitki (2012) surveyed 255 SMEs in Turkey to investigate whether ISO certification affected performance. His study concluded that the result of achieving certification showed no statistical difference in terms of performance for the SMEs who responded. In the UK, Chittenden (1998) found that this may be due to the complexity of ISO 9000 and that many SMEs considered it inappropriate to the SME environment. Conversely, more recent studies in Ghana (Kwamega, 2015), Australia (O’Neil, 2016) and Spain (del Alonso-Almeida, 2015) reassert that QM practices do increase performance and result in positive outcomes.

Murphy (2016a) found that there were at least fifty-five studies conducted from sixteen countries around the world which implies that the application of QM to SMEs is of global interest. As stated earlier, that study was conducted from literature published from 1990 to 2014. Since that time, the findings suggest that interest in QM practices for SMEs is growing, narrowing on consensus and becoming more global. Table 3 shows a selection of at least seventy-three studies from twenty-six countries around the world in the past twenty-eight years (Table 3). Again, the clear majority (Table 2) of these findings suggest that QM is applicable to the SME environment and that performance improvement, both operational and financial, is likely to follow.
Table 3 – The growth of QM SME research since 2014 - Adapted from Murphy 2016.

NOTE: Bolded sources were added by the author.

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Country</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>(Ahire et al. 1996)</td>
<td>Vietnam</td>
<td>(Nguyen 2015)</td>
</tr>
<tr>
<td>USA &amp; Canada</td>
<td>(Briscoe et al. 2005; Murphy 2016a; Murphy 2016b)</td>
<td>Australia</td>
<td>(Eisen et al. 1992; Wiele and Brown 1998; Anderson and Sohal 1999; Husband 1999; Rahman 2001a, 2001b; Gadenne and Sharma 2009; Kumat et al. 2014; O'Neil 2016)</td>
</tr>
<tr>
<td>India</td>
<td>(Alamelu and Balasubramanian 2011; Majumdar 2016; Sinha 2016)</td>
<td>Turkey</td>
<td>(Demirbag et al. 2006a; Demirbag et al. 2006b; Sitki 2012)</td>
</tr>
<tr>
<td>Brazil</td>
<td>(Sousa-Mendes et al. 2016)</td>
<td>Finland</td>
<td>(Gunasekaran et al. 1996)</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>(Temtime and Solomon 2002)</td>
<td>Italy</td>
<td>(Azzone and Cainarca 1993)</td>
</tr>
</tbody>
</table>
Critical to Success Factors for SMEs:

As can be seen in table 1, there is overwhelming support for the idea of QM implementation into SMEs. However, that doesn’t mean the process will be quick, easy or necessarily guarantee positive results. Murphy (2016a) does state that SMEs should commit to QM and that business improvement seems certain to follow. Kumar (2011) states that following a process for SME QM engagement makes improvement more likely, with preparation pivotal to success. If one were to follow a process, logic would dictate that there would need to be a set of common critical to success factors (CSF) that could be measured to allow the organization to assess performance. There is debate as to what the CSF should be in an SME and if those factors should be hard (tools and systems) or soft (people) focused. Lewis (2006) synthesized literature from developing economies that indicated soft factors such as customer focus and customer satisfaction were frequently studied QM criteria. Quazi (1998) conducted a study of 41 SMEs in Singapore and found a set of seven CSF that proved to be beneficial in an SME.
environment. They include leadership, information and analysis, strategic planning, human resource utilization, management of process quality, quality results and customer satisfaction.

Two years later Yusof (1999) compared and contrasted at least five prominent studies of CSF in 1999. Strikingly, there was a large degree of commonality among the models, specifically top leadership commitment, supplier quality management, human resources management and training and education. Yusof (1999), who proposed his own unique model (Table 4), added systems and processes, continuous improvement systems, measurement and feedback, improvement tools and techniques, resources and work environment, and culture to the common elements to produce a list of ten factors.

Table 4 - A comparison of critical to success factors from prominent studies

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Management leadership</td>
<td>Leadership</td>
<td>Management leadership</td>
</tr>
<tr>
<td>Organization</td>
<td>Strategic planning</td>
<td>Continuous improvement system</td>
</tr>
<tr>
<td>Education and training</td>
<td>NA</td>
<td>Education and training</td>
</tr>
<tr>
<td>Quality in design</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Quality in suppliers</td>
<td>NA</td>
<td>Supplier quality management</td>
</tr>
<tr>
<td>Quality in process</td>
<td>Management of process quality</td>
<td>Systems and processes</td>
</tr>
<tr>
<td>Fact based management</td>
<td>Quality results</td>
<td>Measurement and feedback</td>
</tr>
<tr>
<td>Human resource management</td>
<td>Human resource utilization</td>
<td>Human resource management</td>
</tr>
</tbody>
</table>
Yusof (2000) conducted a study of his proposed CSF with UK automotive parts SMEs. He validated that the CSF enhanced QM in an SME and that the CSF for an SME were different from those of a large organization. This finding contrasts with Ahire et al. (1996) who conducted a similar study in the US and Canada in 1996. They found that QM did lead to better product quality and there were no operational differences attributable to firm size for TQM implementation and that both types of firms (SMEs and large organization) implement the elements of TQM equally effectively. Sila (2002) conducted a literature review of the TQM literature from 1989 to 2000 and found twenty-five TQM factors (CSF) that were most common across seventy-six studies. Once again leadership, customer satisfaction and employee involvement featured prominently. He suggested that other lesser known factors such as strategic quality planning, product and service design, communication, social responsibility and employee appraisal, rewards and recognition be considered for future research.

**Barriers to Implementation:**

If we are to accept that critical success factors are important to SME QM performance, we must be aware of what the common barriers to implementation may be. As Murphy
(2016a) stated, there has been research attention in this specific area. A study conducted in the US and Canada found that ISO implementation was more successful when management internalized ISO practices, reduced the behaviors that inhibit adoption and performed a readiness analysis (Briscoe et al., 1995). A major part of that analysis is to determine what the likely QM barriers could be. There seems to be widespread agreement that a lack of resources (human and financial), employee training and top management commitment are the most common barriers to implementation (Antony 2005, Mendes 2014, Kumar 2008, Valmohammadi 2011, Alamelu 2011, Anderson 1999, Antony 2008, Gadenne 2009, Hasson 2003, Kumar 2007, etc.). Representative of this type of work, Mendes and Lourenco (2014), conducted a study in Portugal that asked 95 manufacturing SMEs this very question. Their study highlighted seven different but common factors affecting quality programs. In no particular order:

1. Top management training education/training levels priorities
2. Costs and actual performance
3. Lack of support from external agents
4. Human resources overload
5. Aversion to change
6. Lack of resources
7. Culture and training (workforce)

In other cases, some SMEs can be compromised by the mechanistic and formalization of some of the improvement models that they see as adding bureaucracy (McAdam, 2000). For example, in the UK, SMEs struggled with accurately measuring and recording the quality costs which led the management team of these organizations to believe that TQM was not appropriate.
to the needs of small business (Goh, 1994).

Hu et al. (2015) examined the problem of barriers to QM by identifying both inhibitors and enablers to QM implementation. Hu and his team were particularly focused on Lean implementation in SMEs. The list of inhibitors included the previously mentioned lack of top management commitment, lack of resources and a lack of training. He also added to that list supplier and customer market forces such as SMEs lacking the market power to influence their network of suppliers to adopt Lean. Perhaps more beneficial to SMEs, Hu identified enablers that could make SMEs more competitive versus large organization in the adoption of QM. They include an owner’s long-term commitment, a cross functional workforce, high levels of teamwork and ease of communication.

Are QM Practices Universal?

From nearly the beginning of the American quality revolution in the 1980’s there has been the belief that the principles and practices of QM are universal in nature. This view has been propagated by the gurus of quality management which include Walter Deming (1986), Joseph Juran (1989) and Philip Crosby (1979) to name a few. For example, Juran (1989, p.3) stated that “All organizations can achieve superior results through the application of the universal methods to manage quality, which design, maintain, and continually improve the quality of goods and services.”

In his review Murphy (2016a) discussed evidence that QM could be more context related. Those contextual factors could include country factors ranging from leadership skills to national culture to government and could potentially affect QM implementation and outcomes (Murphy, 2016a). An article that was not included in Murphy’s review was a study conducted by Sousa and Voss (2001), in the UK that questioned the universality of QM and had evidence
that there were certain contextual factors, manufacturing strategy in this case, that affected the implementation of QM in SMEs. Aldowaisan and Youssef (2004) suggested the idea of a tailored framework that utilized an incremental approach to implementing QM, the ISO framework in this case, in small organizations. Assarlind and Gremyr (2016) seem to agree with that suggestion and conducted an interesting study in Sweden from 2009-2012 that found firm size among other factors was critical to QM adoption. The study found that SMEs often contend with scarce resources and as a result it could be beneficial to implement QM in a gradual manner rather than attempting to implement everything at once. These recent insights make a powerful argument that contextual factors should at least be considered when SMEs approach the implementation of QM.

The existing literature shows that there is now wide-spread agreement that QM is appropriate to the SME environment. This agreement is global and not constrained to any geographic area. There are several critical success factors (CSF) and barriers to QM implementation that should be considered by SMEs. It has also been determined that QM is not universal as previously thought but context dependent. One of these contextual factors is firm size. The challenge going forward for SMEs is how to best utilize what is known about the CSF and the associated barriers to maximize business performance. One possible answer to this question is to create a menu of all the factors (CSF, barriers, enablers and inhibitors) and allow the specific SME to choose among the factors that are most closely aligned with their goals and unique situation. From the existing research, a logical path forward could be to combine the work of Ghobadian and Gallear (1996) with the work of Yusof (1999), Hu (2015), Medes and Lourenco (2014) and Assarlind and Gremyr (2016). See Figure 1 for a visual representation. Further described, Figure 1 intends to:
1. Determine the strengths and weaknesses of SMEs in general
2. Determine the critical to success factors of SMEs in general
3. Consider the common barriers to implementation for commonly found in SMEs
4. Consider the enablers and inhibitors of SMEs
5. Determine the specific contextual factors likely to most affect the SME under study
6. Gradually implement QM based on the factors identified in steps 1-5

A reasonable quantity of the factors (3-5 for example) could be chosen for the team to focus their energies on with a specific goal of not overloading the team since a resource constraint is likely to take place. Reducing the number of factors that will be considered will save time and money (a key barrier for SMEs) and increase the probability for success since only a few and not all factors will be included in the model.
Figure 1 Contributing factors to QM in SMEs

The Current Study

Although there was a significant amount of agreement concerning the use of QM in the SME environment there were areas in the literature that offer opportunities for future research. The clear majority (48/73 = 66%) of the surveyed literature (N=73) are survey studies. Qualitative studies account for 22% (16/73) of this literature, and all of these qualitative studies are case studies. There is no experimental study identified that assisted in the evaluations of the effects of a quality improvement program, nor was there any action research study identified that could do the same. Given that many quality improvement programs have failed in the past, and in particular, their implementation in small SMEs are unstudied and unknown, therefore, it is important to conduct a qualitative action research
study to both observe the effects of quality improvement program and identify opportunities by which the program can be improved or customized to the needs of the implementing organization. See Figure 2.

Figure 2 – A comparison of research methods for QM SME research

An additional area that offered opportunities for future research was geography. Table 3 clearly shows that QM SME research is becoming more widespread and more global. The eighteen studies that were added since Murphy’s (2016a) publication attest to this growing interest. Strikingly, there seems to be relatively little research that is being conducted in the world’s largest economy, the United States. Figure 3 illustrates this discrepancy and shows that of the QM SME research that was considered in the article only thirteen percent originated in the United States. That means eighty-seven percent of the existing research has been conducted elsewhere. Therefore, an opportunity to conduct QM SME research in the United States is indicated.
This study will narrow these gaps by conducting a mixed methods action research project in the Unites States of a SME with the goal of building a quality management climate within their organization. The proposed research questions would be the following:

RQ: How did a SME build a quality management climate?

The value of this research is significant for both the academic and practitioner communities. For the academic community, there is the opportunity to add to the body of knowledge of SME QM research, to focus in a particular geographic area (the USA) and to use a research methodology (action research) that is underrepresented in the existing literature. For the practitioner, the benefits are perhaps greater. There is the opportunity to conduct research that could potentially result in a guide detailing how to implement QM in a SME. The guide could be especially useful when considering that SMEs make up 99.9% of American businesses and nearly 48% of the work force and that QM is known to increase business performance. As a note, this research was limited to a single company, however, the author believes that this

Figure 3 – The global reach of QM SME research from 1990-2017

The Global Reach of QM SME Research 1990-2017

UK Other USA Australia Canada Malaysia Turkey Portugal Spain India China Pakistan Ghana
limitation will be outweighed by the potential benefit, as there are currently no existing action research studies in this particular arena. A guide or a collection of best practices from one SME implementing QM could serve as a catalyst for other similar SMEs to join the quality movement and propel their organizations forward.
Research Method

Action Research

One approach to solve this problem would be to investigate the process of how a SME laid the foundations to build a climate of quality within an organization. In this instance, the researcher utilized the action research method. As described in the introduction, action research (AR) was first popularized by Kurt Lewin in the 1940’s to denote a creative approach toward social research which combined generation of theory with altering the social system through the researcher acting on or in the social system. The act itself is presented as a means of both adjusting the system and developing critical knowledge about it (Susman and Evered, 1978). AR aspires to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework (Rapoport, 1970).

Action research was chosen as the research method for a number of reasons. Lewin (1946) coined the term “action research” in 1946 and described the type of problems that would most be suited for this approach. Ideally, the situation would call for the team to answer questions about the current situation, the dangers that the team could or would face and most important of all what course of action that the team should take. It is an approach that has stood the test of time with organizations of all types and sizes adopting the model. Some of these organizations include civic groups, schools, businesses and hospitals to name a few. Gummesson (2000) provides an updated list of reasons that are particularly intriguing for practicing managers. Some of those reasons pertinent to this study include:
1. Action researchers take action

2. Action research always involves 2 goals: solve a problem and contribute to science

3. Action research is interactive

4. Action research aims at developing holistic understanding during a project and recognizing complexity

5. Action research is fundamentally about change

6. Action research requires an understanding of the ethical framework, values and norms within which it is used in a particular context

7. Action research can include all types of data gathering methods

8. Action research requires a breadth of pre-understanding of the business environment

For this action research project, the five-step action research cycle (ARC) first described by Susman and Evered (1978) and was used as a template. The steps include:

1. Diagnosing

2. Action Planning

3. Action Taking

4. Evaluating

5. Specified Learning

Figure 4 highlights the action research cycle steps for the two interventions in this study.
Figure 4 - Action Research Cycle (ARC)

Action Research Process and Outcomes

The sponsor organization was founded in 1966 and has spent over forty-five years designing and implementing cutting-edge solutions for the toughest communications challenges in the world. In addition to the U.S. military, its customers include foreign governments and
militaries across the globe. Additionally, the sponsor organization provides remote communication solutions to the commercial sector, including some of the world’s largest energy companies. It is a wholly owned subsidiary of a larger company and is the world leader in digital communications systems. These advanced communication systems use elements (such as water, vapor, dust or atmospheric variations) in the lowest level of the atmosphere to scatter a small portion of transmitted energy forward in a predictable manner. A point to point link that requires a terminal on each end and is capable of both transmitting and receiving signals is used to create a dependable, compact, and low cost communication solution. These systems are an ideal alternative to expensive satellite communication and can be deployed in the harshest locations.

**Intervention 1**

The research project follows the adapted five stage Action Research model described in Susman Evered (1978).

**Intervention 1: Step 1 - Diagnosing:**

This stage, which involves identifying or defining a problem in the organization, was performed through unstructured interviews with participants, a review of documented data and observation. The organization as a whole was not satisfied with the current state of the quality system and therefore desired a change to a new level of performance. The desire to change and common agreement that change was needed exemplified the unfreezing step. The participants consisted of members of the senior leadership team, individual contributors (engineers, assemblers, purchasing, program managers, etc.) and external stakeholders. The external stakeholders included customers, vendors and third-party auditors.

Approximately thirty interviews, data analysis and observations revealed that the
organization held an antiquated view of quality. The team operated in a quality control rather than quality assurance environment. This meant that focus was on product and defect identification rather than process and defect prevention. The tools used to collect the data followed by its analysis supported that conclusion.

Other common themes that emerged in the data collection phase was that there was a general feeling among the participants that collaboration and communication could and should be improved. Overall, the team operated in and the organizational structure allowed a ‘hero mentality’, where individual team members would go to great lengths to get the job done for the customer and were rewarded to do so. This type of behavior was done at the expense of process focus which is one of the hallmarks of an ISO 9001 company. According to the International Standard Organization, the non-governmental body responsible for creating the standard, ISO 9001 sets out the criteria for a quality management system. The standard provides guidance, tools and best practices that organizations of all sizes can use to ensure that their products and services consistently meet customer’s requirements and that quality is consistently improved (“ISO 9001:2015”, 2017). The organization was ‘ISO 9001 certified’. It did have a collection of processes, known internally as ISO processes, which were created and reviewed by the senior leadership team. However, a number of these processes were out dated. In the most recent third-party audit by National Quality Assurance (NQA) which was performed in April of 2015, there were four audit findings (three minor and one major) that threatened the company’s certification and the ISO certification was seen as an imperative by the company. Current and future contracts were predicated on certification. Based on this result, the team chose to build a climate of quality. According to Ostroff (2012), climate can be described as employees’ perceptions of what the organization is like in terms of practices, policies, procedures, routines and rewards.
Climate is often misinterpreted as culture, which can define why things happen in an organization. It deals with the ideologies and assumptions developed by the organization. ‘Climate’ was chosen as a focal point over the more popular ‘culture’ because it is more concrete and easily measured as compared to the more ambiguous ‘culture’. The perceptions of the employee’s attitude in regard to quality management at the organization were gathered primarily through unstructured interviews with the sources described previously. The interviews included questions regarding the policies, practices and results of the organization’s quality management system. The form of the unstructured interview varied in combination with both targeted questions as well as encouraged ‘free-thought’ conversation. This approach facilitated spontaneity which allowed questions to develop during the course of the interview, which reflected the interviewees' responses.

**Intervention 1: Step 2 - Action planning**

Action planning is the second stage of the action research cycle. It involves considering alternative approaches for solving a particular problem. The main problem the research team faced was how to build a climate of quality (COQ) in a SME. At the time of the study the company had roughly 80-110 employees with revenues ranging between $30-50-million. Those statistics qualify the organization as a small to medium business by most definitions (“Make sure you meet”, 2016). Resources are usually scarce in the small business environment and this situation was no different. In other words, the research team was tasked with building a climate of quality at the lowest possible cost. Although there are many definitions that describe how a company builds a climate of quality, the team relied on internal quality data, intuition and experience to create a solution that was unique to the situation in question. Ultimately, the organization chose to build the COQ on four pillars:
1. Top management support
   a. Quality will be seen as a priority by management, exhibited by words and actions

2. Collaboration
   a. Team will operate as a cohesive unit

3. Data centered decision making
   a. Decision making will be based on data
   b. Tools will be created to facilitate this process

4. Process focus
   a. Team’s work will be governed by processes
   b. It is everyone’s responsibility to follow or change processes

As discussed in the literature review, the four pillars are all key factors that can become enablers or inhibitors to the successful adoption of quality management in a SME. The critical step faced by the team was how to take advantage of the factors that were positively related to SMEs (top management support and collaboration) and how to best mitigate or minimize the impact of factors that were seen to be inhibitors (data based decision making and process focus).

**Intervention 1: Step 3 - Action Taking**

The third phase of the action research cycle is called intervention or action taking. In this phase, an action is selected and implemented. It is where the organization moves from the status quo to the desired state. Based on the data sources described previously the primary factors targeted for intervention were top management support, collaboration, data based decision making and process focus. Table 5 shows the four factors of quality management, the method used to express the factors and the result of the method used to express the factor. Each factor, method and result is expressed in more detail below.
Table 5 - Summary of the factors, methods and results of Intervention 1

<table>
<thead>
<tr>
<th>Factor</th>
<th>Method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Top Management Commitment</strong></td>
<td>Hired Director of Quality</td>
<td>Allocated resources.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Galvanized support across the organization</td>
</tr>
<tr>
<td><strong>Collaboration</strong></td>
<td>Daily cross-functional meeting</td>
<td>Opened lines of communication</td>
</tr>
<tr>
<td><strong>Data-based Decision-making</strong></td>
<td>Quality database</td>
<td>Centralized repository for analysis of quality related data</td>
</tr>
<tr>
<td><strong>Process Focus</strong></td>
<td>Committee formed to address issues</td>
<td>50% of the organizations governing policies were revised</td>
</tr>
</tbody>
</table>

**Top Management Support**

As discussed in the literature review, top management support is a critical to success factor in the implementation of quality management in a SME. Research indicates that it is often an inherent characteristic of a smaller organization versus a larger organization. Top management support was initially displayed by the SME in hiring a resource (Director of Quality) to lead the change effort within the organization and by allocating internal resources (members of the research team) to support the effort. The research team sought to exhibit top management support by having an email sent to the entire organization by the President of the company prior to the beginning of calendar year 2016. It read as follows:
“In order to grow, stay competitive and provide work class communications systems to customers around the world, we must embrace change and continuous improvement throughout the organization. Continuous improvement is not only a mandate of ISO 9001:2008, it is increasingly a customer expectation. Over decades, our customers and competitors have adopted many of the continuous improvement initiatives that begun during Japan’s post-war economic transformation, most famously implemented at Toyota. The Toyota production process became the model for others to follow. While this organization is not Toyota, many of the fundamental concepts and best practices can and should be implemented. Suffice to say, continuous improvement must become the culture within which we operate every day.”

With a new year upon us and as we move to a new facility, now is the time for change. As such, the Management Team and I have created a Continuous Improvement Committee (CIC) led by our Director of Quality. This cross-functional team will drive and direct continuous improvement initiatives aimed at making us a world class organization. However, none of this can happen without your active involvement. Each of you will have the opportunity to participate in Kaizen events (Japanese term for continuous improvement) focused on obtaining tangible results for the benefit of our current and future customers. We want our customers to know we want their business. They want to know their products are designed and built using best practices. The end-user, which is often the military, will know that our products in their possession are reliable and dependable. After-all, our products protect and save lives.
Please join me as we embark on this new venture. The days of “this is how we have always done it” are over. Each of you have the opportunity to help us grow the business, make this a better place to work and show our customers we are the industry leading provider of cutting edge communications systems in the world. I appreciate your support and look forward to a successful 2016.”

The result of the email was galvanized support for the overall quality improvement effort. Each employee now knew and understood that the projects that would be coming in the near future had the support of the senior leadership team. The email served as the catalyst for change within the organization. It prepared the organization for change and made it more likely that the team would encounter allies in the change effort rather than opposition.

**Collaboration**

The collaboration factor was increased through the use of a short daily meeting with the cross functional team that was responsible for getting the production work of the company done. These meetings generally lasted 30 minutes to an hour depending on the volume of issues discussed. Traditionally, the company had used a monthly program review meeting to resolve issues. These meetings usually lasted for 3-4 hours and covered all aspects of the programs that were currently under contract within the organization. Typical topics included financials, schedule adherence, customer concerns, supply chain issues or any other topic that could not be resolved at a lower level. It was run by the Vice President of Program Management (VP PMO) and attended by the senior staff and the pertinent Program Manager (PM) and Project Engineer (PE). All topics that needed resolution in a more expedited manner were addressed with
irregular ad hoc meetings that were topic specific. There were no regular meetings that addressed the concerns of the manufacturing floor.

To address this issue, the Vice President of Operations (VP OPS) suggested a daily meeting to discuss these types of issues. It would be cross-functional in nature and include representatives from Operations (which included manufacturing, supply chain, test), Engineering, Program Management Office (PMO) and Quality. Any issue that was seen to impede the progress of manufacturing or testing the product was discussed and resolved on the spot. If the issue could not be resolved on the spot an off-line meeting was scheduled with the interested parties.

Initially, these meeting were met with some skepticism. The most frequent compliant was that there was no time for an additional meeting and that a daily meeting would be repetitive with little to no added value. The short duration of the meetings and the rapid response to issues mostly alleviated these concerns. Traditionally, the organization had operated in a ‘functional fiefdom’ where each function was principally concerned with maximizing the performance of their particular function rather than working collaboratively to increase the performance of the overall organization. The research team reasoned that if representatives from the major functions in the company worked together on a continual basis and were encouraged to solve problems together, they would be less likely to blame other functions for internal deficiencies. Additionally, the daily meeting would create functional advocates for the collaborative problem-solving approach that could articulately speak to the merits of the approach to their functional colleagues. The success of this assumption would be measured in the total defects metric that would be reported by the Quality Assurance organization.
Data centered decision making

The transition to data-based decision making was more controversial than the first two factors. The organization used a paper based system to track and document all non-conformances or NC’s as they were commonly called. This included the following:

- Incoming non-conformances which the organization called material variance report or MVR’s,
- In process rejections called squawks, which was a term used by the US military to identify in process discrepancies
- Failure reports which were discrepancies found during the test phase
- Corrective action requests for any issues found that did not follow the released ISO processes

The research team evaluated several different data management systems including the creation of a ‘home-grown’ system. Ultimately, it was decided that the best overall value system would be the Quality Database (QDB) offered by West Coast Business Systems. The key advantages to the system were:

- Low cost
  - $1100 in total
- Ease of use
- Process focused
  - Followed the ISO 2015 guidelines
- All records could transition

The key disadvantages were:

- Limited analytics
Not customizable

The QDB was purchased in November of 2015, activated in February 2016, piloted in March of 2016 and the system went live in April 2016.

**Process focus**

In an effort to inculcate a process-based focus across the entire organization a process improvement team was formed. This effort was led by the Director of Quality and included representatives from all major departments. Each member was required to bring ideas to the team that could improve the organization’s performance. The team created a prioritization matrix to help focus attention on the most critical items. The matrix was a tool for potential projects that quantitatively measured how often an issue occurred, the impact the issue had on the organization and the feasibility that an agreeable solution could be created in a timely fashion. These items were scored on a basis of 1-10 and then multiplied to create a project score. The highest scoring items would be worked first. The highest scoring items were:

1. ISO processes
2. Non-conformance Database
3. Supplier Management

As a result of the ranking, the processes were reviewed based on the impact of each process and sixteen of the thirty-two ISO processes were updated over calendar year 2016.

**Intervention 1: Step 4 - Evaluating**

The evaluation phase involves studying the consequence of the actions taken. The researcher conducted informal interviews with the stakeholders described in the diagnosing section. Of specific concern were the actual users of the new systems and the tools put in place. Once again, the pertinent records were reviewed, and the researcher noted
observations based on experience.

The primary metric used to gauge the success or failure of implementing a climate of quality was a cost of poor quality system (CoPQ). It measured the total failure cost which was the summation of the internal failures plus the external failures. Internal failures consisted of non-conformances (NC’s), corrective action requests (CAR’s) and engineering change orders (ECO’s). The NC’s were caused by the organization itself or by vendors. Each individual failure was assigned a cost based on the actual cost to process the material and records related to the failure. The team also used publicly available data related to similar failures in similar industries and the experience of the team itself to create the cost estimates. Table 6 shows the estimates and final calculated costs. External failures were measured by the cost of warrantied items. That data was given to the team by the finance organization. The quantitative performance of the organization is shown below:

**Table 6 – Results from Intervention 1**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Cost Per Record ($)</th>
<th>CY15 (Pre)</th>
<th>CY16 (Post)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonconformance</td>
<td>800</td>
<td>1,171,200</td>
<td>228,800</td>
<td>80% Reduction</td>
</tr>
<tr>
<td>Corrective Action Request</td>
<td>1200</td>
<td>63,600</td>
<td>44,400</td>
<td></td>
</tr>
<tr>
<td>Engineering Change Order</td>
<td>1800</td>
<td>824,000</td>
<td>685,800</td>
<td></td>
</tr>
</tbody>
</table>
Table 6 (Continued)

<table>
<thead>
<tr>
<th></th>
<th>Warranty</th>
<th>CoPQ</th>
<th>Volume (receipts)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>--</td>
<td>245,152</td>
<td>43,537</td>
</tr>
<tr>
<td></td>
<td>--</td>
<td>2,304,152</td>
<td>1,002,537</td>
</tr>
<tr>
<td></td>
<td>2965</td>
<td>2732</td>
<td>7.9% Decrease</td>
</tr>
</tbody>
</table>

The data clearly showed the organization made progress towards building a climate of quality as measured by a number of records including nonconformances, corrective action requests and cost of poor quality. The largest improvement in terms of dollars was the decrease in cost related to internal failures. Informal interviews and data analysis indicated that these results were directly related to the changes made as a result of the project (Table 6). Specifically, the team felt there was better communication between and among the functional organizations. The communication was fostered by the daily morning meetings and centered largely around the failure data provided by the QDB. Schedule and cost considerations were also discussed but predominantly with regards to how they affected manufacturing. It was commonly reported that when an issue was encountered, an employee would first ask “what does the process say”. This is in contrast to the initial interviews recorded in the “diagnosing” step where employees would routinely utilize the “hero mentality” and go to great lengths to “make it work” with little regard to the released processes. The renewed focus on quality was driven in large part by the apparent increase in attention for quality that was shown by the senior leadership team. A common refrain from the employees of the organization was, “it’s getting better” and “we’re not world class yet, but we are on the path”. The research team noticed that the mood of the organization seemed
to change. People were more positive and the employees were more focused on the issue at hand and how to solve the problem in a manner where reoccurrence was less likely to occur.

An interesting problem that the research team encountered was tool usage. For example, corrective action requests (CAR’s) are a tool that organizations use to identify the root cause of an issue, implement a corrective action to bring the material back into compliance and a preventative action to reduce the likelihood of reoccurrence. The research team discovered that CAR’s were seen as punitive by most members of the sponsor organization. Team members who received CAR’s as a result of operating outside of the ISO processes took the assignment of a CAR as a personal attack and in rare cases could become quite emotional. As a result, it was noted that the quality team did not effectively use CAR’s to resolve issues internally with colleagues or externally with vendors. Consequently, there were little documented evidence of these problems and more importantly the resolution for the specific item. Calendar year’s 2015 and 2016 show the transition that took place and a significant increase in CAR usage which led to improvement. Interviews suggested that as collaboration increased, the team felt comfortable with constructive criticism and the need to document issues to prevent re-occurrence which led to an increase in CAR’s.

**Intervention 1: Step 5 - Specified Learning**

The last phase, specified learning, highlights what was learned during the action research project or in this case the first iteration of the intervention phase. The leadership team at the sponsor company identified that quality was an area that was rife for improvement. An improvement team was formed with the goal to build a climate of quality at the lowest possible budget due to constraints found in many SME. This climate of quality was built on the pillars of:

1. Top management support
2. Collaboration 

3. Data centered decision making 

4. Process focus 

Top management support was galvanized through an email from the President to all employees in the company. As a result, all lower level leaders communicated the desire to get better in both actions and words. This effort was reinforced by a relentless focus on process improvement that actively sought the input from the functions that were most closely involved in performing the task under study. The collaboration of individual team members was problem focused instead of people focused and used the data provided by the new quality database to make decisions. Utilizing this approach, the organization was able to save ~$1,300,000 by eliminating non-conformances across the board which resulted in a measured 56% improvement.

The concern the organization now faced was the challenge of consistency; how to lock in that improvement and not allow regression to the previous level of performance. Lewin (1947) described this step of the change process as “refreezing” once the organization reached the new and desired level of performance. He suggested that organizations can ‘lock-in’ this performance through changing processes and retraining of the work force. A critical element related to this step is a robust training system that can accurately track the training requirements and performance of individual employees. After a thorough review of the current training system and associated records used at the sponsor organization it was determined that there was a definitive need to overhaul the training system and requirements. This realization informed the next step of the action research project and directly led to Intervention 2, the second process cycle.
During the time of this study there were a number of items that had the potential to negatively impact the project. For example, business was down in calendar year 2015, resulting in layoffs. Business improved during calendar year 2016 but not back to calendar year 2015 levels. As a result, hiring of personnel resumed in 2016, however the total headcount still remained lower than at the peak prior to the downturn. Ultimately these issues focused the organization on immediate improvement which can be seen in the final results.

**Intervention 2**

Intervention 2, like Intervention 1, followed the adapted five stage action research model described in Susman Evered (1978).

**Intervention 2: Step 1 - Diagnosing**

Despite the success of Intervention 1 a need was identified that resulted in Intervention 2. Specifically, the training process and associated documentation for that process was felt to be lacking in the sponsor organization. The organization felt that they had made great strides in terms of building a quality climate and the quantitative results supported that opinion. However, the move to a new level of performance required a significant amount of change. To ensure that the change was digested by the group and the new level of performance became the status quo, a robust training process was absolutely essential according to the leadership team.

In an effort to validate the general feeling among the team the training records were examined. As described previously, the sponsor organization’s quality system was governed by thirty-two ISO processes. During phase 1 of the project, sixteen of the thirty-two processes were revised. Interviews with the team members indicated that the common thought among the group was that each of the thirty-two processes was retrained on an annual basis. Examination of all thirty-two of the processes showed that only two of the processes (Foreign Object Debris
(FOD) and Electrostatic Discharge (ESD) called for annual refresher training. The other thirty did not specify any form of retraining. If a process was updated or changed in any way, it was the responsibility of the Quality Assurance organization to retrain the team on that specific process. The evidence that the training had actually taken place was a hard copy form that listed a description of the training, the Quality Management System (QMS) element, the date and the signature of the employee and the trainer. For example, if one process was trained to 30 people, the process consisted of each form being manually filled out by the employee with the data provided. The data could be and was often inconsistent. The QMS element was not required (it was optional as indicated on the form) and not often included. The descriptions varied widely, and the trainer was required to sign each form. Once the forms were completed, the trainer would take the forms to the Human Resources (HR) Manager. HR would then manually file each record into the employees’ folder. The result of this process was a general sense of confusion. Records could be and often were misplaced by either the trainer or HR. Assuming that the record was filed, it was difficult to analyze the records for conformance to policy and to determine which employee had received what training or what was required in the near future.

The research team began the process of addressing this issue with expanding the research team. The newly hired Director of HR was included because she was directly responsible for this process. Additionally, the IT Manager was added to explore potential automated solutions for this issue.

**Intervention 2: Step 2 - Action Planning**

An automated solution was determined to be a key objective for the new training system. In addition to the time saved from processing the forms, there would likely be
increased utility the team reasoned. The goal of the new system would be to provide point and click access for each employees’ training record. A critical part of that step would require that the team know exactly what training was required for each employee. Data analysis showed that the sponsor organization did currently have a training matrix which was an attachment to the current HR process. Informal interviews indicated that it was commonly thought to be inadequate within the organization. Employees felt that the training could be more detailed and cover a wider range of responsibilities. The current matrix included the specific ISO process and the function that needed training. There was no delineation for different responsibilities within the function. For example, the engineering function had the same training requirements for all members of the engineering team. Although, the team consisted of electrical engineers, mechanical engineers, project engineers, R&D engineers, computer engineers, draftsman etc the training requirements were the same. Based on these and similar comments from multiple functions throughout the organization, the research team prioritized adding flexibility to the matrix that would capture the unique responsibilities for each employee’s specific role. The QA team would work in tandem with the Humane Resource Department (HR) to build a more comprehensive training matrix. Once the matrix was created, the IT Manager would use that input as the basis for the new automated system.

**Intervention 2: Step 3 - Action Taking**

The first step of the Action Taking process was to define the specific training requirements for all employees. The current process outlined the training module requirements. As discussed in the previous section, the team discovered that the level of training was less than the organization needed. In addition, the amount of annual retraining was increased. The current process required all employees to be retrained annually on five
processes. They were the electrostatic discharge (ESD), foreign object debris (FOD), and business continuity plan (BCP). Two additional processes were mandated by corporate for annual review and they were the Foreign Corrupt Practices Act (FCPA) and export control processes. While these processes were important to how the business was run, they were not representative of exactly how the products and services that the sponsor organization were produced. For that reason, the additional processes of engineering, production control, control of non-conforming product and management information systems or information technology were added to the annual training requirements. Overall, it was an increase in annual training of 80%. In addition, control of the training portion of the ISO processes were transitioned from the HR function to quality. While quality previously was responsible for annually auditing the HR process which included the training requirements, the senior leadership team wanted to keep a closer eye on the maintenance of the training function. Quality would now report monthly on what training had taken place and what was upcoming for the next month. This action included making sure that the appropriate employees were trained at the appropriate time. Quality would collaborate with the process owner for each ISO process.

In an effort to streamline the training requirements matrix a training database was developed. The IT Manager based the design of the training database on the requirements laid out in the HR training matrix. The Database was designed to forecast employee training requirements, capture particular training session details, and maintain employee training records. The system categorized required training by both job position and functional role. It also provided administrative reports for all employee records. Automated scheduling was based on course type and course frequency. The front end, or graphical user interface (GUI), of the system was programed in the language of C Sharp. The back end or data collection and
storage of the system was programmed in the language of SQL. When a user needed to access training related data, he would submit the parameters via the GUI and the system would query the back end for the specific data needed and report the results.

**Intervention 2: Step 4 - Evaluating**

Prior to the evaluation of the solution, the management committee (MC) of the organization were required to review and sign off on the proposed changes. The MC reviewed the updated HR process and training matrix the last week of April 2018. Training to the new processes began the first week of May 2018. The team based the success or failure of the training on direct observations, unstructured interviews with the employees and the occurrence of non-conformances (NC’s). The NC’s would be compared on a quarter versus quarter basis. The idea was that the team could compare February through April 2018 versus May through July 2018 (i.e. prior to the training and after the training). The collected data is shown in Table 7. As can be seen below there was a significant decrease in the total amount of NC’s. The data collected shows that there was an overall 60% decrease in the amount of NC’s over the measured time period. Interestingly, there was an increase in volume of 36% which suggests that the improvement was not affected by volume. The quantitative results exceeded the expectations of all stakeholders.

The interviews and observations collected during this section were aided by the presence of a third-party auditor. As discussed earlier, the sponsor company was ISO 9001 certified to the 2008 standard. The transition audit to the 2015 standard occurred during the evaluation phase of Intervention 2, specifically the audit took place for three and half days in early May 2018. This allowed members of the research team additional (and unbiased) insight into the company’s current performance. The auditor assessed the entire quality management system which included
the new training database. In large part, he was impressed and stated “he could tell that much work had been done to improve the quality management system”. He reviewed randomly selected training records of employees and found no errors or omissions. The employees themselves indicated that the training tool made it much easier for individual team members and their managers to access and display their training needs and recent performance (e.g. what training they had recently received). Overall, the team determined that this was a major improvement over the last system.

**Intervention 2: Step 5 - Specifying Learning**

As described in Intervention 1, the specifying learning section describes what was learned during the action research cycle. For Intervention 2, the data suggests that the improvement gains can be locked in with an effective training or retraining program. The improvement that was seen in Intervention 1 was frozen at the new level of performance with the aid of the new training database that allowed both employees and managers to accurately and easily access and display their training needs. As a consideration for future improvement, the team discussed the possibility of further automating the training process. An example would be to video record particularly difficult manufacturing operations that could be individually recalled by operators on an as needed basis.
<table>
<thead>
<tr>
<th>Measure</th>
<th>Cost Per Record ($)</th>
<th>QRT 1 (Pre)</th>
<th>QRT 2 (Post)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-conformance</td>
<td>800</td>
<td>52,000</td>
<td>20,800</td>
<td>60% improvement</td>
</tr>
<tr>
<td>Volume (Receipts)</td>
<td>NA</td>
<td>1,864</td>
<td>2,333</td>
<td>36% increase</td>
</tr>
</tbody>
</table>
Discussion

The goal of this dissertation project was to explore how one SME built a quality management climate. It was influenced by the work of Bishop (2018), Aldowaisan and Youssef (2006), Ghobadian and Gallear (1996), Yusof (1999), Hu (2015) and Medes and Lourenco (2014). In other words, this project attempted to characterize how one SME executed the following:

1. Determined the strengths and weaknesses of SMEs in general
2. Determined the Critical Success Factor (CSF) of SMEs in general
3. Considered the common barriers to implementation commonly found in SMEs
4. Considered the enablers and inhibitors of SMEs
5. Determined the specific contextual factors likely to most affect the SME under study
6. Gradually implemented a Quality Management (QM) climate based on the factors identified in steps 1-5

This study used the action research method to exemplify how the change process occurred in a real-world application. The results from this project show that the organization was indeed able to build a quality climate as measured by the total defect count and the reduced cost of poor quality. The remaining portion of the discussion section will be divided into four parts as follows:

- Unexpected findings
- Generalizability
- Limitations of the Research
Implications for Practice

Unexpected Findings:

The organization chose four factors to focus on as a foundation for the improvement effort. Two of the factors (top management commitment and collaboration) were commonly found to favor SMEs over larger organizations and the other two factors (data centered decision making and process focus) were ordinarily found to be less common in SMEs as compared to their larger counterparts. The research team reasoned that a balanced approach among the factors, (i.e. two that were favorable among SMEs and two that would need attention) would likely lead to a positive outcome while not overwhelming the limited resources of the team. The unexpected finding was that there were two factors for each case, however, they were not the factors that the team had originally intended. Top management support and data centered decision making was adopted by the organization with enthusiasm. Collaboration and process focus were adopted with some trepidation; however, they were both eventually adopted. The difficulty in establishing collaboration was unexpected primarily because it was supported by the literature as being more naturally found in smaller organizations.

One possible explanation for this occurrence could have been based on the repeated efforts by upper management to improve collaboration which met with failure. Consequently, the team members were anchored to those past efforts. It is not unusual that as improvement initiatives progress, the initial enthusiasm lessens over time and team members regress into their previous behavior. The research team opposed this natural tendency with constant communication. As described in Intervention 1, the collaboration factor was targeted for improvement with the use of a daily meeting. Individual contributors from various functions across the organization found this venue helpful when it came to ‘raising the flag’ for production
issues and getting problems solved in an expedited manner. Management commented that this tendency resulted in the team being on ‘the same page’ in regard to issues that were of interest to senior management. Previously, the organization was forced to scramble to find solutions when some members of the senior leadership team conducted informal interviews with members of the lower level production team. As a result of the collaborative daily meetings, this type of issue was greatly reduced although it was not eliminated.

The other unanticipated factor was that data centered decision making would be adopted as quickly as it was. Initially, there was skepticism especially from the rank and file members of the operations test team. This was mainly due to unease with test team members not understanding how the proposed change would benefit them. The research team spent significant time and effort to develop and deliver training presentations on how to use the new system and what to do when questions did inevitably arise. After resolving the initial resistance, the operations test team and organization as a whole have eagerly adopted the Quality Data Base (QDB) which serves as the central repository for all collected failure data. One of the elements that eased the adoption of the QDB was its incremental approach. Initially, the QDB was only used for failures found within the factory (non-conformances found at receiving inspection, on the manufacturing floor, in shipping, etc.). As the comfort with the new system grew additional capability was added. For example, the corrective action system was implemented approximately three months after the introduction of the QDB. The internal audit system followed, then special projects and eventually risk analysis functionality. Comments from team members have included that failure data was more easily accessible and reliable. Management commented that trends were more easily identifiable, and that information increased positive communication with vendors and customers. The reliance on the QDB as the central point for all
defect data reinforced the need for a robust training system that directly led to Intervention 2.

As described in Intervention 2, the team recognized the need for a more robust training system after Intervention 1, specifically the ability to accurately track what training was needed for each employee and what training had occurred or was about to come due. The team built and implemented a new training database that met these needs with the result of approximately a 60% reduction of NCs or recorded defects which exceeded the expectations of the sponsor company and research team. The team originally believed that due to the renewed focus on training that there would be an initial increase in NC’s that would be followed by a gradual decline of NC’s. The team reasoned that the end result would be an overall reduction in the amount of NC’s recorded. The actual result was an immediate and sharp decline in the number of NC’s recorded. While the team anticipated that progress would be made, and the total defect count would be reduced, the research team was surprised by the magnitude of the improvement for both Intervention 1 (approximately 80% reduction in NC’s) and Intervention 2 (approximately 60% reduction in NC’s).

At first, the team thought that this result may be related to product volume and it did have a minimal impact for Intervention 1. Product volume was measured in monthly material receipts as recorded by the organization’s Enterprise Resource Planning (ERP) tool. For calendar year 2015 there was a total volume of 2965 receipts. For calendar year 2016 there was a total of 2732 receipts which corresponded to an approximately 7.9% decline in volume versus an approximately 80% improvement (reduction) in NC’s. Intervention 2 did not appear to be impacted by volume. As described previously, Intervention 2 used a quarter (three months prior to training) versus quarter (three months after training) measurement to gauge performance. There was a 36% increase in the amount of material received by the organization and a 60%
reduction in non-conformances.

**Generalizability:**

The generalizability of the findings falls into two major categories which are:

- Large organizations vs. SMEs
- Industry

As mentioned previously, there are many differences between a large organization and small to medium sized enterprise (SME). A list of some of the major differences is laid out in table 1. The primary purpose of this study has been to show that the opportunity to build a climate of quality is not an inherent difference among large organizations and SMEs. However, there are certain organizational, procedural and systematic differences than can make it easier or more difficult for an organization to achieve a quality management climate. A distinct focus on these factors, particularly, which factors aide or impede the organizations progress towards it desired goal must be considered. For example, top management support is vital for any improvement project regardless of firm size. It is essential that the organization’s leadership ‘buys into’ the improvement effort and actively supports that effort by allocating the necessary resources (time, material, expertise, etc.) to increase the probability of success. Both SMEs and large organizations are equally capable of showing top management support.

The sponsor organization is this project was primarily an engineering and manufacturing organization. Are the results experienced in this project only applicable to manufacturing organizations? Are other industries, such as service organizations, exempt from these findings? There is truth in the assertion that quality management was born in a manufacturing environment. However, there has recently been intense interest in transferring the positive benefits originally seen on the manufacturing floor into the ‘back rooms’ of organizations (i.e.
those functions traditionally viewed as being more service oriented such as Human Resources, Finance or Marketing among others). In fact, there is an entire division in the American Society of Quality (ASQ) dedicated to promoting the benefits of quality management in service organizations (“What We Do”, 2018). Although the sponsor organization was a manufacturing firm, the interventions used in the action research cycle could have just as easily been applied to a service organization. The results may not have been as dramatic but any organization that has top management support, collaboration among the various teams and departments, used data to make decisions instead of feelings and focused on the process of building their product or service will almost certainly see both operational and financial improvement.

The hospitality industry, for example, is primarily thought of as a service industry. The same factors used in this study of a manufacturing environment could be used to increase performance in a hotel. For example, if the hotel defined increased performance as return visits the application of the four factors may look something like the following:

- **Top management support** - the leadership team determines the goal to increase return visits and allocates the necessary resources for a cross-functional team to study the problem
- **Data based decision making** - the team develops a survey to get data from customers who are repeat patrons. An additional survey is used to get data from customers who are not satisfied and therefore not repeat customers.
- **Collaboration** – the team analyzes the data and collectively develop strategies that are likely to increase repeat customer visits.
- **Process focus** - the team develops operational processes that based on the information gleaned from the previous steps
Limitations of the Research:

The limitations of this study were that it only took place in one organization. As such, it is difficult to generalize the results of the project because only one organization and one industry was studied. However, the benefit of studying one organization is the depth at which the organization can be studied which was a goal of this dissertation project.

Implications for Practice:

The major takeaway from this project is that any organization, of any size or any industry can increase the quality climate of the organization by intensely focusing on a minimal number of high impact factors. The number of factors is important especially in the small to medium enterprise (SME) world because one of the primary inhibitors of quality management adoption has been the deluge of information, practices, methodologies or factors that some SMEs may experience when first beginning the quality management journey. Other factors may be important, and future research projects should explore that topic, but an organization is sure to experience some measure of improved operational and financial success if the improvement project is supported by top management, uses data to make decisions, collaborates cross functionally and is process focused.
Future Research

As a result of this study, three potential future research projects may be of interest.

1. Broaden the scope of this project and conduct this type of project for a larger number of SMEs which would generate a broader data range to evaluate.
2. Validate that the factors chosen for this project are indeed the most impactful factors for a SME through the use of a survey. Could there be other factors that are potentially more impactful?
3. How can a SME sustain a quality management climate?
Conclusions

The focus of this project was to answer the question of how a small to medium sized enterprise (SME) built a quality management climate. It explored the strengths and weaknesses of SMEs in general, considered critical to success factors as well as common barriers to implementation. The project reflected on both potential enablers and inhibitors and the contextual factors for such an operation. A quality management climate was gradually implemented with the focus on the four key factors of top management commitment, collaboration, data centered decision-making and a process focus. It used Lewin’s action research method as the research methodology. In Intervention 1 the project demonstrated that a significant financial improvement could be made using tools that exhibited the four key factors. However, the team discovered that when a substantial change takes place a robust training system is needed to ensure that the change takes hold and behavior does not regress. The design and implementation of the improved training system was the focus of Intervention two. Ultimately, both interventions resulted in increased performance for the organization and improved the quality management climate.

The limitations of this study were that it only took place in one organization. However, the research team does believe that the findings from this project could be generalizable for a number of organizations. More succinctly, if SMEs focused on the factors of top management commitment, collaboration, data centered decision-making and process focus then some measure of operational or financial improvement is likely to follow. However, the results may not be as significant as noted in these findings.
References


*Muma Business Review*, (In Process)


Appendix: IRB Approval

June 25, 2018

Desmond Bishop
Muma College of Business
Tampa, FL 33612

RE: Not Human Subjects Research Determination
IRB#: Pro00035461
Title: How to Build a Climate of Quality in a Small to Medium Enterprise: An Action Research Project

Dear Mr. Bishop:

The Institutional Review Board (IRB) has reviewed your application. The activities presented in the application involve analysis of preexisting de-identified data. As such, the activities do not meet the definition of human subject research under USF IRB policy, and USF IRB approval and oversight are therefore not required.

While not requiring USF IRB approval and oversight, your study activities should be conducted in a manner that is consistent with the ethical principles of your profession. If the scope of your project changes in the future, please contact the IRB for further guidance.

If you will be obtaining consent to conduct your study activities, please remove any references to "research" and do not include the assigned Protocol Number or USF IRB contact information.

If your study activities involve collection or use of health information, please note that there may be requirements under the HIPAA Privacy Rule that apply. For further information, please contact a HIPAA Program administrator at (813) 974-5638.

Sincerely,

Kristen Salomon, Ph.D., Vice Chairperson
USF Institutional Review Board