SUSTAINABILITY ISSUE OF THE TOTAL QUALITY MANAGEMENT (TQM) SYSTEM
IN THE MANUFACTURING INDUSTRY

by

Jesus A. Guillergan

_______________________

Dissertation
Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Business Administration

_______________________

Liberty University, School of Business

December 2021
Abstract

The purpose of this research is to understand the sustainability issue of total quality management (TQM) and its effects in the manufacturing industry. Having exploratory and descriptive objectives, this research used a flexible design single case study on a water treatment company in the southeastern United States to facilitate the examination of the phenomenon using real-life, present-day context, and multiple perspectives from participants. The single bounded case study collected and integrated many forms of qualitative data ranging from interviews, observations, and quality-related archived documents to answer the research questions. The results revealed that failure in sustaining the quality system in place resulted in high product defects, leading to excessive reject costs and loss in productivity. The analysis of the data showed that the firmness of TQM methodology, orientation of the organization culture, type of leadership style, and highly competitive strategies and operational targets affected the sustainment of TQM in the site. The single case study is limited to the understanding of TQM sustainability challenges in the manufacturing industry and the findings will not be generalizable to other business groups or sectors in the same context. The future study could focus on a broader field of prevailing conflicts between opposing objectives, logics, interests, and missions within one multinational organization or within its line companies. This research aims to contribute to the understanding of establishing alignment and coherence of TQM practices to the organizational strategic goals and objectives to improve overall performance with significant value for customer focus and continuous improvement.

Key words: sustainability, Total Quality Management, system, manufacturing
SUSTAINABILITY ISSUE OF THE TOTAL QUALITY MANAGEMENT (TQM) SYSTEM IN THE MANUFACTURING INDUSTRY

by

Jesus A. Guillergan

Dissertation

Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Liberty University, School of Business

December 2021

Approvals

_________________________________________  _______________________
Jesus A. Guillergan, Doctoral Candidate  Date

_________________________________________  _______________________
Goodson K. Mensah, Ph.D., Dissertation Chair  Date

_________________________________________  _______________________
David Duby, Ph.D., Committee Member  Date

_________________________________________  _______________________
Edward M. Moore, Ph.D., Director of Doctoral Programs  Date
Dedication

This research is dedicated to my family, friends, and co-workers. I hope to walk beside you as an exemplary example.
Acknowledgments

I would like to acknowledge the support given by my advisory and analysis committee, Dr. Goodson K. Mensah, Dr. David Duby, and Dr. Nicoles Lowes for their valuable support and time. I am particularly grateful for the assistance provided by my Dissertation Chair, Dr. Goodson K. Mensah, for his guidance and recommendations in refining my research. My time with Liberty University during my dissertation was very fruitful and productive.

I would like to express my deepest appreciation to all of the company’s site managers, support personnel, and participants of my research. All your input, perspectives, and knowledge I gained during the study were unconventional, ground-breaking, and priceless. I take all these lessons learned from all of you to provide focus in helping make our processes more reflexive and dynamic while serving our strategic goals and objectives.

My heartfelt gratitude to my family who traveled with me throughout this DBA journey. To my beautiful daughters, Jermaine, Jianne, and Jamie: I promise I will find more time to cook good soup for all of you—especially for Jermaine, who has been cursed to proofread my papers since my MBA years. To my lovely wife Jewel: you are always my inspiration and my rock. For 37 years, you kept reminding me that what lies ahead of me is nothing compared to what is inside me; you are that key component inside me. It has always been you, all this time, that kept me going.
# Table of Contents

Abstract ........................................................................................................................................... ii

Approvals .......................................................................................................................................... iii

Dedication ........................................................................................................................................ iv

Acknowledgments .......................................................................................................................... v

List of Tables ..................................................................................................................................... xi

List of Figures .................................................................................................................................... xii

Section 1, Foundation of the Study ................................................................................................ 1

  Background of the Problem ............................................................................................................. 2

  Problem Statement .......................................................................................................................... 4

  Purpose Statement .......................................................................................................................... 4

  Research Questions ......................................................................................................................... 5

  Nature of the Study .......................................................................................................................... 8

    Discussion of Research Paradigms ................................................................................................. 9

    Discussion of Design ...................................................................................................................... 10

    Discussion of Method .................................................................................................................... 12

    Discussion of Triangulation ........................................................................................................... 15

    Summary of the Nature of the Study. ............................................................................................ 17

Conceptual Framework ..................................................................................................................... 18

  Framework Diagram ....................................................................................................................... 19

  Concepts .......................................................................................................................................... 21

  Theories .......................................................................................................................................... 23

  Actors .............................................................................................................................................. 24
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructs</td>
<td>25</td>
</tr>
<tr>
<td>Relationships between Concepts, Theories, Actors, and Constructs</td>
<td>27</td>
</tr>
<tr>
<td>Summary of the Research Framework</td>
<td>29</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>31</td>
</tr>
<tr>
<td>Assumptions, Limitations, Delimitations</td>
<td>34</td>
</tr>
<tr>
<td>Assumptions</td>
<td>35</td>
</tr>
<tr>
<td>Limitations</td>
<td>36</td>
</tr>
<tr>
<td>Delimitations</td>
<td>37</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>37</td>
</tr>
<tr>
<td>Reduction of Gaps in the Literature</td>
<td>38</td>
</tr>
<tr>
<td>Implications for Biblical Integration</td>
<td>39</td>
</tr>
<tr>
<td>Benefit to Business Practice and Relationship to Cognate</td>
<td>41</td>
</tr>
<tr>
<td>Summary of the Significance of the Study</td>
<td>42</td>
</tr>
<tr>
<td>A Review of the Professional and Academic Literature</td>
<td>43</td>
</tr>
<tr>
<td>Business Practices</td>
<td>44</td>
</tr>
<tr>
<td>The Problem</td>
<td>48</td>
</tr>
<tr>
<td>Concepts</td>
<td>53</td>
</tr>
<tr>
<td>Theories</td>
<td>57</td>
</tr>
<tr>
<td>Constructs</td>
<td>59</td>
</tr>
<tr>
<td>Related Studies</td>
<td>63</td>
</tr>
<tr>
<td>Anticipated and Discovered Themes</td>
<td>72</td>
</tr>
<tr>
<td>Summary of the Literature Review</td>
<td>83</td>
</tr>
<tr>
<td>Summary of Section 1 and Transition</td>
<td>84</td>
</tr>
</tbody>
</table>
Section 2: The Project................................................................................................................87

Purpose Statement....................................................................................................................90

Role of the Researcher.............................................................................................................91

Actions the Researcher Will Take to Conduct the Study .......................................................92

Discussion of Bracketing to Avoid Personal Bias .................................................................94

Summary of the Role of Researcher.........................................................................................95

Research Methodology ..........................................................................................................96

Discussion of Flexible Design ................................................................................................97

Discussion of Chosen Method for the Study .........................................................................98

Discussion of Methods for Triangulation ............................................................................99

Summary of Research Methodology ......................................................................................101

Participants...........................................................................................................................102

Population and Sampling ....................................................................................................104

Discussion of Population ......................................................................................................105

Discussion of Sampling ..........................................................................................................107

Summary of Population and Sampling ..................................................................................114

Data Collection & Organization ...........................................................................................116

Data Collection Plan ............................................................................................................117

Instruments............................................................................................................................120

Data Organization Plan .........................................................................................................126

Summary of Data Collection & Organization ......................................................................128

Data Analysis ........................................................................................................................130

Emergent Ideas......................................................................................................................131
Coding Themes ........................................................................................................... 132
Interpretations ......................................................................................................... 134
Data Representation .................................................................................................. 135
Analysis for Triangulation ....................................................................................... 136
Use of Leading Qualitative Analysis Software ....................................................... 138
Summary of Data Analysis ......................................................................................... 139
Reliability and Validity .............................................................................................. 141
Reliability ................................................................................................................... 143
Validity ...................................................................................................................... 145
Bracketing .................................................................................................................. 147
Summary of Reliability and Validity .......................................................................... 148
Summary of Section 2 and Transition .................................................................... 150
Conclusion of the Research Proposal ....................................................................... 152
Section 3: Application to Professional Practice and Implications for Change ........ 154
Overview of the Study ............................................................................................... 155
Presentation of the Findings ...................................................................................... 158
Themes and Resulting Constructs Discovered ...................................................... 160
Interpretation of the Themes and Resulting Constructs .......................................... 176
Representation and Visualization of the Data .......................................................... 184
Relationship of the Findings .................................................................................... 197
Summary of the findings ............................................................................................ 224
Application to Professional Practice ........................................................................ 229
Improving General Business Practice ..................................................................... 230
List of Tables

Table 1. Related TQM Models ........................................................................................................69
Table 2. Anticipated and Discovered Themes ................................................................................79
Table 3. Participants in the Study ..................................................................................................113
Table 4. Quality-Related Archived Documents of the Company ..................................................124
Table 5. Research Population Codes .............................................................................................159
List of Figures

Figure 1. Research Framework Diagram.................................................................19

Figure 2. Relationship between Concepts, Theories, Actors, and Constructs Diagram.........28

Figure 3. Word Cloud – TQM Sustainability Issue.....................................................185

Figure 4. Items Clustered by Word Similarity .............................................................186

Figure 5. Contributors to TQM Sustainment Issue and its Effects..................................187

Figure 6. ‘TQM Sustainability Issue’ and ‘Rigid TQM Methodology’ Comparison Diagram...188

Figure 7. ‘TQM Sustainability Issue’ and ‘Market-Oriented Organizational Culture’ Comparison Diagram..............................................................................................................189

Figure 8. ‘TQM Sustainability Issue’ and ‘Pacesetting Leadership Style’ Comparison Diagram..........................................................................................................................190

Figure 9. ‘TQM Sustainability Issue’ and ‘Highly Competitive Strategies’ Comparison Diagram..........................................................................................................................191

Figure 10. ‘TQM Sustainability Issue’ and ‘High Cost of Quality and Warranty’ Comparison Diagram..........................................................................................................................192

Figure 11. ‘TQM Sustainability Issue’ and ‘Impassive Employee Behavior’ Comparison Diagram..........................................................................................................................193

Figure 12. ‘TQM Sustainability Issue’ and ‘Inconsistent Productivity and Performance’ Comparison Diagram..........................................................................................................................194

Figure 13. ‘TQM Sustainability Issue’ and ‘Unpredictable Operational Constraints’ Comparison Diagram..........................................................................................................................195

Figure 14. ‘TQM Sustainability Issue’ and Overwhelmed Process Enablers’ Comparison Diagram..........................................................................................................................196
Section 1, Foundation of the Study

The manufacturing industry has utilized the total quality management (TQM) approach on their processes for decades to address process variations responsible for poor product quality and low performance (Parvadavardini et al., 2016; Vouzas & Katsogianni, 2018). While the methodology has been effective in providing substantial improvements in the organization’s operational excellence and productivity, its sustainment in the field involves many challenges (Bouranta et al., 2017; Carmona-Marquez et al., 2016). Manufacturing companies run into challenges in translating and aligning TQM concepts into the existing organizational structure and not realizing the full benefits of the approach (Muruganantham et al., 2018; Wei et al., 2019). The objective of the study was to understand the sustainability issue of the TQM system in a water-treatment company in the southeastern United States, which had resulted in high costs of quality and low performance. The sustainment of TQM influenced the operational productivity of organizations and positively affected other dimensions of performance such as financial effectiveness and customer satisfaction (Nasim, 2018; Psomas & Jaca, 2016). The qualitative design study aimed to discover, explore, and identify the challenges of sustaining the TQM system in manufacturing processes to provide a complete picture of the phenomenon of the issue in its natural setting. The single case study considered various perspectives that were specific to the stakeholders and practitioners of the TQM system to understand how and why a TQM sustainability issue existed in a water-treatment plant operation.

Sustainment of the TQM system requires a company-wide commitment to quality improvement, and the difficulty of achieving this obligation is real (Muruganantham et al., 2018). The case study assumptions enabled an in-depth, multilayered exploration of the problem based on the research framework. The study authenticated the contributing and resulting
constructs to the TQM sustainability issue by studying their level of influence and impact on the site. The limitations and delimitations of the single bounded case was constrained to the scope of the TQM sustainability issue of the chosen company and may not provide generalization or transferability of results to other situations. The research integrated a biblical perspective and followed four phases of gradual progression of revelation representing creation, fall, redemption, and restoration. The objective of the study was to reach out to the development of the case with compassion and empathy to bring together pertinent evidence that would help transform the participants to serve their true goals. The significance of the study contributed to the understanding of the TQM sustainability issue in the manufacturing industry, and reinforced concepts and theories held true by literatures in TQM. The results of the study presented evidence on how the organization could transform and establish coherence of strategic objectives to TQM practices that would enhance quality and performance of its business. Understanding the relationship between TQM and the company’s strategic development would explain how and to what degree investing in TQM methodology contributes to achieving sustainable business objectives (Andrade Arteaga et al., 2020).

**Background of the Problem**

A water-treatment company in the southeastern United States was experiencing high costs of quality, warranty, and performance issues despite a successful implementation of the TQM system. Its monthly operating metrics report on quality and warranty tracking had been trending unfavorably due to high field failure rates, product repair, and replacement costs. The facility had conflicts sustaining its adaptation of the TQM system due to challenges in its integration into the site’s business strategies and process management practices. There was confusion about TQM’s incompatibilities with its production targets and goals.
Although many studies found that TQM could improve organizational performance, not all cases of TQM application had produced satisfactory results in the organizations that executed it (Hilman et al., 2019; Kumar et al., 2020; Nizamidou & Vouzas, 2020; Panuwatwanich & Nguyen, 2017). According to Oliveira et al. (2019), serious problems arise when companies act more concerned with TQM practice implementation than with its suitability to its operational needs and quality results. There needs to be an all‐inclusive approach to quality management and dedicated support for quality initiatives through proper alignment and integration of its various constituents to gain maximum adaptability (Sila, 2018a).

Specific to the water treatment company, the role of its organizational culture had a major influence in driving the sustainability of the TQM system on its business performance and product quality. Significant gaps in the relationship between organizational strategies and quality management practices existed that created obstacles in achieving the intended purpose. This condition revealed dimensions pertinent to the research questions specific to the TQM sustainability issue as the subject of investigation. According to Sinha et al. (2016), understanding of core organizational cultural values that are conducive for planning and execution of TQM interventions was a major factor in the effective sustainment of TQM in any organization. Company leadership played a major role in influencing the organizational culture because they were principal drivers of quality culture development in their ability to empower roles and responsibilities, influence resource allocation, build partnerships, and develop labor and process management (Bendermacher et al., 2017). Coherence and alignment of purpose to organizational requirements supported the maintenance of excellence and sustainment of management systems to achieve quality and performance outcomes (Kennedy, 2019). The company was a good choice for this research because it had diverse and extensive manufacturing
processes that were greatly dependent on the proper application and sustainment of TQM to produce high quality products and improve performance.

**Problem Statement**

The general problem to be addressed was the sustainability issue of the TQM system in the manufacturing industry, which resulted in high external warranties, internal quality costs, and low productivity. Muruganantham et al. (2018) indicated that organizations face multiple difficulties in translating TQM concepts into practice and many of them have not fully realized the financial outputs and non-financial benefits of implementing and sustaining TQM practices. A high number of senior managers lacked the understanding of the competitive mechanism of TQM that enabled their manufacturing plant to achieve operational excellence and TQM sustainability (Sahoo, 2018). Haffar et al. (2019) determined that organizational culture characterized by high bureaucracy, lack of customer orientation, and continuous improvement had a negative impact on TQM implementation and sustainability. All quality activities begin with the management level, and therefore, senior leadership play an important role in providing resources, setting core values, and creating policies to show employees the importance of TQM implementation and sustainability (Wei et al., 2019). The specific problem to be addressed was the sustainability issue of the TQM system in a water treatment company in the southeastern United States, resulting in high product warranty costs, field failure rates, and cost of quality.

**Purpose Statement**

The purpose of this flexible design single case study was to understand the sustainability issue of the TQM system in the manufacturing industry, which had resulted in high cost of quality and low performance. The study aimed to discover, explore, and recognize the challenges of sustaining the TQM system in manufacturing processes to provide a complete picture of the
phenomenon in its natural setting. The investigation considered various perspectives that were specific to the stakeholders and practitioners of the TQM system in a water-treatment company in the southeastern United States. Sustainment of the TQM system required a company-wide commitment to quality improvement, and the difficulty of achieving this obligation was real (Muruganantham et al., 2018). The qualitative methodology considered the actual workplace conditions, observation, and communication with participants to understand what TQM aspects were incompatible to them and how they perceived the application of the TQM system to the process. The application of a single case study design enabled an in-depth, multi-faceted exploration of TQM sustainability issues in real-life settings and authenticated the contributing factors by studying its suitability, acceptability, and neutrality in the site. The research integrated a biblical perspective and followed four phases of gradual progression of revelation representing creation, fall, redemption, and restoration. The purpose of the study was to reach out to the development of the case with compassion and empathy to bring together pertinent evidence that would help transform the participants to serve their true goals.

**Research Questions**

The research questions focused on the sustainability issue of TQM in the manufacturing industry that was specific to a water treatment company in the southeastern United States. The research questions aimed to explore, describe, and understand how factors such as organizational structure, culture, mission, and strategic goals affected the sustainability of TQM activities. Sabet et al. (2016) maintained that alignment of organizational structures, systems, and processes are essential in the successful sustainment of TQM activities. The research questions intended to create a rich dialogue with the evidence and consider possibilities to gain deeper familiarity with the contributing causes of the TQM sustainability issue.
RQ1: How does the TQM sustainability issue affect the company’s cost and productivity?

RQ1a: How does the TQM sustainability issue influence external warranties, internal costs, and performance?

RQ1b: How does the TQM sustainability issue affect product warranty cost, field failure rates, and cost of quality?

RQ1 sought to understand how the TQM sustainability issue affected cost and productivity. RQ1a aimed to understand how the TQM sustainment issue affected external warranties, internal costs, and performance. RQ1b sought to discern how the issue impacts field failure rates and cost of quality. Improper maintenance and sustainment of TQM practices could lead to high operating costs and product failures, resulting in customer dissatisfaction (Alvarez Santos et al., 2018).

RQ2: Why is there a potential TQM sustainability issue in the water-treatment plant operations?

RQ2a: How does TQM sustainment affect the company’s operational targets?

RQ2b: How does sustaining TQM practices align with the company’s operational strategies?

RQ2 was an open-ended question that aimed to confirm the presence of the issue and allowed the understanding of factors behind why employees find it hard to sustain TQM practices. RQ2a sought to outline the effects of TQM on the operational targets. RQ2b sought to understand how sustaining TQM aligned with operational strategies in real-time. Sabet et al. (2016) indicated that lack of strategic coherence on the purpose of TQM could lead to sustainability issues and its ultimate failure.
RQ3: How does the organizational culture of the company affect sustainability of the TQM system?

RQ3a: How does leadership perceive the importance of TQM sustainment in operations?

RQ3b: How does TQM sustainment affect the behavior of employees in their current role?

RQ3 sought to extract information from participants on how organizational culture was affecting TQM sustainment. RQ3a sought to explore leadership’s expectations of TQM sustainment and its impact on the company’s operation efficiency versus the current practice. RQ3b aimed to understand how individual employees experienced the effects of sustaining TQM on their workload, productivity, and performance. For a successful sustainment of TQM, an extensive culture transformation needed to happen (Alvarez Santos et al., 2018).

RQ4: What TQM activities affect performance in each value stream that make its sustainability an issue?

RQ4a: What process enablers are affected by TQM sustainment activities?

RQ4b: What operational constraints are created when sustaining TQM practices?

RQ4 aimed to identify specific TQM practices that were not sustainable to understand the relationship between sustainability of TQM practices and efficient manufacturing practices. RQ4a sought to know what specific process enabler’s performance was affected by TQM sustainability to understand the overall impact on these processes. RQ4b aimed to outline all the constraints generated by sustaining TQM to understand its real-time applicability in the production lines. A TQM model, which is a one-size-fits-all for all industries, may not produce optimal results (Alvarez Santos et al., 2018).
The research questions facilitated collection of specific case study evidence of the TQM sustainability issue in the water treatment company. The questions sought to understand the presence of the issue and its resulting impact on quality and performance. The inquiries aimed to discover how organizational leadership, culture, and its strategic goals aligned, influenced, or contributed to the sustainment of TQM. The research questions supported the analytic strategy of interpreting the data and searching for auspicious patterns, insights, or concepts to define the current situation of the case.

**Nature of the Study**

The research aimed to capture specific lived-in experiences of TQM practitioners in the water-treatment company in the southeastern United States to understand the system’s sustainability issue. The qualitative methodology provided a clear interpretation of the structure and patterns found among the company’s participants to generate data in the actual work environment. This methodology built a complex general picture, examined words, reported detailed views of participants, and conducted research in the natural setting (Creswell & Poth, 2018). The flexible approach was open to unexpected events and adjusted to emerging evidence as it aimed to recognize how the participants derived meaning from their work, and how their interpretations and perceptions influenced their behavior towards TQM sustainability. The qualitative study covered what data to gather and ignore, from whom to gather it according to its sampling design, how to gather based on collection methods, and how to analyze the information based on its analysis method (Tobi & Kampen, 2018). The researcher used heterogeneous approaches to knowledge development, recognizing participants’ strengths and weaknesses to form a better understanding of the case. This post-positive approach required multiple perspectives to be more expansive in addressing questions about the phenomenon of TQM
sustainability issues. The approach of this flexible design integrated a single case study design and analysis to create a richer picture of the case. The design of the study confirmed validity and reliability in the results so that these could address the research objectives accurately.

**Discussion of Research Paradigms**

The research paradigm was post-positivism. The paradigm reflected an evolutionary process of understanding the world with research that resulted only in an approximation of truth rather than the absolute truth (Kelly et al., 2018). The paradigm held an acceptance of theories, hypotheses, contextual knowledge, and values but had an epistemological skepticism that knowledge was hypothetical rather than absolute. The researcher of the TQM sustainability issue project believed in the dynamics of growth and continuous improvement and therefore anticipated refinement of the associated actions and principles over time. In this single case study, the relativity of truth, solutions, actions, and fundamental policies were subjected to whatever the socially responsible organization deemed necessary for their ‘win-right’ survival and well-being that served their mission, purpose, and community. Any catalyst for change created evaluations and investigations that continually challenged existing theories and principles for advancement. The paradigm supported the focus of research, which was to confirm claims, reform, refine, or abandon these in favor of other strongly warranted claims (Tobi & Kampen, 2018). The researcher believed in theories and values influencing the outcome of real-world investigations and that these aspects could change in light of new evidence to retain objective truth.

Post-positivism assumed that understandings of truth from the context of that reality would potentially be imperfect and acknowledged the existence of unobservable entities, as well as the capacity to explain observable phenomena (Tanlaka et al., 2019). Accordingly, the
researcher reflected the use of qualitative and quantitative sources of data in search for truths to obtain an approximation of the reality, emphasizing empirical testing and controlled methods in the achievement of this goal. Kelly et al. (2018) claimed that post-positivism is intuitive, holistic, inductive, and exploratory where the predominant view not only aligned to quantitative methods of collecting and analyzing data, but also strongly supported the use of some qualitative methods. The researcher’s paradigm provided the guidance on how to collect, analyze, and validate the data around the TQM sustainability issue. The researcher understood how values and beliefs influenced research and how to choose definitions and measures while preserving the value of its objectivity and research integrity (Azadi et al., 2017). The paradigm did not dwell on anticipated consequences of the TQM sustainability issue alone, but also looked into actions of known historical conditions that have produced results compatible to the recognized value system. The researcher’s theoretical view did not seek middle ground between logical intransigence and ambiguity, or by favoring moderate versions of rational contrasts based on how the approach worked in resolving problems.

Discussion of Design

The research design chosen for the study had the capability to capture and understand the live experiences of the TQM practitioners in the chosen company in its natural setting. Guided by the specific research problem, purpose, and research questions concerning the TQM sustainability issue, the researcher was free to adjust the investigation as needed to adapt to unexpected and emergent needs of the study. There was a need for the selected research design to be flexible to adapt to changes as the study evolved with the presentation of multiple complex realities. The fixed design, which was suitable for research that required transcending individual differences and identifying patterns to link to social structures, was not applicable in this study.
The reason was that the fixed design was concerned with aggregates and general tendencies rather than individuals’ experiences, leading to a design weakness in its inability to capture the subtleness and intricacies of individual human behavior (Robson & McCartan, 2016). The fixed design was too rigid for the dynamic nature of the TQM sustainability study.

The mixed-method, which was suited for studies that incorporated the elements of quantitative and qualitative data collection, presented timing issues and complications in integrating findings that could produce incoherent and ambiguous research (Robson & McCartan, 2016). While this design offered an authentication of qualitative and quantitative approaches to enhance validity, there were challenges in linking the data analytically, which would present an application problem in this study. The flexible design, which was suitable for studies that sought to understand the phenomenon as it existed in the real world, was more applicable for the TQM sustainability research. This evolving design used multiple presentations of realities, integrated the researcher as an instrument of data collection, and applied a concentrated emphasis on participants’ perspectives.

This study was conducted with a flexible research design using a qualitative method; specifically, a single case study design was used. According to Zapf et al. (2020), flexible research designs allowed interim analyses where modifications of the study design based on accumulating data or any other information available in real-time were possible without undermining the research’s integrity and validity. To be systematic in investigating the TQM sustainability issue, this research design captured and described the lived reality of the event in progress and produced higher probability in discovering comprehensive information of the case. By describing the complexity of the TQM sustainability issue in the actual operational processes
through this flexible design, the themes became more relevant and accurate, making the approach a best fit for the TQM sustainability problem.

**Discussion of Method**

The qualitative research method provided the need for an informative and descriptive approach to determine how the TQM sustainability issue resulted in high external warranties, costs, and performance in the company’s current setting. The qualitative method was context-dependent and allowed the researcher to understand how unique circumstances in which these happened form events, actions, and meanings (Mohajan, 2018). The study focused on the actual work environment and validated the points of view of the TQM practitioners on how they perceived the sustainment of TQM on their roles. The qualitative researcher empowered individuals to tell their narrative, listened to their input, and reduced the power relationship that often occurs between the researcher and participants of a study (Setia, 2017). The study required an evolving approach as it gathered complex, detailed understanding of the TQM sustainability issue. The qualitative research process was emergent wherein the initial plan of research could not be firmly set, and all phases of the process may change after the researcher entered the workplace and collected data (Keikelame & Swartz, 2019). The investigation of how the TQM sustainability issue affected product warranty cost, field failure rates, and cost of quality required a development of an evolving complex picture of the causes and their resulting outcomes. The qualitative methodology involved noting multiple viewpoints, recognizing the many elements involved in a situation, and generally outlining a greater representation that occurs (Kelly, 2017).

One of the five common qualitative approaches to inquiry was the narrative research, which aimed to understand participants’ diverse social constructions of reality and the cultures in which their life stories resided (Abkhezr et al., 2020). The method captured the diverse nature of
participants’ expressions, which reflected a varied collection of their stories and the multiple ways through which they could create and re-create themselves in different settings and relationships (Manankil-Rankin, 2016). The research required concentrating the study on an individual or a limited number of individuals while gathering data through their stories, distinct experiences, and chronologically organizing the importance of those experiences (Creswell & Poth, 2018). The limitation on the number of participants and the constant reformulation of the inquiry through consistent reflections made the narrative research approach impractical for the TQM study. The phenomenological research design examined how related phenomenon was experienced and tried to define what the participants experienced about the phenomenon (Bastug et al., 2017). The approach aimed to gather descriptions of experience, and not intellectual interpretations or opinions to discover the meaning of an occurrence of multiple individuals who experienced the phenomenon (Thomas, 2020). This approach was not suited for a bounded system, such as a process or a program, and its specificity in the methodology could distort the interpretation and clarity in its application to the TQM study.

The grounded theory research design developed a theoretical explanation of a phenomenon from a specific set of data based on a large number of participants’ socially derived explanations of a situation (Zamani & Babaei, 2021). Grounded theory aligns on the strategy of inductive reasoning and may not need clearly specified goals, research questions, or assumptions prior to the start of the research project (Flynn & Koruska, 2018). This inductive process could open up a possibility that researchers may evade an initial literature review, conduct interviews, and consequently analyze data patterns that could be meaningful to the study’s findings. This method was suited for a homogenous sample and not for the case that focused on the TQM study. Ethnography applied to various disciplines with the goal of learning about social
structures in groups and cultures by utilizing realistic observations in natural settings (Muskat et al., 2018). The approach studied people through active engagement in native populations using in-depth observations of their social interactions and becoming familiar with the effects of cultural and historical contexts. The researchers could discern the fullness of the human experience and the significance people give to objects and cultural practices that recognize a different worldview (Wood & Mattson, 2019). The ethnographic process traditionally studied members of a culture-sharing group and was not suited for the TQM study on a bounded system.

This study intended to develop an understanding of the TQM sustainability issue and its effects on a water-treatment company in the southeastern United States as a single bounded case. The single case study research design involved the study of a single bounded case within a real-life, present-day context or setting, and used multiple perspectives to facilitate the examination of the specific phenomenon (Yin, 2018). A qualitative case study illustrated a unique case and needed to be detailed and descriptive. The case study researcher could collect and integrate many forms of qualitative data ranging from observations, interviews, and documents to answer the research questions (Paddock et al., 2019). This research design identified what TQM activities affected performance in each value stream that made its sustainability an issue and recognized how TQM activities affected process enablers.

According to Ridder (2017), benefits of a single case study showed the comprehensive description and analysis to gain a better understanding of “how” and “why” events occurred. This approach allowed the investigation of research questions on how the TQM sustainability issue negatively affected the company’s cost and productivity, and why there was a TQM sustainability issue in the company’s operations. The single case study methodology provided the opportunity to uncover any subculture or behavior that arose by investigating deeper causes
of the TQM sustainment issues. This approach delivered case data that led to the identification of patterns and relationships, and validation and confirmation of a theory (El-Akruti et al., 2018). This single case study design enabled consumers to play a role in the development, implementation, analysis, and synthesis of research. The case study design also supported the conduct of genuine consultation with stakeholders, including respectful processes, ethical behaviors, and practices to ensure the quality and validity of data gained (Yin, 2018).

**Discussion of Triangulation**

Used as model in the field of navigation that utilizes multiple points of observation to pinpoint a location, triangulation in research framework employs multiple sources of evidence to provide various measures of the same phenomenon (Natow, 2020). Triangulation helped to reinforce the construct validity of the study by using multiple methodological resources or practices to develop convergent evidence (Al-Moghrabi et al., 2020). The TQM sustainability study used more than one type of qualitative data collection procedure, such as gathering data by means of interviews, observations, and documents. The researcher established multiple data sources by gathering data from different periods, locations, or perspectives through the interview of TQM participants who possessed different viewpoints or held varying levels of authority. This process included interviewing senior leadership and production employees within the company from within different product value streams. The researcher also performed shop floor observations of the TQM sustainability issue in multiple departments and performed documentary examination of the occurrence on file. The researcher checked the results of the interview against the shop floor observations and findings in the TQM-related documents. Using multiple methodological resources such as diverse techniques, various data sources, and different
data analysis procedures served as a check on objectivity and incorrectness that any data source, method, or analysis procedure had generated (Rooshenas et al., 2019).

**Interviews.** This qualitative method consisted of interviewing diverse groups of TQM participants in the company, covering at least 50 subjects across five value streams and four functional groups. The value streams included injection molding, filters, pumps, valves, and heat pumps product departments. The functional groups included operations, operations support, product engineering, and field warranty administration. The actors who were distributed across the value streams and functional groups included the executive leadership team, manufacturing line members, operations support members, suppliers, business partners, and warranty business members. The interview covered TQM participants working in three shifts to establish data at different points in time. Interviewing participants in a variety of different operational positions at different settings in time and location built up strong evidence of the phenomenon because the approach covered the diversity of organization (Natow, 2020).

**Observations.** Research observations took place at different times and process locations. The researcher observed how actors performed tasks related to TQM practices at the start and end of the shift, before and after breaks and lunches, and during normal operation. The observations covered various locations that included activities in shipping and receiving, start and end of process line stations, in-line testing stations, and non-conforming locations in the company. This process captured reactions while participants were involved in individual, or group work related to TQM practices. A semi-structured checklist that outlined specific TQM practices and captured objective notes about how and what participants were doing documented the researcher’s observation findings. Constructing descriptive accounts was an important aspect of the methodical process. This activity also included which TQM concepts the participants were
performing well and which ones they struggled practicing. The observation process established strong evidence that included select groups of participants for extended periods, diverse activities at different locations, and work with different concepts (Moon, 2019). The semi-structured checklist that captured the observation findings produced a matrix to show patterns between value stream groups and functional roles.

**Documents.** The researcher examined documents related to the TQM practice in the company. These documents included process audits, standard work reviews, critical-to-quality forms, product non-conformity reports, scrap summaries, productivity statements, quality audits, root-cause-counter measure files, and quality manuals. The document analysis also covered existing TQM operational control documents such as failure mode analyses, process flow diagrams, control plans, escalation processes, and change management policies created to safeguard operations. In addition, the researcher reviewed the pre-production approval process that started from the product development team, suppliers, and operations to link interview and observation findings to the TQM sustainability challenges that the participants shared. The intent was to understand and confirm the presence of the TQM sustainment issue on how the documents captured internal defect occurrences, corrective actions, process changes, design changes, supplier changes, productivity misses, and field or external failures. One of the most common practices of utilizing multiple qualitative methodologies is to combine interviews and observations with documentary analysis (Natow, 2020).

**Summary of the Nature of the Study**

The research was conducted with a flexible design using a qualitative method and a single case study designed to serve the objectives of the investigation. This method provided an informative and descriptive approach to determine how the TQM sustainability issue resulted in
high cost of quality and low performance in the company’s current setting. Through this flexible design, the themes became more relevant and accurate, making the approach a best fit for the TQM sustainability problem. The research paradigm was post-positivism, which held an acceptance of theories, contextual knowledge, and values, but had an epistemological skepticism that knowledge was hypothetical rather than absolute. The paradigm supported the focus of the research to confirm TQM sustainability findings and reformed, refined, or abandoned these in favor of other strongly justified claims. The TQM sustainability study used more than one type of qualitative data collection process, which included gathering data by means of interviews, observations, and document analysis. These data sources came from different periods, locations, and TQM participants who held varying levels of authority. The goal of triangulation was to cross-validate and capture diverse dimensions of the TQM sustainability issue in the company. From the researcher’s post-positivist perspective, this triangulation enhanced the accuracy and validity of a study.

Conceptual Framework

The conceptual framework provided the rationale, background, and structure that supported the investigation of the relationship between research elements to understand the occurrence of the problem (Fisher & Hamer, 2020). The research framework showed how rigid TQM methodology, theories, concepts, leadership style, organization culture, and strategic goals influence the way the research actors sustain TQM practices in the water-treatment company. Proper execution of TQM resulted in high quality and performance; however, its rigid methodology had practices that could best describe and provide details on why the approach was harder to sustain (Hilman et al., 2019; Jung & Lee, 2016; Kumar et al., 2020). The framework also showed the effects of TQM sustainability failure on the cost of quality and external
warranties, productivity and performance, employees’ behavior, and its consequence on operational constraints and process enablers. The structure identified key input constructs such as rigid TQM methodology, pacesetting leadership style, and market-oriented organization culture as contributors to the way TQM practitioners sustained the approach in the manufacturing process. The dynamic pacesetting leadership style set the excellence bar high and made teams work efficiently; and while the style was effective in driving results, it could overload team members (Campion, 2018). The market-oriented organizational culture had an excessive focus on satisfying the needs of its customers and could influence the market-oriented behaviors of their employees in terms of harmonizing values and norms (Byrne et al., 2019). This type of organizational culture was result-oriented with a strong emphasis on competitiveness and achievement. The framework showed how the TQM sustainability issue resulted in elevated cost of quality, inconsistent performance, impassive employee behavior, unpredictable operational constraints, and overwhelmed process enablers. The structure highlighted the major participants in the study and their role in contributing to the research problem and its outcomes.

**Framework Diagram**

The framework diagram below showed the relationship between all the research elements included in the study. The diagram showed the interaction, flow of information, and action between each element.

**Figure 1**

*Research Framework Diagram*
The input constructs consisted of rigid TQM methodology, theories, concepts, pacesetting leadership style, market-oriented organizational culture, competitive company strategies, and operational targets. These constructs influenced the actors or participants of the TQM practices. Rigidity in process and quality management did not bring variety in the workplace that could have positively influenced performance and creation of value for the customer (Banuro et al., 2017). The effect of the input constructs on the actors guided the manner by which each of them applied the sustainment of TQM practices. The actors could manipulate and empower the sustainment of TQM principles in their own space and time given a certain level of authority (Banuro et al., 2017). The actors consisted of the executive leaders, manufacturing line members, operations support members, suppliers and business partners, and warranty administration managers. Leadership’s commitment towards quality management included giving an inspiring vision, motivating quality values, and quality direction to employees
in ways that were clear and understood by all; without these elements, the process failed (Dilawo & Salimi, 2019). In the current state, the impact of the input constructs on the actors contributed to the sustainability issue of TQM in the company. The TQM sustainability problem, in turn, affected the output constructs, which were elevated cost of quality, high external warranties, inconsistent productivity, low performance, impassive employee behavior, unpredictable operational constraints, and overwhelmed process enablers. Failure in maintaining the TQM methodology resulted in increase in costs, compromised products, unmotivated employees, and unsatisfied customers (Banuro et al., 2017). The organization could be truly effective in sustaining TQM when each constituent works together in coherence, recognizing that every participant and every action affects, and is in turn, affected by, every member in the team (Chen et al., 2016).

Concepts

Proper operation of the TQM system improved the quality of products and performance while lowering costs of warranties and field failure rates. Inadequate use of TQM in the company’s processes could lead to issues that would negatively affect cost and customer contentment. Shafiq et al. (2019) affirmed that productivity increased with improvement of quality and failure to maintain TQM could result in low quality, which translates to high cost and loss of competitive position. TQM could be a major source of sustainable competitive advantage and excellence for business organizations while its failure could have contrasting effects. The sustainment of TQM influenced the operational productivity of organizations, which eventually affected other dimensions of performance such as financial effectiveness, customer satisfaction, and other stakeholders’ efficiency (Nasim, 2018; San Miguel et al., 2016).
Sound TQM sustainability required rigid adherence to procedures from all practitioners to have a strong causal effect on organizational performance and cost of quality. Defined as an effective management tool, TQM could reinforce existing business strategies and goals when performed rigorously. TQM is a strenuous management philosophy that requires full commitment to improve product quality and processes, otherwise, a halfhearted execution would lead to failure that translates to high costs and low performance (Amin et al., 2017; Jung & Lee, 2016). TQM’s structured approach required full engagement from employees and management to improve process effectiveness, flexibility, and competitiveness of a business. TQM sustainment was successful when there was active participation from all members at all levels to meet and exceed quality and performance goals. Issues would arise when team involvement was fragmented and not aligned with the correct application of TQM practices (Amin et al., 2017; Bugdol, 2020; Hwang et al., 2020; Shafiq et al., 2019).

TQM and the organizational culture are interrelated. TQM, when sustained successfully, influences the content of the organizational culture. Subsequently, the content of the organizational culture influences the TQM system and its functionality, but it demands a complex cultural shift from the traditional approach to management focusing on the way to a total quality mindset (Jung & Lee, 2016; Nasim, 2018). This cultural shift impacts basic beliefs and deep-rooted values that employees hold about work and could contribute to change resistance. TQM required a radical cultural change from traditional management to the continuous improvement management style in an organization (Haffar et al., 2019). Sustainment of the TQM concept was not an easy undertaking because it necessitated a total change in organizational culture, shifting of responsibility to management, and incessant participation of members in the quality improvement process (Nasim, 2018; Panuwatwanich & Nguyen, 2017).
TQM sustainment required changes to the shared assumptions, frames of reference, and understandings that most organizations have developed through interactions with their environment and altering these established perspectives could create a challenge to TQM sustainability.

**Theories**

Deming’s theory of TQM rests upon 14 points of management that include the system of profound knowledge and the Shewart Cycle of plan-do-check-act (Agrawal, 2019b; Chiarini & Vagnoni, 2017). The theory equated quality as the result of collaborative work efforts over the total costs and stressed the importance of top management support to sustain the TQM system. If the company solely focused on cost as opposed to the proper sustainment of TQM, cost would rise while quality deteriorated. Deming’s system of profound knowledge consisted of the understanding of human nature to solicit active engagement and commitment to the TQM process (Agrawal, 2019b; Chiarini & Vagnoni, 2017). Without this understanding, TQM sustainability would be an issue affecting the outcome related to poor quality and the added cost of warranties. Total participation was a key factor in the sustainment of TQM because it inspired employees to innovate and help the company to maintain its long-term vision and planning (Amin et al., 2017; Chiarini & Vagnoni, 2017; Dahlgaard et al., 2019). Companies that did not demonstrate the importance of teamwork and generated interdepartmental cooperation by recognizing and empowering their employees to participate in decision-making would only discourage total participation. This would not help build a TQM culture needed for positive business performance.

Crosby’s theory of TQM relied on multiple absolutes of quality management and a list of fourteen elements to quality improvement (Agrawal, 2019a). The theory emphasized the strict
adherence to requirements, prevention, quality measured by the price of nonconformity, and zero defects. The focus on stringent requirements of TQM required firm compliance to its procedures, which was dependent on resources for continuous training, monitoring, and audits that some management leadership had difficulties in providing. Application of the TQM methods, tools, and techniques requires dedicated and committed resources, and most companies do not have a strategic roadmap complemented with suitable methods and techniques to ensure successful operations (Dahlgaard-Park et al., 2018). In an attempt for companies to optimize cost, TQM practitioners multitask to cover other aspects of the TQM process, leading to workload and sustainability issues. Managers need to have an in-depth understanding of the importance of building a suitable organizational culture with a focus on TQM basic principles (Álvarez-García et al., 2016). A lack of understanding could lead to the disintegration of management control that might result in a lack of universal application of TQM on the company’s processes.

**Actors**

Executive leaders play an important role in the sponsorship of TQM within a company and set the values essential for it to flourish. According to Álvarez-García et al. (2016), without the right leadership to inspire and influence compliance, sustainment of TQM could not fully succeed in the long-term. Leadership must provide unity of purpose and direction for the organization to sustain TQM and achieve its goals and objectives. In this research study, executive leaders included the operations director, value stream managers, facilitators, and operations engineers. Manufacturing line members’ involvement in TQM sustainability improved quality and increased performance when they had the full support and empowerment from management. The effectiveness of TQM depended on the extent to which employees performed their roles and moved towards the common goals and objectives (Álvarez-García et
TQM sustainability, cost of quality, and efficiency improved when frontline personnel aligned and correlated with the manufacturing processes. In this study, manufacturing line members included molding operators, assembly workers, and fabrication associates.

Operations support members provided a shared responsibility for equipment, hands-on training, and played an important role in increasing uptime, reducing lead-time, and eliminating defects. The effectiveness of this function directly related to TQM sustainability. The operation support group emphasized proactive and preventative maintenance to maximize the operational efficiency of equipment and training of personnel (Dahlgaard et al., 2019). In this study, the operations group included process technicians, quality inspectors, quality technicians, metrology, tooling, and the maintenance crew. Suppliers and business partners had an important role in TQM sustainability. Suppliers and business partners were responsible for providing the quality that satisfied the requirements of the company to process products that meet customers’ needs (Bevilacqua et al., 2017). Lack of involvement and poor communication with suppliers and business partners could create obstacles in the sustainment of TQM. Warranty administration members were the personnel at the receiving end of the finished goods. The groups spread across continental America and Asia-Pacific regions interacted with the distribution centers, product dealers, contractors, and customers. They provided customer feedback and validity of the effectiveness of TQM sustainability in the company’s manufacturing processes.

**Constructs**

The selected research constructs covered the characteristics of the participants and the elements of the TQM sustainability issue. The rigidity of the TQM methodology required strict adherence to policies and procedures. Each deviation from the TQM approach affected the level of quality and performance (Gözükara et al., 2019). The pacesetting leadership style was an
established attribute of the management approach that affected the sustainability of TQM in the manufacturing process. The influence of leadership style on employees’ involvement and participation in quality assurance activities had significant impact (Kumar & Sharma, 2017; Sila, 2018a). The market-oriented organizational culture was a preexisting attribute of the company that could affect TQM sustainability. The relationship between cultural orientation and the sustainment of TQM practices was substantial (Gözükara et al., 2019). TQM practices could affect the preset company’s strategies and operational targets. Quality management was a customer-focused process that aimed for continual support of a company’s strategic goal and objectives (Albuhisi & Abdallah, 2018; Bevilacqua et al., 2017). The TQM sustainability issue could overwhelm process enablers, which were the preset resources and capabilities allocated by the company to accomplish desired targets. Proper sustainment of TQM improved the effectiveness of production resources and their capabilities to support the process and specific tasks (Georgiev & Ohtaki, 2019; Hilman et al., 2019).

TQM sustainment issues resulted in high cost of quality and external warranties that were outcomes of failed prevention and correction initiatives. TQM practices had direct positive relationships with cost related to quality (Kumar & Sharma, 2017; Sila, 2018a). TQM practice and sustainability issues resulted in inconsistent productivity and performance variables, which were measures of efficiency and function to accomplish targets. TQM practices had direct positive relationships with productivity and performance (Sila, 2018a). The impassive employee behavior captured employee reaction to the TQM sustainment issue while fulfilling operational targets. Employees behaved sensibly to gain respect and recognition while adhering to regulations at the workplace (Andrade et al., 2017; Kumar & Sharma, 2017). Issues in sustaining TQM created unpredictable operational constraints and overwhelmed process enablers that
limited the optimization of any part of the manufacturing system or infrastructure to fulfill operational targets. TQM programs that failed limited the performance parameters of the business (Kumar et al., 2020; Wei et al., 2019).

**Relationships between Concepts, Theories, Actors, and Constructs**

The fundamental principle and purpose of TQM was its well-founded methodology of constant improvement and development in operational processes for realizing growth in manufacturing and sales with the optimal level of satisfaction of customers and stakeholders (Tasleem et al., 2019). The concepts and theories related to TQM methodology confirmed the firmness of the approach and its requirement for strict adherence to procedures. The rigidity in TQM practice created tougher knowledge conversion and concept understanding that resulted in a circle of confusing directions and interpretations of the method (Binci et al., 2019). These misinterpretations and confusion created incompatibilities with the way leadership executed their planned strategies and operational targets, most especially when the TQM application slowed down production line rates and impacted on-time delivery. The consequential ambiguity of meaning and understanding produced by employees’ interactions led to different methodology approach implementations and outcomes (Binci, 2019). This situation related to the research question on how sustainment of TQM affects the company’s cost and productivity. The effects of these complexities eroded the commitment from line leaders and team members in performing TQM procedures while working their best efforts to achieve production targets. This condition brought up the research question on why there was a TQM sustainability issue in the company and how this practice aligned with the company’s operational strategies.

The company’s market-oriented organizational culture where group collaboration maintained a high level of firm performance by effectively executing competitive strategies and
operational targets to gain customer value, employed a pacesetting leadership style that strongly supported its goals. The company’s high-paced manufacturing setting created difficulty in sustaining TQM practices due to challenges in linking the demands of the company’s strategies and the effect on productivity and workload of line members. The TQM methodology had more emphasis on operational effectiveness and as much focus on strategic positioning, so it lacked the incorporation of local operational programs and strategies (Bernardino et al., 2016). This circumstance led to the research question on how organizational culture affected the TQM sustainment in the site and how leadership perceived the role of TQM methodology and its importance in their manufacturing processes.

In the company’s high volume fast-paced environment, products transferred from one process to another, rapidly and continuously managed by multi-skilled resources handling multiple responsibilities at the same time. The demand for immediate response and results to address challenges in the workflow was great. There were disagreements between TQM sustainment and its long-term results because of its highly involved training requirements, high deployment time, and excessive focus on standardization, which generated anxiety for immediate results and perceptions of slow improvement outcomes (Bernardino et al., 2016). This case led to the research question regarding what TQM activities created operational constraints, and affected process enablers and overall performance in each department.

**Figure 2**

*Relationships between Concepts, Theories, Actors, and Constructs Diagram*
The sustainment of TQM methodology and recognition of its concepts and theories had a significant effect on the actors that practiced the approach while achieving the targeted goals of their operations. While TQM sustainment could improve quality and performance, some practices, tools, and methodologies of TQM might not be prevalent and compatible in some organizational cultures (Bernardino et al., 2016). The resulting TQM sustainability issue not only created quality and performance problems, but also caused impassive employee behavior affected by putting more time and work on activities to recover lost productivity, rework quality, and retrain. The consequent actions between the rigid TQM methodology, organizational culture, leadership style, and the company’s competitive strategies led to the research problem concerning the TQM sustainability issue and its effects of poor quality and low productivity.

**Summary of the Research Framework**

The research framework consisted of the TQM methodology, theories, concepts, leadership style, organization culture, and strategic goals that influenced the way the research actors sustained TQM practices in the water-treatment company. The framework also depicted
the impact of TQM sustainability failure on the cost of quality and external warranties, productivity and performance, employees’ behavior, and its effects on operational constraints and process enablers. The structure identified key input constructs such as rigid TQM methodology, pacesetting leadership style, and market-oriented organization culture as contributors to the manner that TQM practitioners sustained the practice in the manufacturing process. The framework diagram showed the relationship between all the research elements included in the study. The actors consisted of the executive leaders, manufacturing line members, operations support members, suppliers and business partners, and warranty administration managers.

TQM concepts, including proper operation of the TQM system, improved the quality of products and performance while lowering costs of warranties and field failure rates. Sound TQM sustainability required rigid adherence to procedures from all practitioners to have a strong causal effect on organizational performance and cost of quality. TQM and the organizational culture were interrelated, and when sustained successfully, could influence the content of the organizational culture. TQM theories include Deming’s model that TQM rested upon 14 points of management that included the system of profound knowledge and the Shewart Cycle of plan-do-check-act (Agrawal, 2019b). Crosby’s theory of TQM relied on multiple absolutes of quality management and a list of fourteen elements to quality improvement (Agrawal, 2019a). The theories equated quality as the result of collaborative work efforts over the total costs and stressed the importance of top management support to sustain the TQM system. The theories also emphasized strict adherence to requirements and focus on stringent requirements for compliance to its procedures.
The concepts and theories related to the TQM methodology confirmed the inflexibility of the approach and its requirement for strict adherence to procedures. This created complicated knowledge conversion and concept understanding that resulted in confusion leading to incompatibilities with the way leadership executed their strategies. This condition brought up the research question on why there was a TQM sustainability issue in the company and how this practice aligned with the company’s operational strategies. The company’s high-paced manufacturing setting created difficulty in sustaining TQM practices due to challenges in linking the demands of the company’s strategies. This circumstance led to the research question on how organizational culture affected the TQM sustainment in the site, and how leadership perceived the role of TQM methodology and its importance in the manufacturing processes. The consequent actions between the TQM methodology, organizational culture, leadership style, and the company’s competitive strategies led to the research problem concerning the TQM sustainability issue and its effects on quality and performance.

**Definition of Terms**

The definition of terms in this section aligned with how their particular meaning applied in the study. This was to ensure that there was correct understanding and interpretation of all technical terms regarding their use in the context of the study. The definitions of each pertinent term clarified how its distinctiveness contributed to the focus of the study. The following list included the terms expressed in this study.

*Continuous improvement (CI).* A structured and ongoing effort by all members of an organization in improving products, services, and processes through incremental and breakthrough improvements to enhance overall performance for the customer (Sunder & Prashar, 2020).
Dynamic capability (DC). A firm’s ability to identify cost-effective configurations of internal competencies and assets so that these could be built and integrated to address or manage changes in the business operating environment (Schoemaker et al., 2018).

Hard TQM. Hard TQM includes quantifiable techniques such as statistical measurements, just-in-time production, total quality control, and task-based teams such as quality circles (Nasim, 2018).

Human resource management (HRM). A management function concerned with hiring, training, developing, motivating, and efficiently managing people to achieve organizational goals and objectives (Steffensen et al., 2019).

Impassive behavior. Insensitive and unresponsive response to something that would generally stimulate interest or emotion. A condition of affectless, emotional detachment, or absence of any external sign of reaction in action or facial expression that does not attend to the reality of another person’s thoughts, desire, or substance (Betancourt, 2020).

Knowledge management (KM). A multidisciplinary approach of generating, acquiring, sharing, managing, and applying the knowledge and information of an organization to achieve its objectives and gain higher innovation performance for the competitive advantage (Razzaq et al., 2019).

Lean management (LM). A multi-dimensional approach that includes a variety of management practices to managing and organizing initiatives that aim to improve a company's performance (Abdallah et al., 2019).

Market-oriented culture. An organizational culture defined by its distinct orientation in market intelligence, strategic decision-making, customer-competitor conceptualization, and inter-
functional coordination aimed at maintaining a high level of firm performance by effectively executing actions required in gaining customer value (Olabode et al., 2018).

*Operational constraints.* The weakest link of the manufacturing structure, this constraint is a medium to long-term interruption that prevents the organization’s operations system from achieving its maximum output (Sims & Wan, 2017).

*Organizational culture.* A complex set of shared values, norms, beliefs, assumptions, symbols, and expectations that reflect the behaviors and thinking of an organization (Carvalho et al., 2019).

*Pacesetting leadership style.* A leadership style that sets the pace for the team, demands a high level in performance, and expects excellence at all times with minimal supervision (Campion, 2018).

*Plan-do-check-act (PDCA).* A dynamic and iterative process consisting of a four-stage approach in driving continual improvement on systems, processes, products, and services, and for resolving problems of operational activities in an enterprise (Prashar, 2017).

*Process enablers.* Self-contained functional roles, resources, and core capabilities that support and sustain the operational needs of the organization’s processes and systems (Malek & Desai, 2019).

*Six Sigma.* A method that provides businesses tools to improve the capability of their business processes by focusing on the critical characteristics of products that are essential for customers (Chugani et al., 2017).

*Soft TQM.* TQM’s soft factors include top leadership and human resources, employee participation, and resources’ process management that have a significant effect on the business consequences (Ershadi et al., 2019).
Sustainability. The ability to maintain processes at a certain level and rate by adopting a balanced and systemic integration of dynamic changes and improvements to preserve and enhance overall performance at the same time (Geissdoerfer et al., 2017).

Total quality management (TQM). A management approach employing all members of the organization to participate in long-term improvements of product, processes, and services to satisfy customer expectations (Carmona-Marquez et al., 2016).

Assumptions, Limitations, Delimitations

The assumptions, limitations, and delimitations in the study relate to the research method, design, and framework planned for the study. Qualitative researchers had assumptions about the nature of the realities that existed in the study, the significance of values in research, how knowledge assertions were vindicated, and the development of research (Creswell & Poth, 2018). The value-laden nature of qualitative research was plainly recognized. The assumptions included the existence of multiple realities in the TQM sustainability study and multiple perspectives from the participants. The limitation was related to the open-ended nature of questions used in the qualitative methodology where participants had more control over the substance or content of the data collected (Robson & McCartan, 2016). Verifying the results objectively, required seeking alternative explanations to the research results to strengthen the validity of the findings. The flexible research design for the single bounded case was limited in scope to the TQM sustainability issue of a specific manufacturing company in the southeastern United States. The single case study design would not be able to provide a meaningful basis for generalization of results to the broader population and the outcomes drawn from this bounded case might not be transferable to other situations (Yin, 2018).
**Assumptions**

The research process strictly followed Covid-19 protocol and CDC (Centers for Disease Control and Prevention) guidelines during the interview process of the study. The participants in the study were full-time employees of the company that had practiced and experienced TQM methodologies and its impact on all of its operational processes. The relevance of using the core organizational teams that practice TQM was understanding how values formed that were conducive for the approach’s sustainment (Sinha et al., 2016). The researcher assumed availability of these participants to gain sufficient samples needed in the study and had arranged accessibility to the TQM practitioners from various departments through their respective value stream managers. All the participants were free from the Covid-19 virus and were available for interview. The researcher assumed that all participants would truthfully answer the research-related questions and share their insight and perspective on the impact of TQM sustainment on their roles. The researcher asked for consent and maintained participants’ privacy and confidentiality with all their responses to gain their respect and honest responses. One of the important characteristics of qualitative methods was that they provided a participatory function to the researcher and required that he or she talked to participants and observed them up close, capturing their behaviors and lived experiences accurately (Cypress, 2017).

All archived quality and operations’ documents were accessible and available for review and for data collection. The researcher had access to the documents or had connections to company resources that could share the documents. The researcher assumed the quality and accuracy of the archival data and had used different data sets to understand their contents. Document analysis was combined with other research methods as a means of triangulation to supplement and corroborate outcomes across different data sets and minimized the impact of the
possible biases in a study (Mackieson et al., 2019). The researcher assumed accuracy of the data collection instruments. A triangulation method using interviews and observations were used to help understand results. Sufficient time was set aside for interviews and observations across three shifts and across multiple roles. Observing participants in their natural setting revealed insights not accessible from other data collection methods, such as structures and behaviors the participants might not have been aware of themselves while in action (Morgan et al., 2017).

**Limitations**

This case study was limited to the understanding of TQM sustainability challenges in the manufacturing industry and will not be generalizable to other business groups in the same context. A lack of generalization to a larger scale or wider context was a limitation for the use of qualitative research (Du et al., 2020). The size of sampling was limited to the number of participants made available from each department in the company and dependent on the response rate from each subgroup. Adding more participants to the study would mitigate the issue and would require more time for the interviews to be completed. Considering multiple departments and use of all three shifts, the number of participants was enough to get the level of data saturation to draw meaningful conclusions required in qualitative research (Mackieson et al., 2019).

There might be unknown factors or conditions in the company departments where participants responses could produce bias in their responses to the study. The participant and researcher bias were notable limitations in the qualitative study and applying a rigorous approach to establish validity and reliability was key in overcoming this concern (Paul, 2017). Participants who had the knowledge and experience of practicing TQM and had the understanding of the focus of the research area were chosen in order to minimize this limitation (Sinha et al., 2016).
Du et al., (2020) suggested taking a systematic approach in data analysis, data triangulation, data saturation, member checking, electronic recording of interviews, and sustained engagement in the workplace to promote quality and credibility in the study.

**Delimitations**

The researcher in this case study explored the single phenomenon bounded by the TQM sustainment activity in the chosen water-treatment company and gathered comprehensive evidence through a variety of data sources specific or unique to its environmental conditions. The case study design limited the generalizability of the findings and confined the scope of the research in terms of its research questions (Yin, 2018). This research design delivered the single case data that led to the identification of relationships, patterns, validation, and confirmation of theories applied in the study (El-Akruti et al., 2018). The research framework also delimited the study since it only captured the relationship between all the research elements included in the investigation, as well as their interactions, flow of information, and actions between each of them. The business could be effective in sustaining TQM when each element worked consistently together, understanding that every participant and their action affects, and is affected by, everyone in the team (Chen et al., 2016). The chosen concepts with their definitions and reference to relevant peer-reviewed literature and existing theories were specific to the study’s framework (Lock & Seele, 2018). The chosen theories and concepts were only relevant to the topic of the study and might or might not relate to the broader areas of knowledge considered.

**Significance of the Study**

The reason for conducting the study was to understand the sustainability issue of the TQM system in the manufacturing industry, which had resulted in high cost of quality and low performance. Initiatives to achieve high-quality performance in the manufacturing industry takes
a different approach to sustain it, and the proficiencies in sustaining total quality is reliant on the level of uncertainty and competitive intensity within the organization (Su & Linderman, 2016). The organization aimed to understand why it is experiencing conflicts in sustaining its adaptation of the TQM system and its integration into the site’s business strategies and process management practices. The study generated research questions to collect evidence of the problem and seek to understand and discover how organizational leadership, culture, and its strategic goals influence or contribute to the sustainment issue of TQM. Some businesses still did not understand the use of TQM methodology, which resulted in confusion over its effectiveness on improving quality and performance (Sfakianaki, 2019). This condition led to low product quality and productivity, causing process disruptions, high financial loss, costly lawsuits, and long-term damage to the brand reputation and corporate image (Boikanyo & Heyns, 2019). Understanding the relationship between TQM and the company’s strategic development would explain how and to what degree investing in TQM methodology contributes to achieving sustainable business objectives (Andrade Arteaga et al., 2020). Successful sustainment of the TQM should consider the needs and expectations of stakeholders and customers, the business’ competitive constraint, and CI requirements (Benzaquen & Charles, 2020).

Reduction of Gaps in the Literature

The study added to the understanding of how the TQM sustainability issue happened in a particular organization setting that prioritized the pace of production goals to achieve high financial output. The findings of the study validated and confirmed that the TQM sustainability issue in the manufacturing industry related to challenges in transforming its quality management concepts into practices that are not compatible with the current organizational structure noted by Muruganantham et al. (2018). The study also proved that the adoption and sustainment of TQM
required the organizational culture to change, which was a challenge to its rigid methodology that required firm adherence to its policy (Haffar et al., 2019). The investigation confirmed that there was a mediating impact of the organizational culture and its related dimensions, such as top management commitment, leadership knowledge, and employee engagement to the sustainment of TQM practices. The conclusion of the study supported the claims by Chiarini and Vagnoni (2017) that quality starts with management leadership who play an important role in providing resources, setting core values, and creating policies to show employees the importance of TQM sustainability.

The research contributed to reinforcing the concepts held true by Shafiq et al. (2019) that quality and productivity become efficient with the proper sustainment of TQM practices, and this approach provided the basis for continual improvement of the organization (Honarpour et al., 2017). Regarding practical implications noted in some TQM literatures, the research proved that there was a significant need for establishing alignment and coherence of TQM practices to the organizational strategic goals and objectives. The outcome of the analysis confirmed Psomas and Jaca’s (2016) assertions that successful and effective TQM sustainment had a positive relationship with the business’ strategic initiatives, tactical drivers, and process enablers used to improve overall performance. The study extended the work that proves that the sustainment of TQM had a positive association to quality and financial performance with significant value for customer focus and continuous improvement (Aquilani et al., 2016; Bouranta et al., 2017).

**Implications for Biblical Integration**

The significance of integrating the biblical perspective in the study was in its influence on enhancing the process of collecting, investigating, analyzing, and validating the participants’ experiences in their working environment. The biblical perspective showed that the Bible was
not only a religious instruction for the salvation of man, but also a message of redemption (Hah, 2019). The research approach followed four phases of gradual progression of revelation representing creation, fall, redemption, and restoration. This study reached out to develop the case with compassion and empathy to bring together pertinent evidence of the issue and collective strengths that would help transform the participants to serve their true goals to God. God’s direction was central in this research. Emphasis on the value and worth of the participants and their actual experiences and involvement were very important in this investigation. The religious worldview of human nature is rich and complex and the reductionist understanding of human nature would not be beneficial to the research methodology (Malek, 2019).

Deming’s system of profound knowledge consisted of the understanding of human nature to solicit active engagement and commitment to the TQM process (Agrawal, 2019b; Chiarini & Vagnoni, 2017). This theory aligned with the social interactions that TQM participants maintained, which required care, diplomacy, and sensitivity, in fully understanding the causes of what drives their behaviors and the outcomes toward the practice. Harmonizing participants with TQM sustainment practices enhanced values of work life with an increased level of commitment, job involvement, empowerment, satisfaction, and improved productivity (Patyal et al., 2019). All these initiatives had the desired results with God’s blessing because His direction never canceled the human responsibility (Sarkissian & Phelan, 2019). The biblical perspective called for the organization to act as a steward of God’s creation and provided resources to make the processes successful. This stewardship implied responsibility to preserve process integrity, personnel engagement, respect, understanding, compassion, and obligation to care and maintain unbiased decisions (Malek, 2019).
Benefit to Business Practice and Relationship to Cognate

The results of this study presented evidence on how organizational culture influenced the sustainability of TQM practices that affected the level of quality and the overall performance of the business. There were multiple reasons that affected top management commitment, and this investigation showed that coherence of the TQM practices to the organization goals and objectives were of significant consideration. TQM initiatives focused predominantly on customer satisfaction and culture change and not on bottom line improvements; top management, at some point, needed to see tangible improvements in cost savings or increased business, or they would lose commitment (Anthony et al., 2017). Complementary to this assessment, some companies’ strategic plans focused more on business results and less on business processes, which affected the TQM initiative’s execution, resource infrastructure, and work prioritization for frontline practitioners (Sachdev & Agrawal, 2017). The results of the study showed that the organization could use the information to enhance its operational structure to align strategic goals with TQM practices in achieving high quality products and excellent performance at the same time.

The findings of the study validated the importance of employee engagement and involvement in the sustainment of TQM. Management did not consider TQM practitioners as sustainability experts, but it was exactly their experience in their role and function within the operational processes that gave rise to knowledge that was indispensable for transforming the approach towards sustainability (Süßbauer et al., 2019). Full employee participation was vital in TQM sustainment since it fostered team members’ ownership in handling quality, and reinforced information sharing and cooperation in solving quality issues (Mendes & Jesus, 2018). Employees needed to be empowered by appropriate structures to enable transfer of practical
experience to assist and stimulate sustainability transformations in various operational processes (Süßbauer et al., 2019).

Project management is a multifaceted field that includes quality management. The study concerning the sustainability issues of TQM relates to the cognate because it examined quality systems that affected the end results of projects related to manufacturing processes. Quality management is an integral part of project management from project inception up to customer delivery (Jaeger & Adair, 2016). Project managers needed to manage quality by adapting the policies and procedures to ensure a quality product and service. The balance of the cost and benefits of quality assurance outweighs the cost associated with low quality in any project. Inclusion of quality management in project management saves time and money and leads to a more advanced and efficient project organization (Jaeger & Adair, 2016).

**Summary of the Significance of the Study**

The significance of the study was to understand the sustainability issue of the TQM system in a water-treatment company, which had resulted in high cost of quality and low performance. Understanding the relationship between TQM and the company’s strategic development explained how and to what degree investing in TQM methodology contributes to achieving sustainable business objectives (Andrade Arteaga et al., 2020). Successful sustainment of TQM should consider all the needs and expectations of stakeholders and customers, as well as CI requirements (Benzaquen & Charles, 2020). The study added to the understanding of how the TQM sustainability issue happened in a particular organizational setting that prioritized the pace of production goals to achieve high financial output. The findings of the study validated and confirmed that the TQM sustainability issue in the manufacturing industry related to challenges in transforming its concepts into practices that were not compatible with the current
organizational structure as noted by Muruganantham et al. (2018). Harmonizing participants with TQM sustainment practices enhanced values of work life with an increased level of commitment, job involvement, empowerment, and satisfaction (Patyal et al., 2019). All these initiatives would have the desired results with God’s blessing because His direction never cancels the human responsibility (Sarkissian & Phelan, 2019). Quality management is an integral part of project management from project inception up to customer delivery (Jaeger & Adair, 2016). The results of this study presented evidence on how organizational culture influenced the sustainability of TQM practices that affected quality and performance of the business.

A Review of the Professional and Academic Literature

The academic and professional literatures had shown extensive studies on the implementation and sustainment of the TQM approach in the manufacturing industry and its many-sided outcomes (Nasim, 2018). Generally, the TQM philosophy highlighted the commitment of the organizational leadership, quality control through use of statistical techniques, and the continuous improvement in the quality of work processes through employee training, knowledge sharing, and education (Bugdol, 2020). Narrative literature reviews revealed multiple elements that contributed to the comprehensive effects of the quality system on process and business performance of organizations (Chiarini & Vagnoni, 2017). The academic and professional literature analysis concerning TQM fit and compatibility in the manufacturing industry enabled the researcher to identify multiple thematic themes that contributed to the sustainability issue of the methodology.

Understanding the relationship between TQM and strategic sustainable development would explain how and to what degree investing in TQM practices contributed to achieving strategic sustainable business objectives (Andrade Arteaga et al., 2020). Knowing how to sustain
TQM practices and understanding quality goals could provide a basis for planning how to sustain other business dimensions of performance (Su & Linderman, 2016). This literature review presented the impact of TQM in business practices, potential causes of its sustainability issue, concepts, theories, and related studies in its applications in the manufacturing industry. This section also examined anticipated and discovered themes that were related and potentially applicable to the study of the TQM sustainability issue as presented in peer-reviewed publications.

**Business Practices**

TQM employed as part of a business management strategy aimed to enhance organizational performance and improve customer satisfaction by providing a methodology that promotes high-quality products and services (Hwang et al., 2020; Kumar & Sharma, 2017; Nasim, 2018; Qasrawi et al., 2017). The manufacturing industry has long utilized the TQM approach in processes to address process variations and capability issues, which are responsible for poor product quality (Metaxas & Koulouriotis, 2019; Parvadavardini et al., 2016; Vouzas & Katsogianni, 2018). The TQM system involves teamwork, full participation and collaboration of all stakeholders, customer-driven quality initiatives, continuous improvement of processes, and application of quality management tools and techniques (Albuhisi & Abdallah, 2018; McLean et al., 2017; Nizamidou & Vouzas, 2020; Villanueva, 2018). The authors further added that an effective implementation and sustainment of TQM relates to quality and performance success for as long as practitioners adhere properly to its methodology and guiding principles. While TQM has been effective in enhancing quality and improving performance, its sustainment in the manufacturing field has involved many challenges (Bouranta et al., 2017; Carmona-Marquez et al., 2016; Nizamidou & Vouzas, 2020; Ratty et al., 2018).
Efforts to achieve high-quality performance in manufacturing businesses is different from what it takes to sustain it, and the capabilities of sustaining quality depend on the level of environmental uncertainty and competitive intensity (Su & Linderman, 2016). TQM is an innovative management philosophy that involves pervasive and radical transformation within the company, and the methodology does not take into consideration how employees will fit and function in the system (Jalilvand et al., 2018). Studies show that there is a high TQM failure rate due to lack of resources, insufficient infrastructure, poor mechanism for measuring performance, lack of teamwork, poor communication, lack of leadership commitment, and minimal employee engagement (Al-Ali et al., 2019; Hwang et al., 2020; Jaeger & Adair, 2016; Kaur et al., 2020). Adoption of TQM practices alone does not automatically lead to substantial improvements in manufacturers’ productivity, and operational performance improvement methodologies that are meticulously practiced or technically-oriented are less likely to produce better results (Tortorell et al., 2019).

Most firms often encounter difficulties and challenges in making sure there is smooth and seamless transfer of strategy deployment plans into daily management activities (Sachdev & Agrawal, 2017). There are discrepancies between theory and practice that create frustration for TQM practitioners when they recognize the disconnection between the TQM theory and the quality doctrines introduced by leaders in the organizational environment (Bernardino et al., 2016). Some organizations still misunderstand and misrepresent TQM, which results in skepticism of its effectiveness on improving operational results and the success of its implementation and long-term sustainment (Sfakianaki, 2019). This situation leads to poor quality products and services, causing operational disruptions, major financial loss, expensive
lawsuits, and long-term damage to the brand reputation and corporate image (Boikanyo & Heyns, 2019).

Lean manufacturing methodologies such as TQM were appropriate only to larger businesses because of their extreme cost and time-consuming implementation processes (Georgiev & Ohtaki, 2019; Sila & Walczak, 2017; Toke & Kalpande, 2019). This also applies to organizations that are short-term oriented and believe that the sustainment of TQM practices is costly and not practical in a short-term strategy despite its long-term potential to achieve competitive advantage (Haffar et al., 2019; Sila & Walczak, 2017). The authors also noted that smaller companies have limited financial and physical resources that restrict the application of hard TQM elements such as quality circles and Kaizen-oriented processes. Small manufacturing companies have a flat and rigid organizational structure, which forces them to spend more time on repairs and maintenance work rather than continuous improvement related to productivity and TQM activities (Aquilani et al., 2017; Baidoun et al., 2018). Small business companies have an informal quality management system, making the required systematic benchmarking and monitoring system of their existing processes impractical and very challenging (Aamer et al., 2017). In addition, there is little knowledge about the traceability related to internal and external cost of poor quality in small businesses compared to large organizations who have more resources to do the job (Van Schoten et al., 2016).

The problem of fear in TQM implementation and sustainment is that it affects the allocation of the appropriate project resources that are important in the early stages of quality team forming processes (Bugdol, 2020). Quality management should not focus on control and sanctions of employees but should put more emphasis on management of processes (Moccia, 2016). The implementation of the TQM concept and anxiety for immediate results causes
unwanted apprehension for employees in operations, which can be distressing if the scope and impact of changes is significant enough to affect everyone in the organization (Bernardino et al., 2016; Bugdol, 2020). Previous studies claim that driving out fear in quality management improves participation, but these investigations failed to define fear in the specific aspects of TQM such as leadership, commitment, empowerment, engagement, and teamwork (Bernardino et al., 2016).

TQM requires too much commitment from the team and unrestrained pressure to show obligation to methodology (Albuhisi & Abdallah, 2018). The condition creates strained commitment to proceed without adequate preparation and training necessary for the activity. TQM creates a perceived pressure to achieve high quality and reduce process failure, affecting the approach and role of participants in maintaining engagement and trust (Vouzas & Katsogianni, 2018). This requires strong leadership and higher competencies of members in balancing quality and work (Boikanyo & Heyns, 2019; Psomas & Jaca, 2016; Sila, 2020). There is lack of knowledge in proper application of TQM and confusion with the different understanding of empowerment between team leaders and members sustaining the practice (Carmona-Marquez et al., 2016; Chiarini & Vagnoni, 2017). This creates ambiguity related to the distribution of power and a low level of competence trust (Qasrawi et al., 2017). The authors further noted that team members want to have autonomy without fear of losing support, while leaders do not want to lose their authoritarian powers and demand increased efforts and responsibility.

Studies showed that many improvement projects using the TQM system do not follow similar routes because the methodology does not have a precise roadmap or pattern (Chiarini & Vagnoni, 2017). There are no agreements on one specific set of the most essential TQM practice,
even when developments related to TQM are identified or categorized based on different contexts, methods, and perspectives (Jaeger & Adair, 2016). There is no exclusive explanation that clarifies the entire picture of TQM (Zwain et al., 2017). There is no formal methodology associated with TQM that integrates various tools, and no overall strategy to tackle common problems, which can significantly limit the progress for each project (Anthony et al., 2017).

There is a weak relationship between organizational performance and TQM practices because it takes time for the methodology to produce benefits and influence organizational performance (Aladwan & Forrester, 2016; Qasrawi et al., 2017). Lack of involvement of key strategic partners in quality improvement programs is one of the main barriers that contributes to the TQM sustainability issue (Kaur et al., 2020; Moccia, 2016). TQM is a holistic concept and necessitates the motivation of all team members to strive for customer satisfaction, but organizations offer relatively little consideration to personal relations and human resources management (HRM) (Baidoun et al., 2018; Moccia, 2016).

**The Problem**

The general problem to be addressed is the sustainability issue of the TQM system in the manufacturing industry resulting in high external warranties, internal quality costs, and low productivity. Manufacturing companies encounter numerous challenges in translating TQM concepts into application and many of them have not fully realized the financial outputs and non-financial benefits of sustaining TQM practices (Muruganantham et al., 2018; Wei et al., 2019). Challenges in sustaining TQM practices include ambiguous data on process output, inappropriate measure of performance tracking, and wrong emphasis on solving the problem instead of recurrence prevention (Sachdev & Agrawal, 2017). The process metrics and measurements are often not clear and emphasized, making TQM more of a cultural initiative rather than a process
improvement initiative, consequently making the projects hard to validate and track effectiveness (Antony et al., 2017).

The complexity of TQM practices exacerbates other challenges to its sustainment, such as lack of operative control of manufacturing processes, lack of monitoring of process improvement, lack of information about quality cost, and no benchmarking of existing processes (Aamer et al., 2017; Aladwan and Forrester, 2016; Maistry et al., 2017). A performance measurement system that captures financial and non-financial indicators to measure performance comprehensively may not recognize the full impact of TQM benefits in operations (Al-Ali et al., 2019; Kaur et al., 2020; Wei et al., 2019). Complex and time-consuming process measurement management consists of statistical techniques to reduce the process variation in production processes and use preventive maintenance to improve quality and machine uptime (Wei et al., 2019). Practitioners place more concentration on quality inspection and control instead of prevention, and they struggle to move from a detection-based system to a prevention-based system (Li et al., 2018). An internal quality examination structure must be meticulously set-up at every control point of each critical station in the process to ensure conformance to product or service specifications (Aquilani et al., 2017; Baidoun et al., 2018; Dubey et al., 2018).

Employees believe that the suitability of change on their roles in the business has a significant influence on the overall change implementation, and the role of appropriateness of TQM practices and its sustainability depend on other contextual factors (Haffar et al., 2019; Kaur et al., 2020; Qasrawi et al., 2017).

The company’s strategy formulation focuses more on business results and less on business processes, which affects the initiative’s execution, resource infrastructure, and work prioritization for TQM frontline practitioners (Sachdev & Agrawal, 2017). Ranking of
operational priorities play a significant role in successful sustainment of TQM practices because it allows top leadership to easily prepare a workable plan that can optimize the limited available resources (Aquilani et al., 2017; Baidoun et al., 2018; McAdam et al., 2019). TQM projects focus primarily on customer satisfaction and culture change and not on bottom line improvements; management, at some point, needs to see tangible improvements in cost savings or increased business, or they will lose commitment (Anthony et al., 2017). There should be a strong relationship existing among strategic factors and performance; without these tactical drivers and enablers, successful and effective TQM sustainment is impossible (Carmona-Marquez et al., 2016; Psomas & Jaca, 2016). Reconfiguring strategic and tactical factors to fit the organization’s needs and CI expectations will have a positive effect on long-term TQM sustainability (Andrade Arteaga et al., 2020; Haffar et al., 2019; Kaur et al., 2020). TQM sustainment lacks supporting infrastructure, such as inclusion in operation budgets, formal project selection systems, dedicated internal resources, and formal reporting systems (Anthony et al., 2017). The organizational structure does not have the proper configuration to allocate the needed financial and physical resources to support TQM sustainment activities in the long-term (Jaeger & Adair, 2016; Maistry et al., 2017).

Organizational culture characterized by high bureaucracy, lack of customer orientation, and CI has a negative impact on TQM implementation and sustainability (Al-Ali et al., 2019; Haffar et al., 2019; Nasim, 2018). TQM promotes changes in the organizational structure (Haffar et al., 2019; Jiménez-Jiménez et al., 2019; Sila & Walczak, 2017). However, previous findings indicate that changes of hierarchies in organizational structures create confusion and mistrust in the integration of new business management approaches such as TQM and different working teams (Qasrawi et al., 2017; Talapatra & Uddin, 2019). Many studies highlighted the need to
align the managerial culture with the requirements of quality systems to support sustainment of the approach in the increasing complexity of manufacturing processes (Sinha & Dhall, 2018, 2020). When changes do start to take place in the organization, the sustainment of TQM programs becomes a challenge because leaders expect overnight changes from a transformation that usually takes a long-term journey (Li et al., 2018). Organizations dominated by market and hierarchal cultures do not support a favorable environment for the successful sustainment of TQM compared to cultures dominated by adhocracy or the clan system (Panuwatwanich & Nguyen, 2017). There is lack of understanding and identification of the essential components of the organizational culture that can either support or restrict the cultural change required by TQM before implementing the methodology (Sinha & Dhall, 2018, 2020; Talapatra & Uddin, 2019).

All quality activities begin with the leadership level and therefore management leadership plays an important role in providing resources, setting core values, and creating policies to show employees the importance of TQM implementation and sustainability (Chiarini & Vagnoni, 2017; Hwang et al., 2020; Wei et al., 2019). Studies have shown that one of the major barriers to TQM sustainment is management’s lack of commitment to quality, who consider quality management an extra cost (Bouranta et al., 2017; Vouzas & Katsogianni, 2018). Maintenance of TQM programs fail because of the lack of commitment from top leadership who fear changes and loss of power (Bugdol, 2020; Georgiev & Ohtaki, 2019; Qasrawi et al., 2017; Talib et al., 2019). Top management commitment concerning quality management influences the successful sustainment of TQM programs on business processes and services (Aquilani et al., 2017; Maistry et al., 2017; Tsironis, 2018). The authors further noted that failure of the organization to integrate quality in their strategic objectives plan would hinder the long-term sustainment of TQM practices in the business. This type of management estrangement obstructs communication
processes and immobilizes decision-makers to take up any improvement actions (Bugdol, 2020). The complexity of TQM causes top management to question the suitability of the methodology in their organization after the implementation, and this complication causes corporate leadership to lose involvement and commitment (Chiarini & Vagnoni, 2017). This condition cascades into less integrated leaders that are not effective and fully motivated in leading TQM initiatives (Kumar & Sharma, 2017). This situation, in turn, affects teamwork and employee engagement, which is essential in the sustainment of TQM practices and its success rate, and often loses its essence due to numerous turnovers of top management leadership (Aamer et al., 2017; Aquilani et al., 2017).

Top management should have realistic expectations where they could be able to pursue immediate gains in the short-term while understanding that the greater benefits of TQM are achieved long-term (Li et al., 2018). A high number of senior managers lack the understanding of the competitive mechanism of TQM that enables their manufacturing plant to achieve operational excellence and TQM sustainability (Sahoo, 2018). Training and education are the major motivating factors for implementing TQM, and their critical role for an effective sustainment in both service and manufacturing industries is recognized (Mendes & Jesus, 2018). Integration of knowledge management (KM) that involves acquisition, dissemination, and application of quality data and information contributes to the long-term sustainment of TQM practices in the organization (Honarpour et al., 2017; Marchiori & Mendes, 2020; Yurs et al., 2017).

An incompatibility in cognitive styles of leaders and participants with TQM focus will disrupt the effective operations of the organization (Kumar & Sharma, 2017). Although leadership has a high impact on KM acquisition and application, the role has lower impacts on
knowledge sharing of TQM practices and its benefits because of job and power insecurities (Qasrawi et al., 2017). Knowledge sharing and management are key concerns in evolving a good quality culture and a functioning quality management system that helps organizations keep up with dynamic changes (Iqbal & Asrar-ul-Haq, 2017; Marchiori & Mendes, 2020). The specific problem to be addressed is the potential sustainability issue of the TQM system in a water-treatment company in the southeastern United States, resulting in high product warranty cost, field failure rates, and cost of quality.

**Concepts**

TQM is a customer-focused business management philosophy that gives emphasis to the continual enhancement of the processes and management of business systems by means of policy positioning, resource management strategies, and statistical control (Mendes & Jesus, 2018; Ratny et al., 2018). Customer focus, CI, management commitment, employee quality management, teamwork, and customer satisfaction are some of the principles that establish the foundation of TQM (Fredriksson & Isaksson, 2018; Pantouvakis & Psomas, 2016). Proper operation of the TQM system improves the quality of products and performance while lowering costs of warranties and field failure rates; the guidelines provide the basis for continual advancement of the organization (Honarpour et al., 2017). Experimental investigations made on the relationship of organizational performance and TQM practices showed that TQM has a significant influence on organizational performance (Al-Saffar et al., 2020; Pham, 2020; Saleh et al., 2018).

Productivity becomes efficient with the improvement of quality, and failure to maintain TQM can result in poor quality, which translates to high costs and loss of the competitive position (Addis, 2019; Boikanyo & Heyns, 2019; Shafiq et al., 2019). TQM has a positive
correlation to quality and financial performance with significant value for customer focus, top management commitment, CI, process control, and supplier management (Ali et al., 2020a; Aquilani et al., 2016; Bouranta et al., 2017; Patyal & Koilakuntla, 2017). Proper maintenance of TQM can be a main source of competitive advantage and process excellence for business organizations while its failure can have opposing effects (Sila & Walczak, 2017). The sustainment of TQM influences the operational productivity of organizations, which eventually affects other dimensions of performance such as financial effectiveness, customer satisfaction, and other stakeholders’ efficiency (Nasim, 2018; Psomas & Jaca, 2016; San Miguel et al., 2016). Sustainment of TQM practices calls for firm observance of policy and procedures from all practitioners to have a meaningful contributing effect on operational performance and cost of quality (Bouranta et al., 2017; Jalilvand et al., 2018; Toke & Kalpande, 2020). The philosophy is a set of guiding principles for managing a business and involves a mutual collaboration of everyone in the organization and business partners to satisfy customers’ needs and expectations (Honarpour et al., 2017; Mendes & Jesus, 2018). TQM is an effective business management tool that can strengthen existing business strategies and goals when performed correctly and meticulously (Toke & Kalpande, 2020).

TQM is a strenuous management philosophy that requires full commitment to improve product quality and processes; otherwise, a halfhearted execution will lead to failure that translates to high costs and low performance (Al-Ali et al., 2019; Amin et al., 2017; Jung & Lee, 2016; Psomas & Jaca, 2016). It is a structured approach that necessitates full engagement from all participants to improve operational effectiveness, quality, and competitiveness of the company (Mendes & Jesus, 2018). TQM sustainment is successful when there is active participation from all members at all levels of the organization to meet and exceed quality and
performance goals and objectives (Amin et al., 2017; Bugdol, 2020; Hwang et al., 2020; Shafiq et al., 2019). Teamwork is vital in TQM sustainment since it fosters team members’ responsibility in handling quality initiatives, and reinforces information sharing and collaboration in solving quality issues that arise (Mendes & Jesus, 2018). Good leadership is important in providing motivation and encouragement for employees to engage in teamwork and be successful in their undertakings (Aladwan & Forrester, 2016; Jaeger & Adair, 2016; McAdam et al., 2019).

TQM and the organizational culture are interrelated, and the latter has an influence on behaviors and attitudes toward successful quality management and implementation (Durana et al., 2019; Patyal et al., 2019). The fundamental support of the organizational culture is the principal requirement for the sustainment of TQM practices in business processes (Sinha & Dhall, 2018, 2020). Organizational culture has a critical role in giving recognition and enabling TQM initiatives and it is one of the most essential variables in the success or failure of TQM sustainability (Ali et al., 2020b). Organizational culture creates the climate that influences quality management practices and affects TQM implementation in goal setting, team integration, customer value creation, performance, innovation, cross-functional collaboration, member participation, and recognition (Toke & Kalpande, 2019). Harmonizing organization culture and TQM practices enhances values of employee work life with an increased level of commitment, motivation, job involvement, empowerment, satisfaction, and improved productivity (Patyal et al., 2019). Proper management and understanding of the interconnectedness of organizational culture and the TQM system helps enhance organizational effectiveness (Duran et al., 2019; Toke & Kalpande, 2019).
Successful sustainment of TQM influences the organizational culture’s direction, and teams adjust accordingly as they are trained in their new roles (Nasim, 2018). This relationship develops a collective responsibility, which incorporates shared values and commitment to quality (Bendermacher et al., 2017). Subsequently, the content of the organizational culture influences the TQM system and its functionality, but it demands a complex cultural shift from the traditional approach to management focusing on the way to a total quality mindset (Jung & Lee, 2016; Nasim, 2018). TQM requires a radical cultural change from traditional management to CI management style in an organization (Haffar et al., 2019). Sustainment of the TQM concept is not an easy undertaking because it necessitates a total change in organizational culture, shifting of responsibility to management, and constant participation of members in the quality improvement process (Nasim, 2018; Panuwatwanich & Nguyen, 2017). TQM sustainment requires changes to the shared assumptions, frames of reference, and understandings that most organizations have developed through interactions with their environment and altering these established perspectives can create a challenge to TQM sustainability (Andrade Arteaga et al., 2020).

TQM and KM are synergistically related, and their interaction has a positive effect on their standard principle in both directions where development in one construct leads to development in the other (Green et al., 2019; Honarpour et al., 2017; Marchiori & Mendes, 2020; Zwain et al., 2017). The interconnectedness of the two processes supports an effective means to enhance idea generation, problem-solving skills, and effectiveness in taking corrective and preventive measures to increase process or service quality and efficiency (Marchiori & Mendes, 2020; Yusr et al., 2017). TQM application positively relates to the improvement of learning organizations and supports creation of an environment that empowers team members to
efficiently recognize and solve problems (Tortorella et al., 2019). The authors further added that KM and TQM complement each other when properly planned and implemented in a process.

**Theories**

Deming’s theory of TQM rested upon 14 points of management that include the system of profound knowledge and the Shewart Cycle of plan-do-check-act (PDCA) (Agrawal, 2019b; Chiarini & Vagnoni, 2017; Sila & Walczak, 2017). In this 14-point program, utilization of teamwork and employee participation in decision-making achieves business systems’ optimization (Polese et al., 2019). It is a network of mutually dependent components that function together to achieve the objective of the system proficiently and productively (Fredriksson & Isaksson, 2018). The entire organization performs this set of systematic activities to accomplish its objectives efficiently and effectively in delivering products and services with a level of quality that satisfies customers at the right time and price (Sachdev & Agrawal, 2017; Toke & Kalpande, 2019). The theory outlines the significance of top management support to sustain the TQM system and links quality as the product of collaborative work efforts of the organization over the total costs (Dilawo & Salimi, 2019; Mendes & Jesus, 2018). This expanded view relies on CI for assessing the satisfaction–expectation gap, and at the same time, evaluates employee and customer participation in the process (Benzaquen & Charles, 2020; Polese et al., 2019).

Top management commitment significantly affects job satisfaction and is extremely important for TQM sustainment in the organization’s processes (Arunachalam & Palanichamy, 2017; Mehralian et al., 2016; Ratny et al., 2018; Tsironis, 2018). Deming’s system of profound knowledge consists of the understanding of human nature to solicit active engagement and commitment to the TQM process (Agrawal, 2019b; Chiarini & Vagnoni, 2017; Sila & Walczak,
Employee involvement provides high performance work structures and incorporates CI efforts with typical business operations (Arunachalam & Palanichamy, 2017; Iqbal & Asrar-ul-Haq, 2018). Total participation is a key factor in the sustenance of TQM because it inspires employees to innovate and help the company to maintain its long-term vision and planning (Amin et al., 2017; Chiarini & Vagnoni, 2017; Dahlgaard et al., 2019; Psomas & Jaca, 2016). The involvement requires employees’ full commitment and a shared mission as motives for attaining efficient endeavors for CI (Boikanyo & Heyns, 2019; Phan et al., 2019; Polese et al., 2019). TQM requires that all employees are engaged and involved in helping restructure the organizational culture that supports the practice of sharing the responsibility and accountability for providing quality products and services to customers (Alshourah, 2020, 2021; Boikanyo & Heyns, 2019).

Crosby’s theory of TQM relies on multiple absolutes of quality management culminating in a list of 14 elements to quality improvement (Agrawal, 2019a; Polese et al., 2019). Prevention of defects and conformance to expectation or specification defines quality; result measurement concentrates on the financial cost of quality (Benzaquen & Charles, 2020). Crosby’s 14-quality-steps framework is centered on the importance of top management’s role in organizing operations, nurturing employee education and training, and supporting the real-time implementation of actions (Polese et al., 2019). Quality management, in this perspective, is a dynamic and continuous monitoring process of CI (Kaur et al., 2020; McLean et al., 2017; Phan et al., 2019). The theory highlights the quality requirements for prevention and the result reflects the cost of processing nonconformity, and zero defects (Jalilvand et al., 2018). Conformance to product or service requirements defines quality and must be examined and measured based on
product specifications and tangible targets or metrics rather than based on opinions, beliefs, or experience (Sunder, 2016).

Application of the TQM methods, tools, and techniques requires dedicated and committed resources, and most companies do not have a strategic roadmap complemented with suitable methods and techniques to ensure success with their operations (Chiarini & Vagnoni, 2017; Dahlgaard-Park et al., 2018). Managers need to have an in-depth understanding of the importance of building a suitable organizational culture with a focus on the TQM basic principles (Álvarez-García et al., 2016; Haffar et al., 2019; Nasim, 2018). Leadership has a key role in HRM to enrich job motivation and subsequently enhance performance effectiveness (Polese et al., 2019). A lack of understanding of how the process elements fit together can lead to the disintegration of management control that may result in a lack of universal application of TQM on the company’s processes. The manufacturing process integrates quality management with pure focus on the customers and productivity (Arunchalam & Palanichamy, 2017). The central purpose of TQM is to meet customer requirements regardless of whether they are external or internal customers (Ratny et al., 2018). Customer satisfaction is the primary objective of the quality management system, with heavy emphasis on reduction of defects and improving products and services (Aquilani et al., 2017; Khurshid et al., 2018).

**Constructs**

The selected research constructs included the characteristics of the participants and the elements of the TQM sustainability issue. The rigidity of the TQM methodology requires strict adherence to policies and procedures. Any deviation from the TQM approach affects the level of quality and performance (Chiarini & Vagnoni, 2017; Gözükara et al., 2019). TQM has developed into a philosophy that integrates both the hard and soft aspects of quality management for
effective execution of the methodology (Arunachalam & Palanichamy, 2017; Jusoh et al., 2018; Ratny et al., 2018). The connection between hard and soft features in TQM methodology is business process management, since the TQM needs a base framework in which social factors can develop, operate, and be successful (Al-Ali et al., 2019; Jiménez-Jiménez et al., 2019; Nasim, 2018). Soft TQM constructs such as commitment, top management leadership, strategic quality management, employee involvement, and empowerment are critical to the success of TQM sustainability in the organization (Albuhisi & Abdallah, 2018; Georgiev & Ohtaki, 2019; Hwang et al., 2020; Jiménez-Jiménez et al., 2019).

The pacesetting leadership style is an established attribute of the management approach that can affect the sustainability of TQM in the manufacturing process. The influence of leadership style on employees’ involvement and participation in quality assurance activities has significant impact (Kumar & Sharma, 2017; Moccia, 2016; Psomas & Jaca, 2016; Sila, 2018b). TQM leaders motivate, and their behavior and leadership style are the means in which business management systems such as TQM are carried out successfully (Bendermacher et al., 2017; Chiarini & Vagnoni, 2017; Kumar & Sharma, 2017). Effective leaders encourage proactive behaviors in their employees that support and enhance CI, which is one of the fundamental philosophies of TQM (Moccia, 2016; Nizamidou & Vouzas, 2020). These leaders are key drivers of quality culture expansion through their aptitude to influence appropriate resource distribution, simplify roles, assign responsibilities, and align the workforce with business process management objectives (Ali et al., 2020a; Bendermacher et al., 2017). The significance of the leadership role in sustaining TQM is by giving employees confidence in their job functions and by shifting the traditional role of managing from authoritarian supervision to leading, guiding, and training of team members (Al- Saffar et al., 2020).
The market-oriented organizational culture is a preexisting attribute of the company that can affect TQM sustainability. Market-orientation allows businesses to develop better products and services by producing greater customer value and customer satisfaction. Market-oriented companies create potential maintainable competitive advantage through information sharing and forming coordination among all the functional departments within the business (Ali et al., 2020a). The relationship between business cultural orientation and the sustainment of TQM practices is substantial in influencing quality and performance in the organization (Gözükara et al., 2019; Haffar et al., 2019).

TQM practices can affect the preset company’s strategies and operational target variables. Quality management is a customer-focused process and aims for continual support of a company’s strategic goal and objectives with its practices (Albuhisi & Abdallah, 2018; Bevilacqua et al., 2017). Proper sustainment of TQM improves the effectiveness of production resources and their capabilities to support the process and specific tasks tied to reject reduction and higher productivity (Boikanyo & Heyns, 2019; Georgiev & Ohtaki, 2019; Hilman et al., 2019). TQM sustainment issues result in high cost of quality and external warranties that are outcomes of failed prevention and correction initiatives. TQM practices have direct positive relationships with cost related to quality (Albuhisi & Abdallah, 2018; Sila, 2018a). Continuous quality improvement requires a rigid benchmarking of existing business processes to improve overall performance (Aamer et al., 2017; Cho & Linderman, 2019). This allows cost of quality to be controlled, reduced, and managed for a successful sustainment of TQM (Jaeger & Adair, 2016).

TQM practice and sustainability issues result in inconsistent productivity and performance issues, which in turn affect the overall business targets set by the organization.
TQM practices have direct positive relationships with productivity and organizational performance (Kumar & Sharma, 2017; Sila, 2018a). TQM provides legacy tools and methods that work mainly to reduce errors, waste, and inefficient procedures to improve process performance and productivity (Alkhaldi & Abdallah, 2019, 2020). Giving a full commitment to a TQM setting, leaders should organize and synergize employees’ actions to achieve consistent productivity and performance targets while adhering to agreed quality standards and work procedures (Pham, 2020).

The impassive employee behavior captures employee reaction to the TQM sustainment issue while fulfilling operational targets. Employee behavior is the attitude or actions of an employee in an organization and is affected by factors related to job satisfaction, commitment, and job stress that characterize the main reasons of employees’ affective attitude construct (Gaiardelli et al., 2019). Employees behave sensibly to gain respect and recognition while adhering to strict company regulations and policies at the workplace (Andrade, 2017; Kumar & Sharma, 2017). Employees’ core virtues represent the essential enabling elements to overcome the resistance to change that can successfully implement and sustain the TQM programs properly and effectively (Aquilani et al., 2019; Maistry et al., 2017; McAdam et al., 2019; Moccia, 2016). TQM promotes and supports full involvement of employees and creates participatory strategies that enhance the cooperative performance of employees and their behavior towards initiatives and decision-making processes to achieve business targets and objectives (Al- Saffar et al., 2020; Baidoun et al., 2018).

Issues in sustaining TQM will create unpredictable operational constraints and overwhelm process enablers that limit the optimization of any part of the manufacturing system or infrastructure to fulfill operational targets (Jaeger & Adair, 2016). TQM programs that fail...
restrict the performance parameters of the business from reaching their planned goals (Kumar et al., 2020a; Wei et al., 2019). The operational performance of the business includes high-level quality and process leaness in terms of equipment capability, speed of delivery, flexibility, adaptability to change, product or service dependability, and overall costs (Gaiardelli et al., 2019). The effectiveness of these capabilities on product processes and service depends on the successful sustainment of TQM practices.

**Related Studies**

Six Sigma Quality and Lean Management (LM) are quality models of different alternative TQM roadmaps since all of these methodologies apply to both manufacturing and services to improve safety, quality, and process performance by reducing costs and increasing revenue (Fredriksson & Isaksson, 2018). LM and Six Sigma are leading TQM tools for performance improvement in organizations with the appropriate infrastructure built on change culture and leadership (Shokri et al., 2016). Even though there are differences in definitions of TQM, Six Sigma, and Lean, their goals and objectives seem to be common in application to both manufacturing and services in any industry (Sreedharan et al., 2018). These related methodologies whose main focus is on process control and improvements have their own challenges and sustainability issues.

Six Sigma principle, which integrates with TQM practices with a set of infrastructure and quality management methodology, rests on decreasing errors by reducing variation on process parameters that are critical to quality (Patyal & Koilakuntla, 2017). Six Sigma aims to reduce variations in a process and its primary objective in projects is to decrease variations to the range of 3.4 defects per million (Asif, 2019). From the project management perspective, Six Sigma is a methodical technique and a tool-kit for reducing or eliminating non-conformances in production
processes (Sreedharan et al., 2018). All TQM philosophies except for the commitment requirement are similar in the Six Sigma approach (Fredriksson & Isaksson, 2018). Comparable to TQM, proper application of Six Sigma initiatives improves process performance, promotes customer satisfaction, and enhances innovation capability (Antony et al., 2017; He et al., 2017).

Studies showed that over 60% of Six Sigma projects fail to provide the desired results because they were unsuccessful in demonstrating a longer-term impact and organizations were pulling back from initiatives due to mounting costs (Antony & Sony, 2019, 2020). Similar to TQM, Six Sigma sustainment issues are associated with a substantially high cost of implementation at the initial phase and the reluctance of businesses to support continuing spending due to limited funds (Čaušević & Avdagić-Golub, 2019; Kumar et al., 2016; Ullah et al., 2017; Vendrame Takao et al., 2017). Improper implementation and sustainment of Six Sigma negatively affects employees’ morale, engagement, and customer satisfaction, indicating that there are softer variables in the methodology that affect its delivery (Antony et al., 2018; Shamsi & Alam, 2018; Shokri et al., 2016). The appropriateness of the Six Sigma application centers on the approach’s capability to reduce variation in processes and understanding the trade-off between the degree of variability reduction and the potential accruing benefits is important for its sustainment (Antony & Sony, 2019, 2020). The authors further noted that variation reduction is not the only foundational concept in organizational inefficiency and should not be the sole focus for productivity and performance.

Implementation of Six Sigma requires high investment in training of both top leadership and employees mainly influenced by lack of accepted standards in knowledge sharing or transfer of lessons learned (Čaušević & Avdagić-Golub, 2019; Hussain et al., 2019). Failure of the Six Sigma approach materializes when there is no alignment and joint-optimization of existing core
practices and behavioral values in the organization (Antony et al., 2018; Asif, 2019). Research found that lack of management support, insufficient quality maturity of the business, lack of physical resources, and deficient change management practices contributed to the sustainability issue in Six Sigma project long-term capability (Albliwi et al., 2017; Hudnurkar et al., 2019).

Involvement from top leadership needs to happen to ensure the success of the methodology by endorsing it as a way of making things happen as opposed to treating it as a process improvement tool (Albliwi et al., 2017; Čaušević & Avdagić-Golub, 2019). Top leadership can reflect this awareness in the organizational norms, values, and culture that management stands for and supports.

Six Sigma teams do not have the knowledge to optimize the resources available by not using existing infrastructure to its full capability and this may create non-value-added costs to the initiatives (Hussain et al., 2019). Lack of knowledge and awareness of the approach’s philosophy hampers the effectiveness of the initiatives and its intended outcomes; this can also lead to poor time management of the project and unproductive use of resources (Albliwi et al., 2017; Kumar et al., 2016; Nguyen et al., 2017). The implementation of Six Sigma concepts and practices requires well-organized knowledge coordination and team management at several levels of the organization. Lack of communication and synchronization among multifunctional team members and departments hamper application of the approach (Antony et al., 2018; García-Alcaraz et al., 2019, 2020). Poor or indistinct Six Sigma strategic plans, lack of communication, physical resources, and disregard of the role of employee involvement and engagement in the implementation and sustainment process contributes to intangibility of project outcomes (Antony et al., 2018).
There are quality-based Six Sigma projects that require advanced equipment, modern facilities, and innovative technology to fulfill business goals and customer needs, and smaller organizations cannot provide most of these requirements (Hussain et al., 2019). There is no sufficient mechanism to identify and trace activities for proper implementation of Six Sigma, and there is confusion about the impact of the project’s benefits because of the many different ways of how its performance is measured (Cherrafi et al., 2017; Nguyen et al., 2017; Sunder, 2016). There is lack of understanding about the impact of hard and soft skills in the methodology and insufficient integration of change management that contributes to teams’ resistance to change, an unsupportive organizational culture, and unsustainable results (Antony et al., 2018). The leading misconception of Six Sigma, which also leads to its limitation, is the consideration of the methodology as a statistical toolkit as opposed to a philosophy of continual improvement (Sunder, 2016).

LM refers to the application of Lean practices and principles to optimize business processes, improve quality, reduce waste, enhance innovation capability, increase productivity, and add more value for the customer (Abolhassani et al., 2016; Hallam & Contreras, 2016; Resta et al., 2017). Fredriksson and Isaksson (2018) found that five out of six TQM principles are comparable in LM methodology. Similar to TQM, although a number of studies found that Lean has significantly contributed to the success of large organizations, the majority of smaller enterprises found several barriers such as a lack of tangible benefits and issues with sustainment (Abu et al., 2019). LM strives for process perfection and it employs a systematic process for achieving zero defects and control of inventory by constantly upgrading continuous process flow and optimizing customers’ satisfaction and experience (Modranský et al., 2020). Lean teams are always seeking ways to improve services and manufacturing processes by concentrating on
business components that add more value for the client and remove non-value-added activities that create unnecessary labor and cost to the business (Abolhassani et al., 2016). LM encourages incremental improvements of activities in existing organizational settings to remove variation, waste, and over-burden (known as Muri, Muda, and Mura, respectively) to provide more value to the consumers (Sreedharan et al., 2018).

LM application is constrained exclusively to improve processes in manufacturing cells and has very limited effect on developing the processes of the product (Marodin et al., 2016). Companies practicing LM lack the practical training, technical knowledge of the methodology, and the understanding of the long-term benefits of the practice, which also contributes to change resistance by its employees (Abolhassani et al., 2016; Bajjou & Chafi, 2018; Coetzee et al., 2019; Pearce et al., 2018). Barriers to LM were due to lack of knowledge about lean practices specific to the industry, inadequate financial support, lack of a long-term philosophy, absence of a lean culture in the organization, and an inexperienced workforce (Al-Aomar & Hussain, 2018; Bajjou & Chafi, 2018; Pearce et al., 2018). Failure and confusion to recognize, demonstrate, and verify the effects of the long-term sustainability of LM added to the challenges in the adoption of the methodology (Henao et al., 2019). There is a lack of management commitment, understanding, competence, and support in adopting LS sustainability practices because of inadequate knowledge or familiarity to verify results (Al-Aomar & Hussain, 2018; Chaple et al., 2018; Khaba & Bhar, 2018).

Insufficient quality management practices along with process management issues related to logistics and material workflow contribute to the sustainment issue of LM (Kurilova-Palisaitiene et al., 2018). Limited employee engagement and involvement are driven by failure of leadership to recognize and harness frontline recommendations for process improvement.
initiatives (Khaba & Bhar, 2018; Ufua et al., 2018). Lack of clarity on LM projects do not give the project members the overall view of what and how their role contributes to the overall picture of the project, so subtasks cannot be optimized for maximum effect (Modranský et al., 2020; Sunder, 2016). Some businesses use LM as a quick fix for underlying issues and there is a lack of system-thinking philosophies across various segments in the organization that can reduce the optimization of the approach in improving specific process performance (Anthony et al., 2018; Sunder, 2016).

LM lacks a definitive theory to support its methodology and practices, and more field data needs to be collected to improve theory-driven Lean management methods and knowledge-transfer from iterative processes that continually adjust for improvement (Miao et al., 2019; Sunder, 2016). There are significant restrictions in allocating full-time dedication to project teams who are also part of other teams in addition to their regular jobs. It is hard to commit all the LM work time just to one project (Modranský et al., 2020). The rigid nature of the organizational structures can impede creativity, exploration, risk-taking, and experimentation. Executing out-of-the-box types of LM thinking may not be acceptable in this environment, since all must follow predefined guidelines and practices (Edison et al., 2018). LM’s nature of producing small incremental improvements instead of one meaningful breakthrough for excellence does not work well with the necessity of creating much-needed improvements at many organizations. Similar to Six Sigma, if LM were to be considered as a toolkit instead of a mindset or philosophy for consistent improvement, the methodology will lead to failure in its application and sustainability (Sunder, 2016). Challenges in initiative sustainability is a strategic issue addressed only by transitioning from the formal implementation approach to a full
integration of the practice into the day-to-day business way of life; the infrastructure and accountabilities should be in place (Anthony et al., 2017).

**Table 1**

*Related TQM Models*

<table>
<thead>
<tr>
<th>Method</th>
<th>Description of Sustainability Challenges</th>
</tr>
</thead>
</table>
| Six Sigma    | • Poor long-term impact, mounting cost, and incompatibilities in application (Antony & Sony, 2019, 2020)  
• High cost of initial implementation and reluctance of businesses to support continuing spending (Vendrame Takao et al., 2017)  
• Improper implementation and sustainment of the methodology affects soft variables (Shamsi & Alam, 2018)  
• Conflict in the appropriateness of the application in business processes (Antony & Sony, 2019, 2020)  
• No coherence to the organization’s existing core practices and behavioral values (Asif, 2019)  
• Lack of accepted standards in knowledge sharing or transfer of lessons learned (Čaušević & Avdagić-Golub, 2019)  
• No alignment and joint-optimization of existing core practices and behavioral values in the organization (Antony et al., 2018; Asif, 2019)  
• Lack of management support, insufficient quality maturity of the business, lack of physical resources, and deficient change |
management practices (Hudnurkar et al., 2019)

- Lack of knowledge in optimizing resources and not using current infrastructure to full capability (Hussain et al., 2019)
- Lack of knowledge and awareness of the approach’s philosophy and poor time management (Albliwi et al., 2017)
- Lack of communication and synchronization among team members and departments (Antony et al., 2018)
- Poor strategic plans and disregard of employee involvement and engagement in the implementation and sustainment process (Antony et al., 2018)
- Lack of advanced equipment, modern facilities, and innovative technology to fulfill initiatives (Hussain et al., 2019)
- No sufficient mechanism to identify and trace activities for proper implementation of projects (Cherrafi et al., 2017)
- Misconstruction of Six Sigma as a statistical toolkit as opposed to a philosophy of continual improvement (Sunder, 2016)

Lean Management

- Inadequate effect on developing product processes (Marodin et al., 2016).
- Lack of training, knowledge, and the understanding of the long-term benefits of the practice (Abolhassani et al., 2016)
- Limited financial support, lack of a lean culture in the organizations, and an inexperienced workforce (Al-Aomar &
• Failure to verify and recognize long-term benefits and outcomes (Henao et al., 2019)

• Lack of management commitment, competence, and support in adopting LS sustainability practices (Chaple et al., 2018)

• Insufficient quality and process management practices (Kurilova-Palisaitience et al., 2018)

• Limited employee engagement and poor recognition from leadership (Khaba & Bhar, 2018)

• Lack of clarity on projects do not give the members the overall view of how their role contributes to the bigger picture of the project (Modranský et al., 2020; Sunder, 2016)

• Lack of system-thinking philosophies in the organization that can reduce the optimization of the approach (Sunder, 2016)

• Lack of definitive theory to support its methodology and practices (Miao et al., 2019; Sunder, 2016)

• Significant restrictions in allocating full-time dedication to project teams who were also part of other teams in addition to their regular jobs (Modranský et al., 2020)

• The rigid nature of the organizational structures can impede LM creativity, exploration, and experimentation (Edison et al., 2018)

• Use of LM as a statistical toolkit as opposed to a philosophy of
Anticipated and Discovered Themes

Associated with the broader TQM philosophy, CI represents a vital tool in the manufacturing industry used to enhance customer satisfaction and improve the competitiveness and performance of a company (Ahmad et al., 2017; Hailu et al., 2018; Tasleem et al., 2019). CI by TQM means incrementally improving people, capabilities, processes, and systems to prevent and avoid nonconformities (Kumar & Sharma, 2018; Tavana et al., 2020). Kumar and Sharma (2018) noted that the Deming improvement cycle of PDCA is a commonly used continuous quality improvement model, which consists of four repetitive steps for CI and learning. Challenges in CI initiatives affect TQM sustainability. CI and learning are the concepts of persistently pursuing means to improve operational processes, which involves recognizing benchmarks of best-in-class practices and instilling a sense of worker ownership of the process (Moccia, 2016; Saleh et al., 2018). Benefits from continuous quality improvement initiatives will result in gradual changes in culture or sharing of lessons learned between teams in the organization (Backlund & Sundqvist, 2018; Simmert et al., 2019). CI accomplishments are extensive and broad in scope, continuous, and incremental. The methodology will have to evolve continually for the process to be sustainable (Brindle, 2020). Support of management across all levels in the organization is indispensable to the accomplishment of all CI initiatives. Without top management and employee commitment to continuous improvement, the process will fail (Backlund & Sundqvist, 2018).

CI efforts have a high failure rate due to a systematic focus on success factors instead of directly addressing failures in the business processes or service (McLean et al., 2017). The
authors also noted that the organizational culture significantly affects the environmental structure that supports the CI activities, and this could influence employee involvement and engagement. Management involvement in CI projects is marginal because of concerns for capacity needs and flexibility, consequently limiting their support for sustaining future initiatives (Newham et al., 2016; Talib et al., 2019). Lack of financial resources and commitment from workers are the main barriers to CI because top management treats the practice as an optional program only when resources become available and postpones it when the workload is high (Ahmad et al., 2017; McLean et al., 2017). The authors further claimed that there is lack of recognition of CI initiatives from top management and most workers perceive the practice as an added workload to their existing jobs.

Challenges to CI practices include minimal cooperation from team members, improper integration of the team in CI activities, inadequate management support, low employee involvement, and lack of KM in the business to initiate CI projects (Ahmad et al., 2017; Stelson et al., 2017; Tavana et al., 2020). To maintain sustainability of the approach, effective quality improvement requires that short-term transformation be incorporated expeditiously into a long-term strategy progression (Brindle, 2020). Successful CI activity places the worker as an active participant of the change and not as a passive element, thereby improving job autonomy and significance, with positive consequences of gaining higher commitment, reducing stress, and achieving greater satisfaction (Gaiardelli et al., 2019). Appraising the effect of components of continuous quality improvement initiatives can deliver evidence of their benefits, but evaluations are time-consuming, expensive, and intently focused (Brindle, 2020). The author further added that sustaining continuous quality improvement initiatives needs trustworthy data, confirmation of benefit and value, measurable results, and investment in an organizational culture that
preserves quality improvement. CI project teams frequently initiate resolving problems anew instead of learning from experiences of earlier projects, and “re-inventing the wheel” means lost opportunity to progress or develop achievements from one CI project to another (Backlund & Sundqvist, 2018).

Sustaining a consistent quality performance requires a more dynamic approach where companies need to continually sense and adapt to variations to preserve their performance level (Anthony et al., 2017). The concept of dynamic capability (DC) delivers an overarching justification about how firms’ capabilities mutually sustain quality performance (Su & Linderman, 2016). The company’s capability to incorporate, transform, and reconfigure external and internal core proficiencies to address rapidly varying business environments creates patterns from existing practices and learnings that enables it to adapt operations through changes in the market (Wollersheim & Heimeriks, 2016). Differentiated from ordinary capabilities that determine how a company functions daily by enabling operational effectiveness, DC empowers the company to sense and seize new business opportunities and convert these to new value-creating strategies by transforming ordinary capabilities (Laaksonen & Peltoniemi, 2018). Some studies explained that DC is the right strategy to maintain the sustainability of a business management process in a company (Putri et al., 2018). According to Kumar et al. (2020b), the dimensions of DC and quality management capabilities have a positive impact on performance; DC assists a business in sustaining its competitiveness and effectiveness in the market’s dynamic environment.

DC includes sensing, seizing, and reconfiguring to transform existing information to produce new knowledge, which contributes to a company’s adaptability to change so they can sustain a consistent quality performance (Laaksonen & Peltoniemi, 2018; Su & Linderman,
DC helps sustainment of new processes by measuring new strategic designs and initiatives to aid in making a quick and timely decision on matters like resource allocation, organizational structure changes, and alliances (Putri et al., 2018). Businesses constantly develop their products and processes to adapt to customers’ changing needs with their ability to reconfigure timely. This adaptation helps TQM practices to positively influence companies’ innovation performance to adjust to customers’ varying demands (Laaksonen & Peltoniemi, 2018; Yusr, 2016). It is a strategic function of executives to develop DC to reconfigure effectively whenever any change occurs and to keep up with the needs of re-allocation and re-combination of the organization’s assets and physical resources (Putri et al., 2018). Research found that teams with high DC awareness exhibit a collective efficiency of coordination, utilize resources more efficiently, demonstrate superior reflection in action, and depend on more suitable and structured actions compared to teams with low DC responsiveness (Wollersheim & Heimeriks, 2016). DC’s quality dimensions also include the capacity to associate individual knowledge into new functional capabilities and have the coordinating ability to distinguish, assemble, and distribute resources by enabling the distribution of process intelligence across the business unit (Kumar et al., 2020b).

DC has a positive association with quality management and other related fields, such as HRM in the realization of adaptive capabilities in companies that are capable of enduring in hypercompetitive business environments (Gutierrez-Gutierrez et al., 2018). The authors further noted that with this logic, quality management could play an important role not only in day-to-day activities of the business but also in its long-term strategic orientation for success. Studies proposed that DC is distinctive to the company and cannot be examined by comparing their utilization between firms. In contrast, studies also found that DC is comparatively similar across
companies in the form of “best practices” (Laaksonen & Peltoniemi, 2018). However, the authors claimed that irrespective of their differences regarding the uniqueness of DC, the treatment of DC as a business-level performance variable is more prevalent in organizations. DC is another course of action for optimizing existing organizational resources, advancing the quality management position, and improving competitive advantage by integrating means that help the company effectively adjust to dynamic changes in the overall business environment (Maleki-Minbashrazgah & Shabani, 2019). The nature of DC as a dependable mechanism for resources adaptation comes from an organization’s systematic ability to renew the company’s endowment of resources by forming new resources and reintroducing the mix of both external and internal resources (Salvato & Vassolo, 2018). The authors claimed that in contrast, a business whose adaptation is fragmented, comprising of intermittent acts of resourcefulness or ad-hoc problem solving to resolve quality issues only as they become known, is not performing an appropriate DC.

Recent studies discovered that several HRM-related TQM elements such as employee training, empowerment, communication, recognition, and rewards contribute to the achievement of employee involvement initiatives (Aamer et al., 2017; Baidoun et al., 2018; Bakotić & Rogošić, 2017). These HRM-driven results positively affect the sustainment of the TQM practice, the systems approach to management, decision-making, and the factual approach to continuous improvement (Aquilani et al., 2017; Sila, 2020). The education and training dimensions of HRM have a strong influence on TQM sustainability, which is reinforced by appropriate compensation, benefits, and employee development and selection (Ali et al., 2020b; Dubey et al., 2018). The authors further claimed that HRM practices are most common enablers of TQM and that the HRM department has a significant role in the approach’s success. HRM
practices have links to quality and customer satisfaction through the process of organizing work that allows employees the discretion to respond to diverse customer demands in maximizing results (Lee et al., 2019). Enabling and empowering employee decision and involvement in the quality decision-making process improves motivation, cultivates engagement, reduces turnover, and has a constructive relationship with the overall performance of the business (Aamer et al., 2017; Aquilani et al., 2017).

HRM is a strategic management tool used for the successful implementation of corporate objectives and sustainability that requires initiatives and engagement by employees at all levels of the organization (Süßbauer et al., 2019). HRM contributes to better quality and performance by helping design work to increase employee preference and involvement in operational decisions. The role designs training to develop employees’ knowledge, skills, abilities, and constructs incentives designed to motivate effort (Baidoun et al., 2018; Lee et al., 2019). HRM promotes standard practices that form a workforce that has important company-specific skills and provides the opportunity to use those abilities successfully through organizational design (Ali et al., 2020b; Cho & Linderman, 2019). This creates long-term commitment and motivation of employees to excel, most especially in quality and performance-related initiatives planned by the organization.

Studies showed that HRM-related quality management practices, such as high-performance work practices, add to generating a learning-oriented organization by supporting successful new product development processes and incorporating innovative knowledge sharing in the work system (Gutierrez-Gutierrez et al., 2018). HRM has a critical role of managerial sensitivity by supporting change through the creation of sound business strategies and a responsive organizational climate where employees enthusiastically adhere to certain norms and
core values favorable to upholding business goals (Maleki-Minbashrazgah & Shabani, 2019). The authors further noted that successfully building the commitment needed from both management and employees to support business process strategies would be beneficial in any sustainability program created by the organization. The combination of effective HRM practices and sustainment of TQM practices within business management processes supports the company's initiatives to achieve a high level of business performance and total customer satisfaction (Alkhazali et al., 2019).

KM is a strategic organizational resource that is associated with business success where knowledge sharing enables innovation, creation of organizational practices, growth, process sustainability, and attainment of competitive advantages (Calvo-Mora et al., 2016). This systematic process of outlining, configuring, retaining, and sharing of knowledge and experience of employees gives the organization the capacity to turn threats into opportunities and adjust to the fluctuating and challenging business environment. TQM and KM share the same elements such as teamwork, worker training, empowerment and involvement, performance measurement, management and leadership commitment, benchmarking, and a supportive organizational culture to be successful in their implementation and sustainment. Knowledge creation, exploration, accumulation, transaction, and management directly affects and influences quality management activities involving problem solving and task improvement initiatives that lead to organizational learning (Seo et al., 2016). Effective TQM practices such as CI, statistical control of quality, management of customer satisfaction, individual learning and innovation, and process improvement techniques accommodates the practice of KM (Calvo-Mora et al., 2016; Honarpour et al., 2017).
KM elements such as knowledge sharing, acquisition, and application have a significant and positive impact on all of the dimensions of TQM, which indicates that the effective use of KM results in sustainable TQM activities within the organization (Abbas, 2020). The author further stressed that dynamic organizations take KM and TQM as inter-subjective constructs and underline the importance of building knowledge from experienced workers as key sources of innovation to achieve success. Many project leaders know lessons learned and KM as important and valuable parts of the work process, but do not have enough time to incorporate this in their regular routine; this causes significant limitation to inter-project improvement (Backlund & Sundqvist, 2018). The authors further noted that the KM process, envisioned to share knowledge between CI projects, would have to be supported by a work setting and environment that permits team members to share openly and discuss solutions to problems. KM integration is positively associated with quality management activities and new product development initiatives because it determines important points in quality management applications that enable companies to be more strategically flexible to the dynamic changes in the business environment (Gutierrez-Gutierrez et al., 2018).

**Table 2**

*Anticipated and Discovered Themes*

<table>
<thead>
<tr>
<th>Process</th>
<th>Anticipated and Discovered Themes related to TQM sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Improvement (CI)</td>
<td>CI represents a vital tool in the manufacturing industry used to enhance customer satisfaction and improve the competitiveness and performance of a company (Ahmad et al., 2017). CI by TQM means incrementally improving people, capabilities, processes, and systems to prevent and</td>
</tr>
</tbody>
</table>
avoid nonconformities (Kumar & Sharma, 2018). CI accomplishments are extensive in scope, continuous, and incremental; it will have to evolve continuously for the process to be sustainable (Brindle, 2020). CI efforts have a high failure rate due to a systematic focus on success factors instead of directly addressing failures (McLean et al., 2017). Management involvement in CI projects is minimal because of concerns for capacity needs and flexibility, consequently limiting their support for sustaining future initiatives (Newham et al., 2016; Talib et al., 2019). Lack of financial resources and commitment from workers are the main barriers to CI because top management treat the practice as an optional program only when resources become available and postpone it when the workload is high (Ahmad et al., 2017; McLean et al., 2017).

**Dynamic Capability (DC)**

DC delivers an overarching justification about how firms’ capabilities mutually sustain quality performance (Su & Linderman, 2016). Businesses constantly develop their products and processes to adapt to customers’ changing needs with their ability to reconfigure timely. This adaptation helps TQM practices to positively influence companies’ innovation performance to adjust to customers’ varying demands (Yusr, 2016). DC’s quality dimensions also include the capacity to associate individual knowledge with new functional capabilities and have the coordinating ability to distinguish, assemble, and distribute resources by enabling the distribution of process intelligence across the business unit.
DC has a positive association with quality management and other related fields, such as HRM in the realization of adaptive capabilities in companies that are capable of enduring in hypercompetitive business environments (Gutierrez-Gutierrez et al., 2018).

**Human Resource Management (HRM)**

HRM-driven results positively affect the sustainment of the TQM practice, the systems approach to management, decision-making, and the factual approach to continuous improvement (Aquilani et al., 2017). The education and training dimensions of HRM have a strong influence on TQM sustainability in the organization, which is reinforced by appropriate compensation, benefits, and employee development and selection (Ali et al., 2020b). HRM practices have links to quality and customer satisfaction through the process of organizing work that gives employees the discretion and initiative to respond to diverse customer demands in maximizing results (Lee et al., 2019). HRM contributes to better quality and performance by helping design work to increase employee preference and involvement in operational decisions. The human resource role designs training to develop employees’ knowledge, skills, abilities, and constructs incentives designed to motivate effort (Baidoun et al., 2018; Lee et al., 2019). The combination of effective HRM practices and sustainment of TQM within the business management philosophy supports the company's initiatives to achieve
performance excellence and a high level of customer satisfaction (Alkhazali et al., 2019). HRM has a critical role of managerial sensitivity by supporting change through the creation of sound business strategies and a responsive organizational climate where employees enthusiastically adhere to certain norms and core values favorable to upholding business goals (Maleki-Minbashrazgah & Shabani, 2019).

Knowledge Management (KM) TQM and KM share the same elements such as teamwork, worker training, empowerment and involvement, performance measurement, management and leadership commitment, benchmarking, and a supportive organizational culture to be successful in their implementation and sustainment (Calvo-Mora et al., 2016). KM elements such as knowledge sharing, acquisition, and application have a significant and positive impact on all of the dimensions of TQM, which indicates that the effective use of KM results in sustainable TQM activities within the organization (Abbas, 2020). Effective TQM practices such as CI, statistical control of quality, management of customer satisfaction, individual learning and innovation, and process improvement techniques accommodate the practice of KM (Honarpour et al., 2017). KM integration is positively associated with quality management activities and new product development initiatives because it determines important points in quality management applications that enable companies to be more strategically flexible (Gutierrez-Gutierrez
Summary of the Literature Review

Literatures confirming the TQM sustainment issues showed the presence of the suitability position and practicability application of the approach to the current strategic framework of the organization. TQM’s customer-focused concepts concentrate on CI of processes and enhance the company’s business management systems (Mendes & Jesus, 2018). Its theories equal quality as the result of collaborative work efforts over total cost (Dilawo & Salimi, 2019), and total participation of employees to maintain long-term vision and planning (Dahlgaard et al., 2019). However, there is no distinct theory that defines TQM and there is little consensus on what its essential features can do for a particular application (Chiarini & Vagnoni, 2017). As a result, TQM models adapted by similar industries may result in different outcomes (Jaeger & Adair, 2016). This creates complications in its application in business practices and involves many challenges and difficulties (Carmona-Marquez et al., 2016; Nizamidou & Vouzas, 2020). While TQM practices support development of an environment that empowers teams to recognize and solve problems (Tortorella et al., 2019), there is a fundamental tension and conflict between the principle of manipulation and empowerment (Banuro et al., 2017).

Many factors contribute to sustainability issues. Lack of top management commitment, poor teamwork, insufficient resources, unreliable methods of measuring results, and poor communication all contribute to the approach’s sustainability (Hwang et al., 2020; Kaur et al., 2020). The general problem of TQM sustainability in the manufacturing industry involves challenges in transforming TQM concepts into practices that can be compatible with the current organizational structure (Muruganantham et al., 2018). The adoption and sustainment of TQM
requires the organizational culture to change, which may be a challenge to the methodology (Haffar et al., 2019). The TQM concepts and theories confirm the rigidity of the approach and its requirement of firm observance to its procedures (Gözükara et al., 2019). This inflexibility can create operational constraints that can result in confusion and misalignment with the way leadership executes their strategies.

The literatures showed conflicts of the TQM approach and the consequences of its sustainability, which reduced overall operational performance as opposed to contributing to its total efficiency. There are sufficient number of studies that showed successful application of TQM practices and those that failed sustainability. The extent to how companies practice TQM initiatives, how they structure TQM programs, and how they align their strategies are different. Understanding the relationship between TQM and strategic sustainable development would explain how and to what degree capitalizing in TQM elements contributes to realizing strategic sustainable business objectives (Andrade Arteaga et al., 2020). Knowing how to sustain TQM and quality performance could provide a basis for understanding how to sustain other business dimensions of performance (Su & Linderman, 2016). For successful integration into the organization’s resources and capabilities, any TQM approach should consider the needs and expectations of all stakeholders, customers, the business’ competitive constraint, and CI requirements (Benzaquen & Charles, 2020).

**Summary of Section 1 and Transition**

The first section of the research covered the foundation of the study. The manufacturing industry has applied the TQM approach to their processes for decades but experienced problems in translating and aligning TQM concepts with their existing organizational structure (Muruganantham et al., 2018; Wei et al., 2019). The objective of the study was to understand the
sustainability issue of the TQM system in a water-treatment company in the southeastern United States, which has resulted in high cost of quality and low performance. The purpose of the flexible design single case study was to discover, explore, and recognize the challenges of sustaining the TQM system in manufacturing processes to provide a complete picture of the phenomenon in its natural setting. The sustainment of TQM influences the operational productivity of organizations and positively affects other dimensions of performance such as financial effectiveness and customer satisfaction (Nasim, 2018; Psomas & Jaca, 2016). The single case study considered various perspectives that were specific to the stakeholders and practitioners of the TQM system to understand how and why a TQM sustainability issue existed in a water-treatment plant operation. The triangulation process employed qualitative methods that included interviews, observations, and documents to establish the validity of the findings. The case study assumptions enabled an in-depth, multifaceted exploration of the problem based on the research framework. The study authenticated the contributing and resulting constructs to the TQM sustainability issue by studying their level of influence and impact on the site. Use of the systematic approach in data analysis, triangulation, and data saturation addressed the limitations inherent in the qualitative design to preserve validity (Du et al., 2020). The delimitations of the single bounded case was limited to the scope of the TQM sustainability issue of the chosen company and might not provide generalization or transferability of results to other situations. The research integrated a biblical perspective and followed four phases of gradual progression of revelation representing creation, fall, redemption, and restoration. The results of the study presented evidence on how the organization could transform and establish coherence of its strategic objectives to TQM practices that enhance quality and performance of their business. The significance of the study contributed to the understanding of the TQM sustainability issue in
the manufacturing industry, and reinforced concepts and theories held true by literatures in TQM. Coherence between TQM practices and the company’s strategic objectives would clarify how much and to what degree supporting TQM methodology could contribute to the achievement of business goals (Andrade Arteaga et al., 2020).

The second section of the study discussed the role of the researcher, the appropriateness of the research methodology, the type of research participants involved in the study, and discussion on the population and sampling. This section also included discussion on how research data were collected and organized, how data were analyzed and interpreted, and how reliability and validity were established. According to Robson and McCartan (2016), the researcher’s principal job is to connect the research questions and the questionnaire. Reflexivity is part of the research process and researchers must be continuously instinctive to avoid bias and be conscious about risk of preconceptions and assumptions affecting the data collection (Fleet et al., 2016). The single case study was appropriate for the chosen company as a single bounded case, and a sample size of 50 full time employees who have experienced using the TQM approach participated in the study. Qualitative data collection involved multiple activities such as conducting interviews, observations, and checking archived documents related to the research problem (Creswell & Poth, 2018). Yin (2018) noted that the researcher must be able to interpret the information as it is composed and understand instantly if the information contradicts each other, therefore requiring the necessity for more evidence. Creswell and Poth (2018) recommended using at least two of the validation strategies such as researcher’s lens and participant’s lens to establish validity in the study.
Section 2: The Project

The purpose of this flexible design single case research was to understand the sustainability issue of the TQM system in a water-treatment company in the southeastern United States. Researchers should be familiar with the research framework and participants, and respect varied knowledge systems and diverse means of interrelating (Azzari & Baker, 2020; Creswell & Poth, 2018). The study included a review process that contained a proposal that detailed access, selection, and permission for the targeted location, and participants were sought (Creswell & Poth, 2018; Yin, 2018). To avoid personal bias in the research, the researcher started by identifying the phenomenon to study and bracketing out her or his assumptions and experiences and gathering data from participants who have experienced the phenomenon (Gregory, 2019). The benefit of the flexible approach on this study came from its openness to unforeseen events and its flexibility to adjust to evolving evidence as the study progressed (Zapf et al., 2020). The importance of using documents in the research helped derive additional insights from the study by enabling access to massive historical data and records of the organization’s activities and events (Farquhar et al., 2020). The study incorporated one of the common practices of triangulating multiple qualitative methods by combining observations and interviews with documentary analysis (Natow, 2020). The research participants in the study were permanent employees of the company who have been trained with the use of existing business management systems such as TQM. Choosing participants from various groups and roles who had hands-on experience with the phenomenon helped develop an authentic picture of individual perspectives, perceived values, and preferences in the study, and how these insights would have aligned or contrasted (Levant & McCurdy, 2018; Wilkins et al., 2019). The documents related to the TQM practice were included in this population and provided supplementary insight from different
perspectives by enabling access to retrospective records of the organization’s research-related activities, including assessment of evidence from quality forms (Bouncken et al., 2021).

The study used a purposeful sampling strategy to identify and create a selection of information-rich perspectives that had relevance to the phenomenon and research problems under investigation (Ames et al., 2019). The study used a sample size of 50 participants for the interview and quality-related documents to gather pertinent information on TQM sustainability issue. Studies proposed that researchers utilizing participant interviews initially conduct no more than 50 interviews to allow researchers to cope with the complexity of the analytic task (Kindsiko & Poltimäe, 2019; Sim et al., 2018; Vasileiou et al., 2018). Data collection included information from interviews, observations, and archived documents, and were recorded using field notes, observation, and interview protocols. The handwritten field notes were digitized and imported into a qualitative software, and abbreviations were developed to make data organization clearer (Hahlweg et al., 2017). The archived data sets were organized into a chart of rows and columns in a file, with each column designated for its relevance in the study and each row designated for an individual document (Baxter et al., 2016). The interpretation process was done by creating the codes and developing the themes from the codes, before organizing the themes into greater units of constructs to make sense of the collected data (Creswell & Poth, 2018). Computer-assisted qualitative software, NVivo, was used to handle data synthesis, analysis, storage, and management of data, but it was noted that the software was unable to understand text and could not replace the researcher’s analytical skills (Houghton et al., 2017).

To enhance reliability in the study, comprehensive field notes using transcripts and digital files were used (Creswell & Poth, 2018). The validity of the findings in this qualitative research involved cautious recording and frequent verification of the data that was collected during the
investigative process, and its trustworthiness was maximized to create credible and defensible results (Cypress, 2017).

This section covered the purpose statement and role of the researcher, who made decisions based on personal experience in the field, oriented by epistemological and theoretical understanding that resulted in rational interpretations of the data (Bispo, 2017; Wesely, 2018). Researchers must ensure that research activities did not exploit vulnerable subjects and should develop efficient practices for engaging participants in fair and nondiscriminatory means (Devotta et al., 2016). The single case study used in this research provided the single bounded case the needed details and descriptive information from participants in their specific roles. The use of interviews and observations in the triangulation process provided a full and detailed account of the experience from a participant and served as the baseline on which the findings were analyzed (Bouncken et al., 2021). Appendices A through E showed the data collection instruments. The appropriate population for the study was composed of permanent employees of a water-treatment company in the southeastern United States. The desired sample consisted of participants who were full-time employees of the company who had acquired sufficient experience in leading, practicing, supporting, and having an in-depth understanding of the effects of TQM sustainability in the manufacturing process. Data were collected from interviews, observations, and archived documents. Interpretations were drawn by using memoing and were incorporated from a range of perspectives gathered during the interview analysis to discover more about the participants’ lived experience of the phenomenon (Patel et al., 2016). Reliability signified the dependability of the methodological process, and clarity was provided in the analytical procedures and a justification of the methods used to increase the trustworthiness of the study (Rose & Johnson, 2020). As proposed by Yin (2018), multiple sources of evidence,
pattern matching, logic models, key informants review, explanation building, and addressing rival explanations were used to enhance validity in this case study.

**Purpose Statement**

The purpose of this flexible design single case study was to understand the sustainability issue of the TQM system in the manufacturing industry, which has resulted in high cost of quality and low performance. The study aimed to discover, explore, and recognize the challenges of sustaining the TQM system in manufacturing processes to provide a complete picture of the phenomenon in its natural setting. The investigation considered various perspectives that are specific to the stakeholders and practitioners of the TQM system in a water-treatment company in the southeastern United States. Sustainment of the TQM system required a company-wide commitment to quality improvement, and the difficulty of achieving this obligation is real (Muruganantham et al., 2018). The qualitative methodology considered the actual workplace conditions, observations, and communication with participants to understand what TQM aspects were incompatible to them and how they perceived the application of the TQM system on the process. The application of a single case study design enabled an in-depth, multi-faceted exploration of TQM sustainability issues in real-life settings and authenticated the contributing factors by studying its suitability, acceptability, and neutrality in the site. The research integrated a biblical perspective and followed four phases of gradual progression of revelation representing creation, fall, redemption, and restoration. The objective of the study was to reach out to the development of the case with compassion and empathy to bring together pertinent evidence that would help transform the participants to serve their true goals.
Role of the Researcher

The qualitative research methodology helps researchers access thoughts, perspectives, and lived experiences of participants, which can facilitate the development of an understanding of the meaning that they attribute to their involvement and experiences of the phenomenon (Creswell & Poth, 2018). This situation required the researcher to have the capacity to make good decisions based on his or her experience in the field, oriented by epistemological, ontological, and theoretical understanding that resulted in the researcher’s coherent interpretation of the data (Bispo, 2017; Wesely, 2018). The notion of reflexivity is an important component of the qualitative research process and researchers persistently reflexive to eliminate bias and to be cognizant when there is a risk of preconceptions and assumptions affecting the analysis (Fleet et al., 2016; Probst, 2016). Concerns of bias and rigor are extant in all research concerning people and there is normally a sound relationship between researcher and participant, and researcher and setting (Robson & McCartan, 2016). The authors further noted that the notion of ‘researcher-as-instrument’ was fundamental to most studies, and therefore the potential for bias was great, so researchers needed to improve the reliability of their research practices and methods. Researchers would have to recognize their social standing and motivations for conducting research and how they interacted around participants; they had to be self-reflexive to diminish presumptions of the group and to conduct research that better represented their subjects’ experiences (Devotta et al., 2016; Henderson, 2018; Wesely, 2018). The authors added that self-reflexivity was important to the research process and that lived experience provided added depth in the understanding and enhancement of knowledge creation.

In qualitative research, the risks to participants were well-known, discussed, and accounted for in literatures and ethical reviews, making it of utmost importance to understand the
consequences and impact of research on its subjects (Ngozwana, 2018; Stahlke, 2018). The qualitative researcher deals with numerous ethical issues that arise throughout the data collection phase in the field setting and in examination and distribution of qualitative information (Creswell & Poth, 2018). Researchers should ensure that the study did not exploit or abuse susceptible and vulnerable subjects and should develop efficient practices for enlisting and engaging participants in fair and nondiscriminatory means (Devotta et al., 2016). It is the obligation of the researcher to be familiar with the research framework and participants and to revere diverse knowledge systems and different means of interrelating (Azzari & Baker, 2020; Creswell & Poth, 2018). Researchers should carefully address concerns related to consent, confidentiality, and the role of objectivity in improving shared understanding of the lived experiences of participants having complex vulnerabilities (Probst, 2016). Preparing and conducting an ethical study helped the researcher understand and address all foreseen and emergent ethical issues in the investigation (Creswell & Poth, 2018). Participants’ protection from any harm in the study was important, as well as keeping their information private and confidential so subjects were not accidentally placed in an unwanted situation (Råheim et al., 2016; Yin, 2018).

**Actions the Researcher Will Take to Conduct the Study**

The researcher created a task review process that included submitting a proposal that specified the details of the study in the project associated with how access, selection, and permission for the targeted location and participants were sought (Creswell & Poth, 2018; Yin, 2018). This review process also included details of the sampling selection and collection techniques for research data, and how the researcher managed, recorded, and stored the resulting information. The ethical issues related to ethical guiding principles that included integrity, fairness, justice, respect for person, and concern for welfare were considered to ensure that there
was equitable treatment of participants, protection of privacy, and minimum harm (Creswell & Poth, 2018). The researcher protected the anonymity of the subjects, communicated to them their role in participation in the study, clarified the objectives of the study, and did not employ deception in the research (Azzari & Baker, 2020). The researcher was accountable for leading the study with care and sensitivity by acquiring agreement and consent from all participants and notifying them of the nature of the case study before soliciting participation and feedback (Fleet et al., 2016; Yin, 2018). The author further noted that selection of participants was rightly important so that groups of subjects relevant to the study were included. The researcher made certain he or she was mentally, physically, emotionally, and spiritually-centered to protect the participants and their invaluable information (Azzari & Baker, 2020).

Researchers must have a full understanding of the research context from various angles by observing and conversing with multifunctional participants in the study, especially those with varied perspectives to identify patterns and offer insights in data collection and analysis (Devotta et al., 2016; Robson & McCartan, 2016). Having a solid understanding of the literature base helped the researcher focus the approach of the study and improved the data gathering design in a way that improved the potential for contributing new knowledge to theory and practice (Azzari & Baker, 2020). By being participant-centric, the researcher provided a fluid interview structure that enabled the participants to be more involved, so that an empathetic understanding of subjects’ experiences that recognized root causes and solutions to help solve problems were identified (Råheim et al., 2016; Wesely, 2018). Studies showed that when participants who experienced the problems defined the true causes of the issues, solutions created to resolve the issues based on their input were likely to be much more effective (Azzari & Baker, 2020; Råheim et al., 2016).
The researcher began the analysis of data at the same moment as data collection by writing down notes, constructing mental links between participants’ feedback and theory, and committing to memory the most thought-provoking and outstanding content (Azzari & Baker, 2020). The researcher was dedicated to listening, paying attention, and understanding each participant to find the best link to the research question (Robson & McCartan, 2016; Yin, 2018). Interviewing with a genuine interest in participants and inquisitiveness for the research topic led to elevated quality of the data (Azzari & Baker, 2020; Yin, 2018). In principle, it provided the means to integrate experiential knowledge of the participant into the research process (Devotta et al., 2016).

**Discussion of Bracketing to Avoid Personal Bias**

Bracketing in qualitative research is a form of research engagement process where the researcher sets aside his or her experiences and assumptions of the phenomenon under investigation to allow more consideration of fresh perspectives from the experiences of others (Gregory, 2019; McWhorter, 2019). Bracketing, as a theoretical construct, recognizes participants’ subjectivity and puts it center-stage in addition to objectivity; this helps achieve a better understanding of the phenomenon in real-time and is a powerful means to support and clarify research findings (Dörfler & Stierand, 2020). The authors further noted that bracketing is about being sensible to what is happening whether the researcher likes it or not and refraining from bias judgement of participants and acknowledging their beliefs and values as sources of insight. Since analyses of the data always integrate conventions that the researcher takes along with the focus of the study, bracketing can be predominantly challenging most especially when the researcher is profoundly knowledgeable of the specific theoretical model or framework (Creswell & Poth, 2018; Gregory, 2019). This process is ongoing, and includes the careful and
thorough development of language, word context, and interpretations with which to represent findings.

To avoid personal bias in the research, the researcher started by initially identifying the phenomenon to study, bracketing out her or his assumptions and experiences, and gathering data from a number of participants who had experienced the phenomenon (Gregory, 2019). The researcher provided a supportive environment by revering the subjects’ personhood and this required respecting participants’ autonomy and decisions (Dörfler & Stierand, 2020; McWhorter, 2019). Thereafter, the researcher evaluated and analyzed the data by converting and saturating the information to significant quotes or accounts and incorporating these statements into pertinent themes (Gregory, 2019; McWhorter, 2019). The researcher then created a textural picture of the statements of the participants based on what they experienced, and a structural interpretation of how they experienced these accounts in terms of the situation, condition, or context (Creswell & Poth, 2018). The authors further noted that the researcher could then combine all these structural and textural descriptions to represent a complete depiction of the experience. It was important for the research collection and analysis to reach an instinctive and intuitive understanding of the participants’ subjective real-time accounts of their lived experiences (Dörfler & Stierand, 2020).

**Summary of the Role of Researcher**

The role of the researcher is to have the capacity to make good decisions based on his or her experience in the field, oriented by epistemological and theoretical understanding that results in coherent interpretation of the data (Bispo, 2017; Wesely, 2018). The researcher ensured that the study did not exploit or abused susceptible and vulnerable subjects and developed efficient practices for enlisting and engaging participants in fair and nondiscriminatory means (Devotta et
It was the obligation of the researcher to be familiar with the research framework and participants, and to respect diverse knowledge systems and different means of interrelating (Azzari & Baker, 2020; Creswell & Poth, 2018). The researcher carefully addressed concerns related to consent, confidentiality, and role of objectivity in improving shared understanding of the lived experiences of participants having complex vulnerabilities (Probst, 2016). This was done by creating a review process that included submitting a proposal that specified the details of the study associated with how access, selection, and permission for the targeted location and participants would be sought (Creswell & Poth, 2018; Yin, 2018). To avoid personal bias in the research, the researcher started by initially identifying the phenomenon to study and bracketing out his or her assumptions and experiences, gathering data from a number of participants who had experienced the phenomenon (Gregory, 2019).

**Research Methodology**

The flexible design for the research study provided a multilayered depiction of the phenomenon and the interpretation of detailed views of participants, the examination of word contents, and the conduction of research in a natural setting (Creswell & Poth, 2018). The suitability of the flexible approach in this study came from its ability to identify unforeseen events and its flexibility to adjust to evolving evidence as the study familiarized with how participants derived meaning from their varied TQM experiences (Bouncken et al., 2021; Zapf et al., 2020). This research developed an understanding of the TQM sustainability issue and its effects on the organization as a single bounded case. The single case study research design consisted of the examination of a single bounded case delimited by a real-life present-day context or setting and used multiple viewpoints to expedite the investigation of the phenomenon (Yin, 2018). The relevance of using the single case study method on the unique case provided the
necessary detailed and descriptive information from participants in their specific settings within
the organization.

The TQM sustainability study used more than one type of qualitative data collection
procedure, such as gathering data by means of interviews, observations, and documents. The
importance of using interviews in the triangulation process was in its ability to acquire a full and
detailed account of the experience from a participant under study, serving as the baseline on
which the findings were refined (Bouncken et al., 2021). The authors further noted the
significance of using observation in the triangulation process was in its capability to supplement
and illuminate data acquired from participant interviews, along with explaining and confirming
the meaning of a participant’s spoken comments. The importance of using documents in the
triangulation process was that the process could derive complementary insights into the study
from various perspectives by enabling access to immense retrospective data and archives of the
organization’s research-related activities and events (Farquhar et al., 2020).

Discussion of Flexible Design

The study aimed to capture specific lived experiences of TQM practitioners in a water-
treatment company in the southeastern United States to understand the system’s sustainability
issue. Collecting these experiences required a clear understanding of the structure and patterns
found in the company’s organizational culture, strategies, and among the company’s TQM
participants to produce data in the actual work environment. The flexible design for the research
study provided a multifaceted representation of the phenomenon, examining word context,
interpreting detailed views of participants, and carrying out research in the natural setting
(Creswell & Poth, 2018). The appropriateness of the flexible approach in this study originated
from its openness to unforeseen events and its flexibility to adjust to evolving evidence as the
study recognized how the participants derived meaning from their varied TQM experiences (Bouncken et al., 2021; Zapf et al., 2020). This included capturing participants’ perceptions and interpretations that influenced their behavior toward sustainment of TQM.

The application of the flexible design in the study supported and facilitated the evolving nature of the research and focused on participants’ views, the researcher as an instrument of data collection, and presentation of multiple realities (Robson & McCartan, 2016). The flexible research design promoted the understanding of existing traditions of the study. Based on the study’s collection and analysis method, the research design covered and identified what data sets were pertinent from participants in the sampling design (Tobi & Kampen, 2018). This design was beneficial in recognizing participants’ strengths and weaknesses to create a better understanding of the phenomenon and added to knowledge development. The flexible design in the research incorporated a single case study design to examine the single bounded case and create a richer picture of the phenomenon.

*Discussion of Chosen Method for the Study*

A case study is a recognized research strategy that employs systematic and intensive investigation of an individual person, community, business unit, or an organization in its own right, to examine in-depth data relating to several constructs (Robson & McCartan, 2016). This research developed an understanding of the TQM sustainability issue and its effects on a water-treatment company in the southeastern United States, as a single bounded case. The single case study research design included the study of a single bounded case surrounded by a real-life, present-day context or setting, and used multiple viewpoints to facilitate the investigation of the particular occurrence (Yin, 2018). The appropriateness of the single case study method related to
its application to the unique case that was in need of detailed and descriptive information from participants, in their specific settings within the organization.

This chosen method enabled the collection and integration of many forms of qualitative data ranging from observations, interviews, and documents to answer the research questions (Paddock et al., 2019). This methodology enabled identification of TQM activities that affected quality and performance in each unit in the organization, which made its sustainability an issue, and distinguished how TQM activities influenced process constraints and enablers. The advantage of using a single case study method was its application of a comprehensive description and analysis process to gain a better understanding of “how” and “why” the phenomenon happened (Ridder, 2017). The methodology provided the opportunity to discover any subculture or distinct behavioral patterns that arose when investigating deeper reasons of the TQM sustainment issues. This approach delivered information that led to the identification of patterns and relationships, and validation and confirmation of a theory that ensured quality and validity (El-Akruti et al., 2018; Yin, 2018).

Discussion of Methods for Triangulation

Triangulation reinforced the construct validity of the study by using multiple methodological resources or practices to develop convergent evidence (Al-Moghrabi et al., 2020). The TQM sustainability study used more than one type of qualitative data collection procedure, such as gathering data by means of interviews, observations, and documents. The researcher aimed to establish multiple data sources by gathering data from different periods, locations, or perspectives through the interview of TQM participants who possessed different viewpoints or held varying levels of authority. The appropriateness of using interviews in the triangulation process was its ability to acquire a full and detailed account of the experience from
a participant under study, serving as a baseline on which the findings were refined (Bouncken et al., 2021). The authors further noted that through interview, the researcher could discover descriptions of real-life accounts of the interviewee about their interpretations of the meaning of the phenomenon under study. Interviewing participants from various operational positions at different settings in time and location formed strong evidence of the phenomenon because the approach covered the diverse population in the organization (Natow, 2020).

Research observations took place at different times and process locations. The researcher observed how participants performed tasks related to TQM practices at the start and end of the shift, before and after breaks and lunches, and during normal operations. The appropriateness of using observation in the triangulation process was its ability to complement and illuminate data acquired from participant interviews, as well as its explanation and confirmation of the meaning of a participant’s verbal comments (Bouncken et al., 2021). The authors also added that the researcher could find alignment of meaning and importance by observing participants’ behaviors, gestures, facial expressions, bodily tone, interview environment, and other nonverbal signs. The observation process formed strong evidence that included select groups of participants for extended periods, diverse activities at diverse locations, and work with different models (Moon, 2019).

The researcher investigated archived documents related to the TQM practice in the organization. These documents included process audits, standard work reviews, critical-to-quality forms, product non-conformity reports, scrap summaries, productivity statements, quality audits, root-cause-counter measure files, and quality manuals. The document analysis also covered existing TQM operational control documents such as failure mode analyses, process flow diagrams, control plans, escalation processes, and change management policies created to
safeguard operations. The appropriateness of using documents in the triangulation process was its ability to derive supplementary insights into the study from different perspectives by enabling access to immense reflective data and records of the organization’s research-related activities and events (Bouncken et al., 2021; Farquhar et al., 2020). The authors further explained that this activity allows exploration of more concealed evidence from recording and contributes greatly to the understanding of the phenomenon. One of the most common practices of triangulating multiple qualitative methodologies was to combine observations and interviews with documentary analysis (Natow, 2020).

**Summary of Research Methodology**

The study aimed to capture specific lived experiences of TQM practitioners in a water-treatment company in the southeastern United States to understand the system’s sustainability issue. The appropriateness of the flexible approach in this study originated from its openness to unforeseen events and its flexibility to adjust to evolving evidence as the study recognized how the participants derived meaning from their varied TQM experiences (Zapf et al., 2020). The importance of the single case study in this research related to its application to the unique case that was in need of detailed and descriptive information from participants, in their specific settings within the organization. The relevance of using interviews in the triangulation process was in its ability to acquire a full and detailed account of the experience from a participant under study, serving as a baseline on which the findings were refined (Bouncken et al., 2021). The authors further noted that the use of observation in the triangulation process complements and illuminates data acquired from participant interviews, providing explanation and confirmation of the meaning of a participant’s verbal comments. The importance of using documents in the triangulation process helped derive supplementary insights in the study from different
perspectives by enabling access to immense reflective data and records of the organization’s
research-related activities and events (Farquhar et al., 2020).

**Participants**

The research included a diverse group of TQM participants from the chosen organization.
A participant is an individual from whom a study’s data were collected, typically through
interviews, who provided relevant information or understanding about the case and proposed
additional sources of evidence for the study to examine (Yin, 2018). Participants had knowledge
of social interactions in specific contexts as they occurred and gained it by practicing and
observing real-life settings. This observation was important when the main objective was to find
out what was currently going on (Robson & McCartan, 2016). Participant involvement
acknowledged that individuals could contribute significant knowledge and experience to research
activities. They also created transparency and accountability between the research objectives and
the participants to provide the researcher an opportunity to respond to their concerns (Gregory et
al., 2018). The research participants were permanent employees who were employed with the
company at least three months and had been trained and familiarized with the use of existing
business management systems in place such as the TQM. These participants came from multiple
functional groups, which included leadership, manufacturing associates, operation support
members, suppliers, and warranty managers. It was important to understand what participants
already believed because their existing “mental models” shaped by their predispositions to
understand, accept, and apply the models laid down by management experts had real-life value to
the study (Condit et al., 2016).

The type of participants who were eligible to be included in the study were those who had
a role in leading, practicing, supporting, or being at the receiving end of the TQM sustainment
effects. The participants in leadership roles were individuals who managed the structure of the TQM system, which involved managing its application and monitoring employee compliance to the approach’s requirements. These participants provided the top-level support to the needs of the operations team running the lines and were familiar with the TQM methodology, concepts, and theories mentioned in the study. The leadership role has a positive relationship on the effectiveness of TQM (Álvarez-García et al., 2016). The participants in the operations roles were the manufacturing and assembly associates who practiced and sustained TQM methodology in the processes. These participants were responsible for ensuring that the application of the TQM methodology was effective in capturing non-conforming products from the manufacturing or assembly lines, and that the proper identification and disposition of these products took place appropriately. The effectiveness of the function of this group directly related to TQM sustainability. The effectiveness of TQM depended on employees performing their roles and moving toward common objectives (Álvarez-García et al., 2016).

The participants in the operations support roles were individuals who maintained the calibration of quality instruments, updated quality-related documents, examined engineering changes, verified machine process settings, performed first article inspections, and regulated line-tester parameters. This group also included buyers, business partners, and suppliers. Partnership with business suppliers improves quality, which satisfies the company’s requirements to process products that meet the customer’s expectations (Bevilacqua et al., 2017). Necessary for TQM sustainment, these participants verified product specifications, assembly processes, supplies, internally made parts, and other purchased components before the lines could use them. The operations support group focused on preventive initiatives to maximize the operational efficiency of business processes (Dahlgaard et al., 2019). The participants handling
warranty claims and service requests from the company’s customers provided closed-loop feedback from the field regarding product quality and delivery. Their input from the customer measured the effectiveness of TQM sustainment in the organization.

**Population and Sampling**

The appropriate population for the study was composed of permanent employees of a water-treatment company in the southeastern United States. These individuals belonged to the manufacturing division of the company and had a role in leading, practicing, supporting, and having an in-depth understanding of the effects of TQM sustainability in the manufacturing process. Choosing participants from various groups and roles who had hands-on experience with the phenomenon helped develop an authentic picture of individual perspectives, perceived values, and preferences in the study and how these insights might have aligned or contrasted (Levant & McCurdy, 2018; Wilkins et al., 2019). The documents related to the TQM practice in the company were included in this population. These documents provided supplementary insights from different perspectives by enabling access to retrospective records and data of the organization’s research-related activities, including assessment of concealed evidence from quality forms that greatly contributed to the understanding of the phenomenon (Bouncken et al., 2021). The study used a purposeful sampling strategy. This method identified and created a selection of information-rich perspectives that had relevance to the phenomenon and research problems under investigation (Ames et al., 2019). The sampling method increased the credibility of the results by defining the target group specifically for the purpose of the study and collecting data from a comprehensive range of settings to increase the level of detail on the phenomenon (Bungay et al., 2016).
The study’s sample frame comprised of participants from the molding, filter, and pumps departments and included participants from the units’ support structure and the quality documents associated with the units’ activities in the manufacturing division of the site. Rationale of the sample frame selection came from the performance metrics of the company that indicated that these departments had significantly low productivity results, high production costs, and high reject rates compared to other departments. The desired sample consisted of participants who were full-time employees of the company who acquired sufficient experiences in leading, practicing, supporting, and having an in-depth understanding of the effects of TQM sustainability in the manufacturing process. The study used a sample size of 50 participants for the interview and quality-related documents to gather pertinent information on the TQM sustainability issue. Studies proposed that researchers utilizing participant interviews initially conduct no more than 50 interviews to allow researchers to cope with the complexity of the analytic task (Kindsiko & Poltimäe, 2019; Sim et al., 2018; Vasileiou et al., 2018). This setup provided substantial information to explain the phenomenon and reach data saturation. As a current employee of the chosen company and part of the postgraduate educational plan supported by the employer, the researcher had permission to access the sample.

**Discussion of Population**

The eligible population for the study was composed of full-time and permanent employees of a water-treatment company in the southeastern United States. These individuals belong to the manufacturing division of the company and had a role in leading, practicing, supporting, and having an in-depth understanding of the effects of TQM sustainability in the manufacturing process. This population was composed of multifunctional groups such as senior management, operations engineers, line supervisors, manufacturing personnel, assembly
associates, support teams, and warranty managers that had experienced TQM practices and had diverse perspectives about its application and sustainment. Selecting participants from various groups and roles who had hands-on experience with the phenomenon helped develop an authentic picture of individual perspectives, perceived values, and preferences in the study and how these insights might have aligned or contrasted (Levant & McCurdy, 2018; Wilkins et al., 2019). This population shared common experience and knowledge on how the practice of TQM affected quality and productivity in the manufacturing process. They were familiar with the contrasting results when they did not apply the methodology correctly and were knowledgeable of how their actions translated into conflict and confusion in the manufacturing line. Their experiences in utilizing TQM practices made this population of about 450 employees appropriate for the single case study.

The documents related to the TQM practice in the company were included in this population. The selection of population in qualitative research not only covered multiple varying data sources, such as people, events, accounts, organizations, sites, and documents, but also elements of investigation such as cases to be examined for case studies (Gentles & Vilches, 2017). The authors added that it was important to highlight that in qualitative research, the possibilities regarding what can be sampled and studied are highly diverse, flexible, and seldom restricted to people only. These documents included process audits, standard work reviews, critical-to-quality forms, product non-conformity reports, scrap summaries, productivity statements, quality audits, root-cause-counter measure files, and quality manuals. The document analysis also covered existing TQM operational control documents such as failure mode analyses, process flow diagrams, control plans, escalation processes, and change management policies created to safeguard operations. These documents provided supplementary insight from
different perspectives by enabling access to retrospective records and data of the organization’s research-related activities, including assessment of concealed evidence from quality forms that greatly contributed to the understanding of the phenomenon (Bouncken et al., 2021). This made approximately 14 types of documents related to TQM practices in the company’s archive eligible for the study.

**Discussion of Sampling**

The qualitative research used a single case study design to understand the TQM sustainability issue in a chosen company as a bounded phenomenon. Case studies were not good methods for evaluating the prevalence of phenomena, so this made a sampling logic, which required an operational estimation of the entire population of potential respondents not applicable as a sampling method (Yin, 2018). The qualitative nature of case studies did not use quantitative conventions of sampling; instead, the study chose participants who were able to provide data, which were most relevant to the research problem and the central phenomenon through purposive sampling (Ames et al., 2019). The authors added that this method allowed the achievement of an adequately varied geographic spread of respondents who had rich data and information, which were relevant to the study, while establishing a good representation from a larger population. The researcher determined the type of purposeful sampling strategy that applied to the case and the rationale for the selection, along with the sampling information used with the case (Creswell & Poth, 2018). This was possible when there was no purpose or reason to generate a statistical generalization to any population outside or beyond the sample examined (Robson & McCartan, 2016).

The study used a purposeful sampling strategy. This method identified and created a selection of information-rich perspectives that had relevance to the phenomenon and research
problems under investigation (Ames et al., 2019). The sampling method increased the credibility of the results by defining the target group specifically for the purpose of the study and collecting data from a comprehensive range of settings to increase the level of details on the phenomenon (Bungay et al., 2016). In this qualitative case study, sample size might not matter, but indices such as data repeatability, adequacy, and saturation were important in achieving the full understanding of the research topic (Ghorbani et al., 2018). Identifying and selecting participants or groups of participants who were particularly experienced and knowledgeable about the phenomenon of interest had the ability to share experiences and opinions in an expressive, eloquent, and contemplative manner to achieve depth of understanding (Creswell & Poth, 2018). This non-probability sampling method was subjective and relied on the judgement of the researcher based on clear criteria and related to selecting participants with specific characteristics and units of data, which would best answer the research questions (Ghorbani et al., 2018).

The purposeful sampling strategy was appropriate in this study since it focused on the concentrated range of information-rich perspectives of participants and documents to strengthen the credibility of the phenomenon and provided the depth of understanding. Embedded in the sampling strategy was the ability to associate, differentiate, and to identify differences and similarities in the phenomenon. The sampling method helped the researcher understand if a logical generalization and maximum utilization of data and information applied within the bounded case to prove that the phenomenon was happening throughout the chosen site (Bungay et al., 2016). The sampling of information-rich participants and documents covered the range of variations needed in the study and the iterative approach of comparing the results drew enough input to make certain that the theoretical saturation happened appropriately (Ames et al., 2019; Bungay et al., 2016). The appropriateness of the sampling method in the study allowed a very
thorough examination of the TQM sustainability issue in the site through the lens of the participants who had in-depth knowledge and experience of the process. The method also allowed the use of relevant documentation that supplemented participants’ experiences and strengthened the credibility of the TQM sustainability issue in the chosen site (Bouncken et al., 2021; Farquhar et al., 2020).

A sampling frame is a list of specific participants or other device selected from the research population used to define a researcher's topic of interest (Robson & McCartan, 2016). The frame defined a set of features or elements from which a researcher could choose a sample of the target population. Frames were persistent patterns of cognition, presentation, and interpretation of data collection, emphasis, and exclusions that preserved a central organizing idea for constructing a sense of significant events, which suggested what was at issue (Yang & Van Gorp, 2019). The authors added that this organizing approach worked to structure the phenomenon meaningfully by promoting a precise interpretation of an issue through careful selection and prioritization of certain aspects and developments, while downplaying or excluding other data. In the study, the justification or reasoning of the selection was related to the functions of framing that included the definition of the phenomenon, the causal interpretation, solution generation, and ethical evaluation (Robson & McCartan, 2016). This was to make sure that the frame designed for the study was not problematic, inconsequential, marginal, or biased. In addition, analysis of the company’s documents related to quality and productivity that confirmed departments’ performance helped this non-randomized selection avoid sampling bias and generalization of data by separating the researcher’s influence in the selection. There was a strong relationship among strategic factors and performance; without these tactical drivers and
enablers, successful and effective TQM sustainment was not possible (Carmona-Marquez et al., 2016; Psomas & Jaca, 2016).

The sample frame included participants from the molding department, which has the highest internal rework rate in the site; the filter department, which has the highest internal scrap costs; and the pumps department, which has the highest external rejects. The sample frame included participants from the departments’ support structure and the quality documents related to the three major departments in the manufacturing division of the site. Justification of the sample frame came from the analysis of data from the quality and performance metrics of the company that indicated that these three departments had significant systemic issues with quality management and productivity compared to other departments. The quality-related documents such as the product non-conformity report, warranty versus sales, scrap report, and the increased number of root-cause countermeasure documents supplemented the evidence of elevated TQM sustainment failures in these three departments. Use of documents in research provided background information and comprehensive coverage of data that were helpful in supplementing and contextualizing the study within its field (Bouncken et al., 2021). The sample frame reflected the environmental characteristics that revealed the selected participants to be undergoing the live experience of the phenomenon at its highest level (Yang & Van Gorp, 2019). The company’s daily management documents such as production reports, first-pass yield, and past due orders confirmed the departments’ struggle with quality and performance. The participants’ lived experiences, perspectives, and participation, along with the supplementary evidence from related documents that confirmed the phenomenon, provided real-time information on the sustainability issue of TQM in the site, making this frame appropriate for the study (Farquhar et al., 2020; Yang & Van Gorp, 2019).
The selection of the desired sample reflected the essential population characteristics to assure coverage of important aspects of the phenomenon (Burgette et al., 2018, 2019). The desired sample consisted of participants who were full-time employees of the company who had acquired sufficient experience in leading, practicing, supporting, and having an in-depth understanding of the effects of TQM sustainability in the manufacturing process. These participants possessed meaningful perspectives and relevant information needed to answer the research questions in the study and had a deeper understanding of the phenomenon. They described dominant patterns and characteristics that contributed to the conflict, confusion, and possible resolutions to the sustainability of TQM through their roles in the manufacturing process. In addition to the selected participants, the quality-related documents such as the product non-conformity reports, warranty versus sales, scrap report, productivity statements, and root-cause countermeasure files were included as desired samples for the study. This desired sample of participants, along with the selected quality-related documents, provided new information for the study to reach saturation point, making this selection appropriate for the study.

Qualitative studies had no upfront scheme as to how many participants needed to be part of the study and that sample size depended on a number of factors relating to methodological, practical, and epistemological issues (Turner-Bowker et al., 2018; Vasileiou et al., 2018). In general terms, Robson and McCartan (2016) suggested that qualitative sample sizes should be sufficient to allow the unraveling of a new and richly textured understanding of the phenomenon that may apply to what may be happening in other cases. Creswell and Poth (2018) offered a general recommendation for determining sample size in qualitative research to not only investigate a few locations or participants but also to gather general detail about each location
and participant examined. An estimate of sample size in qualitative studies was essential for initial planning, while the sufficiency of the succeeding samples and final size depended on the continuous evaluation of results during the duration of the research process (Robson & McCartan, 2016; Turner-Bowker et al., 2018). In appraising the principles of sample size in qualitative studies, Malterud et al. (2016) claimed no formula could predict the sample size or by perceived redundancy. The authors further noted that using tools to determine sample size should not depend on procedures from a particular analysis method but should depend on collective methodological principles for approximating a substantial number of participants, events, or units.

The study used a sample size of 50 participants for the interview and quality-related documents to gather pertinent information on the TQM sustainability issue. Studies proposed that researchers utilizing participant interviews initially conduct no more than 50 interviews to allow researchers to cope with the complexity of the analytic task (Kindsiko & Poltimäe, 2019; Sim et al., 2018; Vasileiou et al., 2018). The authors further added that the researcher could utilize the criterion of data redundancy where he or she terminates the sampling when there is no more new information produced by sampling more participants. The sample size covered a sufficient number of participants that provided impactful evidence and data to bridge theoretical concepts, established adequate information that aligns with literature, supported the objectives of the study, and answered the research questions. The selected number of experienced TQM-frontline participants provided power information to the study, making this sample size appropriate for the study. Malterud et al. (2016) presented the model of information power as a reasonable guiding principle for determining sample size by proposing that a smaller sample could be adapted if the sample could provide more information power, and vice versa. Table 3
shows the number of participants selected in the study. The core sampling focused more on participants who practiced and sustained TQM. These employees, who were assembly associates, had direct hands-on involvement in TQM activities.

**Table 3**

*Participants in the Study*

<table>
<thead>
<tr>
<th>Position in Company / Actors</th>
<th>Department</th>
<th>Role in TQM Study</th>
<th>Number of Participants</th>
<th>% in Total Sample</th>
<th>% in Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly Associates</td>
<td>Molding</td>
<td>Practicing Role</td>
<td>9</td>
<td>18%</td>
<td>54%</td>
</tr>
<tr>
<td></td>
<td>Filters</td>
<td></td>
<td>9</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pumps</td>
<td></td>
<td>9</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Department Managers</td>
<td>Molding</td>
<td>Leading Role</td>
<td>1</td>
<td>2%</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Filters</td>
<td></td>
<td>1</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pumps</td>
<td></td>
<td>1</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Quality Manager</td>
<td>All</td>
<td>Leading Role</td>
<td>1</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Lean Leaders</td>
<td>All</td>
<td></td>
<td>2</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Human Resource</td>
<td>All</td>
<td></td>
<td>2</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Quality Technicians</td>
<td>Molding</td>
<td>Supporting Role</td>
<td>1</td>
<td>2%</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Filters</td>
<td></td>
<td>1</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pumps</td>
<td></td>
<td>1</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Process Technicians</td>
<td>Molding</td>
<td>Supporting Role</td>
<td>1</td>
<td>2%</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Filters</td>
<td></td>
<td>1</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pumps</td>
<td></td>
<td>1</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Buyers /Suppliers</td>
<td>All</td>
<td></td>
<td>3</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Field Representatives</td>
<td>All</td>
<td>Receiving Role</td>
<td>3</td>
<td>6%</td>
<td>12%</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----</td>
<td>----------------</td>
<td>---</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>Warranty Managers</td>
<td>All</td>
<td></td>
<td>3</td>
<td>6%</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Total Number of Participants</strong></td>
<td>50</td>
<td>100%</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The quality of the desired sample combined with the selected sample size of the study participants who were frontline TQM practitioners generated a comprehensive database for the TQM sustainability issue and drew clear and credible explanations of the phenomenon. This setup provided substantial information to explain the phenomenon and reach data saturation. The researcher has access to the sample. As a current employee of the chosen company, and part of the postgraduate educational plan supported by the employer, the researcher had permission to access the sample.

**Summary of Population and Sampling**

The eligible population for the study was composed of full-time employees of a water-treatment company in the southeastern United States. These individuals belonged to the manufacturing division of the company and had a role in leading, practicing, supporting, and being at the receiving end of TQM sustainment effects. Choosing participants from various groups and roles who had hands-on experience with the phenomenon helped develop an authentic picture of individual perspectives, perceived values, and preferences in the study and how these insights might have aligned or contrasted (Levant & McCurdy, 2018; Wilkins et al., 2019). This population shared common experience and knowledge on how the sustainment of TQM affected quality and productivity in the manufacturing process, making this population of about 450 employees appropriate for the single case study. The documents related to the TQM practice in the company were included in this population. These documents provided
supplementary insight from different perspectives by enabling access to retrospective records and data of the organization’s research-related activities that greatly contributed to the understanding of the phenomenon (Bouncken et al., 2021). This made approximately 14 types of documents related to TQM practices in the company’s archive eligible for the study.

The study used a purposeful sampling strategy. The sampling method increased the credibility of the results by defining the target group specifically for the purpose of the study and collecting data from a comprehensive range of settings to increase the level of details on the phenomenon (Bungay et al., 2016). The purposeful sampling strategy was appropriate in this study because it focused on the range of information-rich perspectives of participants and documents to strengthen the credibility of the phenomenon and provide depth of understanding. The sample frame included participants from the molding department, which had the highest internal rework rate in the site; the filter department, which had the highest internal scrap costs; and the pumps department, which had the highest external rejects. Justification of the sample frame came from the analysis of data from the quality and performance metrics of the company that indicated that these three departments had significant systemic issues with quality management and productivity compared to other departments.

The desired sample consisted of participants who were full-time employees of the company who had acquired sufficient experience in leading, practicing, supporting, and having an in-depth understanding of the effects of TQM sustainability in the manufacturing process. These participants possessed meaningful perspectives and relevant information needed to answer the research questions in the study and had a deeper understanding of the phenomenon. The study used a sample size of 50 participants for the interview and quality-related documents to gather pertinent information on the TQM sustainability issue. Studies proposed that researchers
utilizing participant interviews initially conduct no more than 50 interviews to allow researchers to cope with the complexity of the analytic task (Kindsiko & Poltimäe, 2019; Sim et al., 2018; Vasileiou et al., 2018). This setup provided substantial information to explain the phenomenon and reach data saturation. As a current employee of the chosen company, and part of the postgraduate educational plan supported by the employer, the researcher had permission to access the sample.

**Data Collection & Organization**

Data collection and organization structured in a systematic approach enabled the researcher to address research questions of the study. Data sets were collected from interviews, observations, and archived documents, and were recorded using field notes, observation, and interview protocols. Data and transcriptions were then be stored in digital files. Utilization of a semi-structured and face-to-face interview for the overall data collection process was beneficial because of the method’s ability to gain astute information based on prepared questions (Alam, 2020, 2021). The researcher observed how participants answered the questions, recorded notes on observed behaviors and expressions, and captured activities within each participant’s workstation. Observation of participants in their working environment assisted the researcher in developing a deeper understanding of the phenomenon because the process supplemented and supported participant engagement (Gilmore et al., 2019). Collecting data from archived documents from the company related to the phenomenon enriched and supplemented the primary data gathered through interviews and observations (Bouncken et al., 2012). Member checking was performed to ensure that participants’ reconstructions were distinguishable to them as acceptable representations of their lived experience and realities. Follow-up interviews were important, most especially when the participant offered other sources of evidence relevant for the
study or suggested other individuals who had specific experience with the phenomenon (Alam, 2020, 2021).

Interview guides, observation protocols, and archived data were utilized to gather information related to the research problem. Appendices A through E show the data collection instruments. In qualitative research, examining different perspectives of multiple participants and observing them at the same time produces an increased understanding of complex phenomena and diminished potential limitations intrinsically associated with the qualitative research practice (Scheffelaar et al., 2018). A question-and-answer format served as one method of organizing the database and had a benefit of allowing the researcher to create a targeted cross-case and custom-made synthesis by evaluating participants’ responses to a specific question (Yin, 2018). The information was filtered and sorted in a manner that represented the desired responses that served the inquiry at hand while searching for insights, patterns, or concepts that stood out. This process was especially helpful in managing, storing, and handling interview data during and after the completion of the study. The handwritten field notes were digitized and imported into a qualitative software, and abbreviations were developed to make data organization clearer (Hahlweg et al., 2017). The archived data were organized into a chart of rows and columns in a file, with each column designated for their relevance in the study and each row designated for an individual document (Baxter et al., 2016). This format aided with labeling and identification of findings into meaningful information.

Data Collection Plan

In a case study, the researcher traditionally investigates the bounded system, such as an activity, a process, a program, an event, or individuals of a chosen site (Creswell & Poth, 2018). The authors added that this examination would require access to extensive forms, such as
internal company documents and records, observations, interviews, and physical artifacts from multiple cases. In this study, the researcher collected data from interviews, observations, and archived documents, and recorded this information using field notes, observation, and interview protocols. The researcher then stored information and transcriptions in digital files. A semi-structured and face-to-face personal interview was utilized in the study for the overall data collection process because of the method’s ability to gain astute information based on prepared questions on the research topic (Alam, 2020, 2021). Furthermore, the author noted that using a personal interview stimulated the depth of responses from the participants by promoting independence and individuality in their opinion, which was highly valued information in the data collection process. This made face-to-face interviews appropriate for the research project.

The researcher observed how participants answered the questions, noted down observed behaviors and expressions, and captured activities within the participant’s workstation to understand other contributors to the study. Observation of participants in their working environment assisted the researcher in developing a deeper understanding of the phenomenon because the process supplemented, supported, and unpacked participant engagement (Gilmore et al., 2019). It was one way to identify reality from the viewpoint of participants inside the case (Yin, 2018). Collecting data from archived documents from the company related to the phenomenon enriched and supplemented primary data gathered through interviews and observations (Bouncken et al., 2012). This made these data collection activities appropriate for the study. All ethical concerns were observed across the research activities in selecting the site, gaining proper access and consent for all participants, sampling purposely to increase credibility of results, and collecting information through documents, observations, and interviews (Creswell & Poth, 2018).
An essential means of safeguarding against researcher bias is member checking. This technique includes returning to participants, either via face-to-face, or through email or phone, to show them the transcripts, records, explanations, and interpretations of the researcher based on the interview (Robson & McCartan, 2016). The authors added that the process reveals the value of the participants’ perceptions and contributions. Member checking was completed to settle and reflect on the concerns of the participants and the needs of the study. The process involved participants reviewing interpretations, thinking independently, and appraising findings that increased the transactional validity of the results by giving voice to informants, and establishing more equitable researcher-participant relationships (Brear, 2019). Returning the results or data back to participants to check or validate for resonance, meaning, and accuracy with their experiences increased the credibility and the trustworthiness of results (Birt et al., 2016; Naidu & Prose, 2018). Participants were given a chance to check the researcher’s data or interpretation from their viewpoint and to increase the fidelity of the research by maintaining the participants’ integrity and worth (Iivari, 2018; Varpio et al., 2017). Member checking was performed to ensure that participants’ reconstructions were distinguishable to them as acceptable representations of their lived experience and realities, and further reassessed their intentions and corrected errors as necessary. Additional information provided by the participant was captured and summarized, taking into account any evidence that might be corrected, expanded, or that might lead to new discoveries.

The interview serves as one of the most important sources of case study evidence and could especially assist by proposing explanations of the “hows” and “whys” of significant events in the study, as well as insights reflecting informants’ relativist perceptions (Yin, 2018). As suggested by the author, case study interviews were open-ended dialogues rather than planned
inquiries, and there were follow-up conversations with participants to satisfy the needs of the original investigation. Qualitative follow-up interviews helped in constructing a deeper understanding and knowledge of the collected data related to what was of significance in the day-to-day experiences of the participants in the study (Kristoffersen, 2019). Follow-up interviews were important and were done most especially when the participant offered other sources of evidence relevant for the study or suggested other individuals who had specific experience with the phenomenon (Alam, 2020, 2021). New interview questions were created and followed up, most especially when these arose from responses to the initial interviews. This action reinforced the data and information related to the study. This action also helped supplement the credibility of the results by adding more information to corroborate any insights that might be comparable or contrary to the data already collected (Yin, 2018).

**Instruments**

Data collection in qualitative research is the process of gathering information on the phenomenon in a systematic approach that enables the researcher to answer queries related to research questions; frequently used instruments are participant interviews, observations, and group discussions (Moser & Korstjens, 2017, 2018). As recommended by the authors, the qualitative interviews were open-ended questions and took descriptive answers with little or no numerical value. Research instruments in this qualitative study collected new ideas and opportunities to test their value and accuracy to explore a deeper understanding of the phenomenon and formulate predictions for possible practical solutions (Scheffelaar et al., 2020). The authors added that the usability and feasibility of the qualitative instruments were contingent on the interaction of several factors and the participants to determine which instruments applied best to serve the objectives of the study under certain conditions. Interview guides, observation
protocols, and archived data were used to gather information related to the research problem. These instruments gave the researcher an active position in understanding, monitoring, and supplementing the research findings collected from participants in the real-time setting. In this qualitative research, examining different perspectives of multiple participants and observing them at the same time produced an increased understanding of the complex phenomenon and diminished possible limitations intrinsically associated with the qualitative research practice (Scheffelaar et al., 2018).

The semi-structured case study interview guides resembled guided conversations to allow pursuit of consistent and fluid lines of inquiry regarding the participant’s in-depth experience with the phenomenon (Yin, 2018). The author noted that the guide should allow the interviewer to satisfy the needs of the line of his or her inquiry while instantaneously asking questions in the open-ended interview. The interview guides shown in Appendices A through D contained inquiries focused on answering the research questions with consideration to the roles the participants took related to TQM sustainment. This grouping consisted of participants in the leading role, practicing role, supporting role, or receiving role in the sustainment of TQM methodology. The inquiries also considered the influence of various related themes from management processes such as continuous improvement, dynamic capabilities, human resource management, and knowledge management that contributed to the current state of the phenomenon.

To maintain focus and emphasis on addressing the four research questions, the interview questions were categorized into four groupings representing four participant roles, such as leading, practicing, supporting, and receiving. This setup maintained the alignment of the interview inquiries in getting the appropriate information to answer each research question.
Appendices A through D show the interview guide format for the groupings of interview questions. This format also allowed a concentrated path in achieving saturation of relevant data that was specific to each research question. Creswell and Poth (2018) suggested that the interview questions were refined through pilot testing to assess the degree of researcher bias and make this instrument more adaptable to the environment. The interview inquiries had been through pilot testing for fine-tuning and development of the relevant lines to improve each question’s content. The interview guide carried the awareness of the principle of confidentiality to protect participants, most especially in research conducted in a workplace environment (Creswell & Poth, 2018).

To preserve mutual trust and respect with participants helping with the study, the researcher only used observation as a data collection instrument when they gave their informed consent. Observing participants as part of the study without their permission and knowledge for the purpose of the researcher is against the principle of informed consent (Robson & McCartan, 2016). Participant observation was utilized to watch what their actions meant and to pay attention to what they shared to supplement and corroborate data gathered from other collection instruments. Being part of the working and social environment of the chosen company in the study, the researcher easily discerned the meaning of the experiences of participants through the experience of the observer (Northcote & Phillips, 2019; Simoný et al., 2018). Preserving the researcher-participant relationship was important while conducting participant observation to learn about the subjects under study in their natural settings, through observing and participating in their activities to reconcile between what participants said, and what they did in reality (Franco & Yang, 2021).
To satisfy the objectives of the study in aiming to understand the sustainability issue of TQM practices, the observation focused on the actual standard work and procedures happening in the manufacturing lines to examine compliances and non-compliances. This type of observation captured actions in real-time and covered the phenomenon’s context (Yin, 2018). Execution of quality inspection activities per critical-to-quality instructions by participants was observed to understand how these checks were done, or whether these actions were completed at all. Explanations from participants were collected on what worked well in their practice of TQM and what activities caused issues in its sustainment based on findings from observations to validate their actions. In addition, the observer also noted down response time to quality issues and captured other inputs introduced to the line such as purchased components, kits, internally made parts, and schedules that contributed to the phenomenon under study. To answer the research questions, observation also focused on observable factors that affected process capabilities and enablers, which influenced how participants sustained TQM practices in the line. This observation included how leadership recognized, supported, or stimulated the participants’ actions throughout the shift. Robson and McCartan (2016) recommended using an existing coding scheme that was appropriate to provide relevant information to answer the research question. The authors added that a straightforward and reliable scheme is one that is objective, focused, explicitly defined, exhaustive, non-context dependent, mutually exclusive, and easy to record. Appendix E shows the observation protocol designed for the study. The observation form was specifically designed and tailored to gather visual and recognizable information related to answering research questions of the study in the site.

Documents could supply distinct details to substantiate information from other data collection sources (Yin, 2018). The archival data that was gathered to support the study were
documents related to the company’s TQM practices, which include warranty versus sales reports, quality alerts, first pass yield, and standard work audits. Additional documents such as product non-conformance reports, site scrap summaries, critical-to-quality forms, process audits, daily productivity reports, root-cause countermeasures, and archived documents supporting evidence of TQM implementation were included. These documents provided supplementary insight from multiple viewpoints by allowing access to reflective records and data of the organization’s quality-related activities, including assessment of concealed evidence from quality forms that greatly contributed to the understanding of the phenomenon (Bouncken et al., 2021). This made approximately 14 types of documents related to TQM practices in the company’s archive eligible for the study. Table 4 shows the documents used in the study.

**Table 4**

*Quality-Related Archived Documents of the Company*

<table>
<thead>
<tr>
<th>Documents</th>
<th>Specific Purpose in understanding TQM sustainability in the Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warranty versus Sales</td>
<td>The document tracked warranty performance and top-level quality issues to show quality performance trends. The contents helped define the current state of TQM sustainability and gaps in the process.</td>
</tr>
<tr>
<td>Quality Alerts</td>
<td>The document tracked direct customer complaints that were reported directly by field representatives to the organization’s customer service hotline. The contents helped define the current state of TQM sustainability and gaps in the process.</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>First Pass Yield</td>
<td>The document tracked individual lines and their throughput performance to identify top process defects and trends. The contents helped define the current state of TQM sustainability and gaps in the process.</td>
</tr>
<tr>
<td>Standard Work Audits</td>
<td>The document tracked compliance and non-compliance to standard work procedures. The contents helped define the current state of TQM sustainability and gaps in the process.</td>
</tr>
<tr>
<td>Product Non-Conformity Report</td>
<td>The document tracked occurrence of internal defects and their disposition. The contents helped define the current state of TQM sustainability and gaps in the process.</td>
</tr>
<tr>
<td>Site Scrap Summaries</td>
<td>The documents tracked rejected material or components due to process issues. The contents helped define the current state of TQM sustainability and gaps in the process.</td>
</tr>
<tr>
<td>Critical-to-Quality Forms</td>
<td>The document showed evidence of critical inspections driven by past significant quality events. The contents helped define the current state of TQM sustainability and gaps in the process.</td>
</tr>
<tr>
<td>Process Audits</td>
<td>The document showed evidence of process variations and corrective measures. The contents helped define the current state of TQM sustainability and gaps in the process.</td>
</tr>
</tbody>
</table>
Daily Productivity Report
The document tracked manufacturing’s daily performance. The contents helped define the current state of TQM sustainability and gaps in the process.

Root-Cause Countermeasures
The document showed evidence of corrective measures of significant quality events. The contents helped define the current state of TQM sustainability and gaps in the process.

Control Plans
These are supporting documents that show quality controls and procedures. These documents showed evidence of TQM implementation and baseline expectations.

Quality Manual
These are supporting documents that show quality policy and guidelines. These documents showed evidence of TQM implementation and baseline expectations.

Change Management Policies
These are supporting documents that regulated change management processes. These documents showed evidence of TQM implementation and baseline expectations.

Process Failure Mode Analyses
These are supporting documents that identified and evaluated the potential failures of a process and reaction plans. These documents showed evidence of TQM implementation and expectations.

Data Organization Plan
Part of the data organization plan was the creation of a case study database that organized the information gathered for the single case study and had a format that enabled data to be
conveniently examined and recovered. Conversion of data from the field required making choices about the suitable text units of the data and digital representations of the instrument materials (Creswell & Poth, 2018). Utilizing the questions that were part of the original study procedure, a question-and-answer format was served as one method of forming and organizing the database (Yin, 2018). The author further suggested that the question-and-answer format had a benefit because it allowed creation of a targeted cross-case and custom-made synthesis by evaluating the participants’ responses to a specific question from a data set. This was an appropriate process for the research project since organizing the data in such a way that all the questions were visible and distinguishable allowed the full measure of scope and benefits of the original database. The setup filtered and sorted information in a manner that best represented the desired responses that served the inquiry at hand while searching for insights, patterns, or concepts that stood out. This process was especially helpful in managing, storing, and handling interview data during and after the completion of the study.

The data organization plan that incorporated observational information included the use of a tabulated format that captured observed actions of participants and their compliance to TQM practices in their station. Key phrases or words from the observation, with reference to time, date, and place were highlighted (Creswell & Poth, 2018; Yin, 2018). Handwritten field notes were digitized and imported into a qualitative software, and abbreviations were developed to make data organization clearer (Hahlweg et al., 2017). The authors further noted that initial coding was helpful when organizing field information on a phrase-by-phrase approach and clustering these into categories or themes. This technique also derived meaning from text by systematic coding and classification to recognize recurring themes or patterns. The archived data were organized into a chart of rows and columns in a file with each column designated for their
relevance in the study and each row designated for an individual document (Baxter et al., 2016). This format assisted with the labeling and identification of results into meaningful information related to the study. This data organization plan was appropriate for the study because it was systematic and comprehensive in organizing qualitative content to maintain the chain of evidence that served the objectives of the research.

**Summary of Data Collection & Organization**

Data were collected from interviews, observations, and archived documents, and recorded using field notes, observation, and interview protocols. Data and transcriptions were then stored in digital files. A semi-structured and face-to-face interview was utilized for the overall data collection process because of the method’s ability to gain astute information based on prepared questions (Alam, 2020, 2021). This made face-to-face interviews appropriate for the research project. The researcher observed how participants answered the questions, noted down observed behaviors and expressions, and captured activities within the participant’s workstation. Observation of participants in their working environment assisted the researcher in developing a deeper understanding of the phenomenon because the process supplemented and supported participant engagement (Gilmore et al., 2019). Collecting data from archived documents from the company related to the phenomenon enriched and supplemented interviews and observations (Bouncken et al., 2012). This made these data collection activities appropriate for the study. All ethical concerns were observed across the research activities (Creswell & Poth, 2018).

It was important to give participants a chance to check the researcher’s data or interpretation from their viewpoint to increase the fidelity of the research by maintaining the participant’s integrity and worth (Iivari, 2018; Varpio et al., 2017). Member checking was performed to ensure that participants’ reconstructions were distinguishable to them as acceptable
representations of their lived experience and realities, upon which they further reassessed their intentions and corrected errors as necessary. Follow-up interviews were important most especially when the participant offered other sources of evidence relevant for the study or suggested other individuals who had specific experience with the phenomenon (Alam, 2020, 2021). New interview questions were created and followed up that arose from responses to the initial interviews. This action reinforced the data and information related to the study. Interview guides, observation protocols, and archived data were used to gather information related to the research problem. In this qualitative research, examining different perspectives of multiple participants and observing them at the same time produced an increased understanding of this complex phenomenon and diminished possible limitations intrinsically associated with the qualitative research practice (Scheffelaar et al., 2018).

A question-and-answer format served as one method of organizing the database and had a benefit of creating a targeted cross-case and custom-made synthesis by evaluating the participants’ responses to a specific question (Yin, 2018). The setup filtered and sorted information in a manner that best represented the desired responses that served the inquiry at hand while searching for insights, patterns, or concepts that stood out. This process was especially helpful in managing, handling, and storing interview data during and after the completion of the study. In organizing observation data, key phrases or words, which were the product of observation containing actual evidence, were highlighted (Yin, 2018). Handwritten field notes were digitized and imported into a qualitative software, and abbreviations were developed to make data organization clearer (Hahlweg et al., 2017). The archived data were organized into a chart of rows and columns in a file with each column designated for their relevance in the study and each row designated for an individual document (Baxter et al., 2016).
This format aided with the labeling and identification of outcomes into meaningful information related to the study. This data organization plan was appropriate for the study because it was systematic and comprehensive in organizing qualitative content to maintain the chain of evidence that served the objectives of the research.

**Data Analysis**

Data analysis assisted in the classification, interpretation, and representation of data into meaningful information that provided context for the study. It was a process of breaking up something complex into its minor components and using logical and analytical reasoning to determine properties, patterns, relationships, or trends (Robson & McCartan, 2016). After organization of the data, Creswell and Poth (2018) suggested prioritizing memoing during the course of the analysis phase by starting the process at the initial review of the data and continuing until the inscription of the conclusion. Memos based on the unit of text were organized to create descriptions that were reflective of content to assist in data sorting activities. The process of describing and classifying codes into themes included understanding and making sense of the words, transcript, and phrases collected from data collection instruments such as interviews, observations, and archived documents. Codes were designated to units of meaning of the descriptive information collected during a study and were attached to varying sizes of words, sentences, phrases, or paragraphs, associated with or independent from a study’s setting (Røddesnes et al., 2019).

The interpretation process was done by creating the codes and developing the themes from the codes, afterwards organizing the themes into greater units of constructs to make sense of the collected data (Creswell & Poth, 2018). Interpretations were prepared within a social construct, ideas, or a grouping of individual views based on hunches, intuitions, and insights that
the researcher could link to a larger research developed by others (Ravitch & Mittenfelner Carl, 2016). Data visualization has a social power in its ability to create feelings, meanings, and engagement in its audience and users because it awakens a wide range of viewpoints in individuals who participate with it (Engebretsen, 2020). To conduct the analysis for triangulation, the results of the interview against the shop floor observation and the findings in the TQM-related documents were checked. Multiple methodological resources such as diverse techniques, various data sources, and different data analysis procedures were used to check on objectivity and incorrectness that any data source, method, or analysis procedure had generated (Rooshenas et al., 2019). Computer-assisted qualitative software, NVivo, was used to handle data synthesis, analysis, storage, and management of data, but it was noted that the software was unable to understand text and could not replace the researcher’s analytical skills (Houghton et al., 2017). The software allowed the evaluation of a broader range of data sources, such as video, audio, and data sets, and offered increased data visualization options and the capability to generate predefined and custom-made reports (Phillips & Lu, 2018).

**Emergent Ideas**

Creswell and Poth (2018) explained that scribbling memos or notes in the margins of filed transcripts or underneath observation diagrams or images assisted in this preliminary process of exploring and understanding the contents of a database. The authors added that scanning texts, words, and phrases allowed the researcher to construct a sense of the information’s relevance in its entirety in addressing the research questions. Interpretations were drawn by using memoing and were incorporated from a range of perspectives gathered during the interview analysis to discover more about the participants’ lived experience of the phenomenon (Patel et al., 2016). The in-depth analysis of transcripts involved a series of
interactions in other contexts to uncover other changes that transpired over time, which revealed other developments that affected the research topic. Memoing helped in capturing thoughts, ideas, and questions during data analysis, and aided in the discovery of essential categories that led to the identification of relationships among other components of the study (Leger & Phillips, 2017).

Creswell and Poth (2018) suggested prioritizing memoing during the course of the analysis phase by starting the process at the initial review of the data and continuing until the inscription of the conclusion. Memos based on the unit of text were organized to create descriptions that were reflective of content to assist in data sorting activities. Three levels of analysis, such as segment memos, document memos, and project memos were used to capture ideas from reading particular phrases in the data, concepts developed from reviewing an individual file, and the integration of ideas across one concept (Ravitch & Mittenfelner Carl, 2016). This helped in authenticating multiple concepts that fit together across the study. A sorting strategy was utilized to retrieve and sort memos through time, participant, content, or data form. Memoing was used as a complementary tool in the systematic analysis of the study since it tracked progression of ideas through the process, which in turn led to the trustworthiness of the investigation of the qualitative data and results. This process helped anticipate the discovery of some evidence through informed premonitions, intuition, and unexpected incidences that led to richer and more meaningful explanations of the background, context, and participant actions in the research (Creswell & Poth, 2018).

**Coding Themes**

The process of describing and classifying codes into themes was important in this qualitative study and included understanding and making sense of the words, transcript, and
phrases collected from data collection instruments such as interviews, observations, and archived documents. Codes were designated to units of meaning of the descriptive information collected during a study and attached to varying sizes of words, sentences, phrases, or paragraphs, associated with or independent from a study’s setting (Røddesnes et al., 2019). The process of coding was used in combining the visual data or text into classifications of information, searching for evidence of the code from multiple records in the research, and then giving a designation to the code (Creswell & Poth, 2018). The codes were used as the basic building block that formed the structure of the analysis and were clustered into themes or narratives that interpreted the relevance of the concept (O’Connor & Joffe, 2020). The authors encouraged researchers to be transparent about their rationale in developing the thematic structure since this level of interpretive flexibility was significant in qualitative research. An initial list of about 25 potential codes were developed that closely described word segments or phrases irrespective of the size or content of the database (Creswell & Poth, 2018). The temporary codes were examined for their relationship to the themes based on the research framework and the literature review.

The coding process helped reveal patterns among events to conceptualize the empirical content of the area of research. A line-by-line analysis of the data were performed to understand and determine what codes were appropriate for participants’ responses. This process continued until a main category related to the main concern of the TQM study participants was identified. The description and classification of codes was related to the main category, along with the emerging patterns extracted from the data. The coding process provided the direction and synchronization for simultaneous data collection, analysis, and category saturation to help create underlying structural patterns of the study (Leger & Phillips, 2017). The codebook for the study contained the finalized list of codes and descriptions; the book helped articulate the codes’
distinctive boundaries in assessing inter-rater reliability among them (Creswell & Poth, 2018). The authors noted that the codebook should contain a condensed label suitable to apply in a margin, a description with inclusion and exclusion criteria to define boundaries, and an example of the codes using data from the research for clarification.

**Interpretations**

In qualitative research, interpretation involves conceptualizing beyond the codes and themes to the greater significance of the study; a well-established view of this process was about clarifying or shedding light on meaning (Robson & McCartan, 2016). To start the interpretation process, codes were created, and themes were developed from codes, and then these themes were organized into greater units of constructs to make sense of the collected data (Creswell & Poth, 2018). As suggested by the authors, categorical aggregation was used to seek a collection of instances from the data in anticipation that issue-relevant meanings might materialize. This categorical aggregation was also used to examine a single instance and to draw meaning without searching for multiple instances. Data were pulled separately and assembled back together in meaningful ways to establish patterns while looking for associations between several categories (Creswell & Poth, 2018). Interpretations were done within a social construct, ideas, or a grouping of individual views based on hunches, intuitions, and insights that the researcher could link to a larger research developed by others (Ravitch & Mittenfelner Carl, 2016). Specifically, this was done by gathering ideas, perceptions, and personal views of TQM participants and comparing these insights to existing interpretations from relevant literatures. Peer advice on initial data interpretations and audit trails was acquired to evaluate preliminary findings that helped articulate any patterns identified in the data sets. As suggested by Creswell and Poth (2018), the study incorporated diagraming as a means of visually demonstrating the relationship among
concepts at certain points, which were also beneficial in final reporting because of the way diagrams display clarity.

The information was interpreted as this was being composed and recognized instantaneously; if multiple sources of information contradicted each other, there was a need for supplementary evidence (Yin, 2018). The author further emphasized that the researcher should stay on course with the data collection and interpretation, and the key technique was to recall the purpose and the rationale of the study. Researchers defined integrity in terms of transparency, honesty, and objectivity, and commonly stressed the significance of being vested in the research questions and removing bias in the interpretation of data (Shaw & Satalkar, 2018). To create a valid and effective interpretation, a framework was generated on what was happening instead of what was occurring or emerging from what researchers learned during their participation within the setting (Robson & McCartan, 2016). As suggested by the authors, a preexisting framework was started, and this was validated on its appropriateness to the study with potential modification.

**Data Representation**

Data representation and visualization make the data engaging and digestible by helping to identify trends and outliers within the data set (Engebretsen, 2020). The authors added that the process assists in telling a narrative within the data while supporting an opinion or argument and highlighting the significant parts of a collection of data to convey complex patterns and facts quickly and efficiently. Data representation and visualization in the study consisted of a word cloud, items clustered by word similarity, and multiple comparison diagrams between themes and constructs. To facilitate understanding, persuasion, and clarity, data visualization in the study also consisted of a flow diagram that categorized and organized information based on categories
and themes that were broken down into understandable portions. Data visualization has a social power in its ability to create feelings, meanings, and engagement in its audiences and users because it awakens a wide range of viewpoints in individuals who participate with it (Engebretsen, 2020). According to the authors, it is stimulated by the textual content of visualizations and contextual dynamics like users’ previous experiences with the phenomenon.

The data sets stored in text, tabular, or figure form were represented by creating a visual image of the information. A word table was generated to display data from various data sets that were arranged in a uniform framework; the benefit of this setup allowed a search for differences and similarities in the information to be performed (Yin, 2018). A matrix that contains text and not numeric characters were used to cross-reference and compare categories that were utilized to establish a representation of data ranges or patterns (Creswell & Poth, 2018). As suggested by the authors, a cause-and-effect diagram could be created to show the level of abstraction. In creating the display, the selected themes and type of information presented were drafted and feedback was sought on structuring ideas, noting patterns and potential comparisons, and revisiting associated texts and conclusions. As suggested by Creswell and Poth (2018), feedback was sought on the preliminary outlines and data displays by sharing information back to participants as an important validation step in research.

**Analysis for Triangulation**

Triangulation helps to reinforce the construct validity of the study by using multiple methodological resources or practices to develop convergent evidence (Al-Moghrabi et al., 2020). The TQM sustainability study used more than one type of qualitative data collection procedure, such as gathering data by means of interviews, observations, and documents. Multiple data points were established by gathering information from different periods, locations, or
perspectives through the interview of TQM participants who possessed different viewpoints or held varying levels of authority. This process included interviewing senior leadership and production employees within the company from different product value streams. Shop floor observations of the TQM sustainability issue in multiple departments were completed and documentary examination of the occurrence on file was performed. The results of the interview were checked against the shop floor observations and the findings in the TQM-related documents. Multiple methodological resources such as diverse techniques, various data sources, and different data analysis procedures were used to check on objectivity and incorrectness that any data source, method, or analysis procedure had generated (Rooshenas et al., 2019). Triangulation involved use of multiple data sources to corroborate evidence. When qualitative researchers uncover evidence to document a code, theme, or perspective from multiple and different sources of data, they are triangulating information and establishing validity of the results (Creswell & Poth, 2018).

The multiple sources of evidence included interviewing diverse groups of TQM participants in the company, covering 50 subjects across five value streams and four functional groups. Interviewing participants in a variety of different operational positions at different settings in time and location built up strong evidence of the phenomenon because the approach covered the diversity of organization (Natow, 2020). The second source of evidence came from observations taking place at different times and process locations. Actors were observed on how they performed tasks related to TQM practices at the start and end of the shift, before and after breaks and lunches, and during normal operations. The observation process established strong evidence that included select groups of participants for extended periods, diverse activities at different locations, and work with different concepts (Moon, 2019). The third source of evidence
included the examining of documents related to the TQM practice in the company. These
documents included process audits, standard work reviews, critical-to-quality forms, product
non-conformity reports, scrap summaries, productivity statements, quality audits, and root-cause
countermeasure files. One of the most common practices of utilizing multiple qualitative
methodologies was to combine interviews and observations with documentary analysis (Natow,
2020). A convergent evidence was developed from these three sources to help strengthen the
construct validity of the case study. Use of multiple sources of evidence to provide multiple
measures of the same phenomenon would increase confidence that the research had rendered the
incident accurately (Yin, 2018).

Use of Leading Qualitative Analysis Software

The purpose of the qualitative software as an analysis tool is to assist with the
management aspect of the investigation; the researcher must do the hard analytic thinking and be
aware of its limitations (Creswell & Poth, 2018). Qualitative synthesis consisted of processing
large volumes of data, and it required an effective system for managing study results and
decisions concerning exclusion and inclusion, handling reproductions of research reports,
organizing, and combining data. An electronic database was created for organizing the search
strategy and sorting references. Computer-assisted qualitative software, NVivo, was used to
handle data synthesis, analysis, storage, and management of data, but it was noted that the
software was unable to understand text and could not replace the researcher’s analytical skills
(Houghton et al., 2017). NVivo helped alleviate the workload in constructing and examining
qualitative research data by enabling the researcher to handle large amounts of data through
structuring tasks spontaneously (Røddesnes et al., 2019). The software allowed the evaluation of
a broader range of data sources, such as video, audio, and data sets, and offered increased data
visualization options and the capability to generate predefined and custom-made reports (Phillips & Lu, 2018). The software was used to support three phases of the research process, such as data collection, data analysis, and data representation of findings (Woods et al., 2016). As suggested by the authors, the software was used to assist in creating text and audio files, making it possible to create interview notes, field notes, reflective journal records, and interview transcriptions within the software.

Using NVivo in the study provided an anchor to brainstorm around the development of themes that was grounded in data, enabling further in-depth analysis of the findings (Dalkin et al., 2020, 2021). The study benefited from the dynamic nature of the software that allowed merging, deleting, or coining of new codes during analysis and kept track of how an interpretation strategy deployed while addressing the same data in numerous repetitions (Rossolatos, 2019). NVivo did not completely scaffold the analysis process and limited data collaboration might constrain the interpretative research processes, so it was important that the researcher remained true to the objectives of the study while benefitting from this technology (Maher et al., 2018). It was important that the researcher did not let the technology itself drive the research design and analysis, prompting him or her to collect large volumes of data that might not be appropriate for answering the research questions. (Robins & Eisen, 2017).

**Summary of Data Analysis**

Data analysis is a process of breaking up something complex into its minor components and using logical and analytical reasoning to determine properties, patterns, relationships or trends (Robson & McCartan, 2016). Interpretations were drawn by using memoing and were incorporated from a range of perspectives gathered during the interview analysis to discover more about participants’ lived experience of the phenomenon (Patel et al., 2016). The in-depth
analysis of transcripts involved a series of interactions in other contexts to uncover other changes that transpired over time, which revealed other developments that might affect the research topic. Memos based on the unit of text were organized to create descriptions that were reflective of content to assist in data sorting activities. The process of describing and classifying codes into themes included understanding and making sense of the words, transcript, and phrases collected from data collection instruments such as interviews, observations, and archived documents. Codes were designated to units of meaning of the descriptive information collected during a study and were attached to varying sizes of words, sentences, phrases, or paragraphs, associated with or independent from a study’s setting (Røddesnes et al., 2019).

The description and classification of codes should relate to the main category along with emerging patterns extracted from the data. The coding provided the direction and synchronization for simultaneous data collection, analysis, and category saturation to help create underlying structural patterns of the study (Leger & Phillips, 2017). The interpretation process was performed by creating the codes and developing the themes from the codes, and then organizing the themes into greater units of constructs to make sense of the collected data (Creswell & Poth, 2018). Data were pulled separately and re-assembled in meaningful ways to establish patterns while looking for associations between several categories. Interpretations were prepared within a social construct, ideas, or a grouping of individual views based on hunches, intuitions, and insights that the researcher could link to a larger research developed by others (Ravitch & Mittenfelner Carl, 2016). To facilitate understanding, persuasion, and clarity, data visualization in the study consisted of illustrations and diagrams to categorize and organize information based on categories and themes that were broken down into understandable portions. Data visualization has a social power in its ability to create feelings, meanings, and engagements
in its audiences and users because it awakens a wide range of viewpoints in individuals who participate with it (Engebretsen, 2020).

The results of the interview were checked against the shop floor observations and the findings in the TQM-related documents. Multiple methodological resources such as diverse techniques, various data sources, and different data analysis procedures were used to check on objectivity and incorrectness that any data source, method, or analysis procedure might have generated (Rooshenas et al., 2019). An electronic database was created for organizing the search strategy and sorting references. Computer-assisted qualitative software, NVivo, was used to handle data synthesis, analysis, storage, and management of data, but it was to be noted that the software was unable to understand text and could not replace the researcher’s analytical skills (Houghton et al., 2017). Data analysis is an iterative process that involves moving back and forth between sampling, data collection, and data examination to collect meaningful data and thought-provoking findings; what materializes from data analysis outlines succeeding sampling decisions (Moser & Korstjens, 2017, 2018). This allowed the researcher to have a comprehensive understanding of personal experiences and reasons influencing the participants’ preferences (Vennedey et al., 2016).

**Reliability and Validity**

Replication of findings in quantitative research aids in the systematic self-correction process used in generating ideas to reflect a more accurate understanding of the phenomenon (Collingridge & Gantt, 2019). Research methods were reliable if these were sufficiently free of bias and consistently produced the same results given similar contexts such as participants and research conditions. Reliability signified the dependability of the methodological process. Clarity was provided in the analytical procedures and a justification of the methods was used to increase
the trustworthiness of the study (Rose & Johnson, 2020). The validity of the findings in this qualitative research involved cautious transcriptions and frequent verification of the data that was collected during the investigative process, and its trustworthiness was maximized to create credible and defensible results (Cypress, 2017). This process allowed systematic categorization of the findings to find common themes or groupings by removing overlapping information (Creswell & Poth, 2018).

There was a need to acknowledge the researcher’s role in the study, including biases, assumptions, feelings, and how these affected how research was conducted, including analyses, outcomes, and conclusions (FitzPatrick, 2019). As Yin (2018) proposed, multiple sources of evidence, pattern matching, logic models, key informants review, explanation building, and addressing rival explanations were used to enhance validity in this case study. Bracketing, as a theoretical construct, recognized participants’ subjectivity and placed it center-stage in addition to objectivity; this was used to achieve a better understanding of the phenomenon in real-time and was a powerful means to support and clarify research findings (Dörfler & Stierand, 2020). To avoid personal bias in the research, the phenomenon to study was specifically identified, bracketing out any existing assumptions and experiences, and gathering data from a number of participants who had experienced the phenomenon (Gregory, 2019). A supportive environment was provided by respecting the subjects’ personhood and this required valuing participants’ autonomy and decisions (Dörfler & Stierand, 2020; McWhorter, 2019). Subsequently, the data were evaluated and analyzed by converting and saturating the information to significant quotes or accounts and incorporating these statements into relevant themes (Gregory, 2019; McWhorter, 2019).
Reliability

Replication of findings in quantitative research is important as it assists the systematic self-correction process for the modification of ideas to reflect a more accurate understanding of the phenomenon and increases confidence in the accuracy of findings (Collingridge & Gantt, 2019). The authors added that research methods are reliable if they are sufficiently free of bias to consistently produce the same results given similar contexts such as participants and research conditions. Defining the suitable method to show reliability was important and was contingent on a certain range of the data itself. In cases where the coding scheme was multifaceted and additional interpretation was required, a consensus coding method was utilized (Watts & Finkenstaedt-Quinn, 2021). This qualitative study was done honestly, carefully, and thoroughly in conducting the research and one way of realizing this was through an audit trail that verified the repeatability and accuracy of the results (Robson & McCartan, 2016). Another common way of dealing with reliability challenges was to produce as many procedures as explicitly as possible and to carry on research as though an auditor was monitoring the process (Yin, 2018). The author advised that it was beneficial to conduct case studies so that an assessor in principle, would replicate the procedure and optimistically conclude the same results.

To enhance reliability in the study, comprehensive field notes using high-quality recording instruments and digital files were used (Creswell & Poth, 2018). As suggested by the authors, the transcriptions included notes that captured the inconsequential, but often essential, overlaps and pauses. Reliability signified the dependability of the methodological process. Clarity was provided in the analytical procedures and a justification of the methods was used to increase the trustworthiness of the study (Rose & Johnson, 2020). The authors further noted that the researcher would need to consider to what level this research methodology might be
replicable, and whether comparable analyses and results would transpire if the data collection processes were repeated. Related to coding, prior decisions were performed regarding the number of codes, amount of data that was coded, the unit of coding, the conceptual depth that codes captured, the reliability measured, and its acceptable threshold (O’Connor & Joffe, 2020). The authors added that the qualitative reliability specified that the methodological approach needed to be consistent across different researchers and different studies.

Credibility was maintained by depicting an accurate and truthful representation of participants’ lived experiences through persistent observation and prolonged engagement to examine the situation of the phenomenon in its current state. Transferability was achieved by utilizing purposive sampling methods and providing thick and robust data with an extensive range of information through accurate and detailed descriptions of the participants and their lived experiences (Cypress, 2017). Interviews of TQM participants and data collection were carried on until data saturation and replication was attained to enhance the adequacy and appropriateness of the study. To achieve dependability, a company’s doctoral level researcher review was requested to analyze the transcribed materials, and validate the descriptors, themes, and findings. The analyst’s feedback and recommendations were compared to the study’s thematic analysis to consider proposals that were acknowledged after agreement and understanding were met from both parties (FitzPatrick, 2019). The researcher, who was the lone instrument of the study, maintained a reflexive journal to capture all the notes, summaries, and documents daily during the research process to satisfy the confirmability of the study. The interview records were part of the audit trail that aided in the examination of the TQM process as data collection, analyses, interpretations, and representation were made. Reliability improved when care and consistency
were applied in research practices that were observant of the subjectivity and limits of the research outcomes (Cypress, 2017).

**Validity**

Validity is the process of determining the result’s accuracy from the perspectives of the researcher, the participants, and the reviewer of the research (Creswell & Poth, 2018). It is a provisional construct that is based on the objectives and processes of specific research methodologies rather than a universal concept that is both singular and fixed (Rose & Johnson, 2020). In this qualitative research, the validity of the findings involved cautious recording and frequent verification of the data that was collected during the investigative process; its trustworthiness was maximized to create credible and defensible results (Cypress, 2017). The author broadly defined this process as the state of being well grounded, pertinent, meaningful, coherent, consistent with accepted principles, and the quality of being sound and well founded. A valid research would establish accurately what existed in reality, and a valid measurement or instrument would essentially assess what it intended to measure. The underlying constructs, such as physical anxiety and emotional security, were assessed to understand whether the measurement instruments provided an adequate measure of the construct under study compared to other measures of the same phenomenon (Collingridge & Gantt, 2019).

To ensure validity in the study, corroboration of evidence through triangulation of multiple data sources, which included interviews, observation, and archived data, was done. This process allowed systematic categorization of the findings to find common themes or groupings by removing overlapping information (Creswell & Poth, 2018). The researcher also clarified bias or engaged in reflexivity, so the reviewer understood the position from which the former undertook the inquiry. There was a need to acknowledge the researcher’s role in the study,
including biases, assumptions, feelings, and how these affected how research was conducted, including analyses, outcomes, and conclusions (FitzPatrick, 2019). As suggested by the author, discrepant evidence was reported to understand this intriguing aspect of the findings and its influence or relationship to the interactions of the participants’ lived experiences with the phenomenon. Member checking and participant feedback were incorporated to solicit their views of the credibility of the findings, interpretations, and representations. Seeking participant validation ruled out the likelihood of misinterpreting what participants said and did and their perception of what was going on, as well as a way of identifying the researcher’s biases that could negatively affect the study (FitzPatrick, 2019).

Prolonged engagement and persistent observation constructed solid field-based decisions on what were relevant to the objectives of the study; with the collaboration of participants, credibility and support of the findings were established (Creswell & Poth, 2018). External audits and a peer review of the data and research process were enabled. Deliberations about the analysis and findings aligned the researcher back with the data and enhanced trustworthiness and debriefing with participants to explain results reinforced researcher understandings and interpretations (Rose & Johnson, 2020). This validation process also showed respect for the participants’ contributions, and reinforced ethical consideration. As proposed by Yin (2018), multiple sources of evidence, pattern matching, logic models, key informants review, explanation building, and addressing rival explanations to enhance validity in this case study were used. In making more sense of the phenomenon’s reality, saturation of data were achieved from the broadest possible range until no additional information could be found that would develop properties for the category (Constantinou et al., 2017; Saunders et al., 2018). The
researcher had a commitment and rigor, sensitivity to context, transparency and coherence, and maintained impact and relevance to develop the quality of qualitative research (Yardley, 2017).

**Bracketing**

In qualitative research, bracketing is a form of a research engagement process where the researcher sets aside his or her experiences and assumptions of the phenomenon under investigation to allow more consideration of fresh perspectives from the experiences of participants (Gregory, 2019; McWhorter, 2019). Judgment concerning the true nature of reality was suspended to preserve pure consciousness and pure phenomena through the separation of assumptions and biases to achieve an understanding of the occurrence as experienced by the participants in real-time (Cypress, 2017). Bracketing, as a theoretical construct, recognized participants’ subjectivity and placed it center-stage in addition to objectivity; this helped achieve a better understanding of the phenomenon in real-time and was a powerful means to support and clarify research findings (Dörfler & Stierand, 2020). The authors further noted that bracketing was about being sensible to what was happening whether the researcher liked it or not and refraining from bias judgment of participants and acknowledging their beliefs and values as sources of insight. Since analyses of the data always integrated conventions that the researcher took along with the focus of the study, bracketing could be predominantly challenging, most especially when the researcher was profoundly knowledgeable of the specific theoretical model or framework (Creswell & Poth, 2018; Gregory, 2019). This suspension of inquiry was ongoing in the study, and included the careful and thorough development of language, word context, and interpretations with which to represent true and actual findings.

To avoid personal bias in the research, the phenomenon to study was specifically identified, bracketing out any existing assumptions and experiences, and gathering data from a
number of participants who had experienced the phenomenon (Gregory, 2019). It was important for the researcher to be explicit about their preunderstanding and orientation of the phenomenon and bracketed these out during data collection and analysis (Cypress, 2017). A supportive environment was provided by revering the subjects’ personhood and this required respecting participants’ autonomy and decisions (Dörfler & Stierand, 2020; McWhorter, 2019). Thereafter, the data were evaluated and analyzed by converting and saturating the information to significant quotes or accounts and incorporating these statements into pertinent themes (Gregory, 2019; McWhorter, 2019). A textural picture of the statements of the participants was created based on what they experienced, and a structural interpretation of how they experienced these accounts in terms of the situation, condition, or context was made (Creswell & Poth, 2018). As suggested by the authors, all these structural and textural descriptions were combined to represent a complete depiction of the experience. To achieve credibility, the collected and analyzed data were presented to the participants, and they were asked if the narrative was a precise and factual reflection of their lived experience of the phenomenon (Cypress, 2017). It was important for the research collection and analysis to reach an instinctive and intuitive understanding of the participants’ subjective real-time accounts of their lived experiences (Dörfler & Stierand, 2020).

**Summary of Reliability and Validity**

Defining the suitable method to show reliability was important and was contingent on a certain range of the data itself. Qualitative researchers should be honest, careful, and thorough in conducting the research and one way of realizing this was through an audit trail that verified the repeatability and accuracy of the results (Robson & McCartan, 2016). To enhance reliability in the study, comprehensive field notes using high-quality recording instruments and digital files were used (Creswell & Poth, 2018). Reliability signified the dependability of the methodological
process. Clarity was provided in the analytical procedures and a justification of the methods was used to increase the trustworthiness of the study (Rose & Johnson, 2020). Credibility was maintained by depicting an accurate and truthful representation of participants’ lived experience through persistent observation and prolonged engagement to examine the situation of the phenomenon. Transferability was achieved by utilizing the purposive sampling method and providing thick and robust data with an extensive range of information through accurate and detailed descriptions of the participants and their lived experiences (Cypress, 2017). To achieve dependability, a company’s doctoral level researcher review was requested to analyze the transcribed materials, and validate the descriptors, themes, and findings. The researcher maintained a reflexive journal to capture all the notes, summaries, and documents daily during the research process to satisfy the confirmability of the study.

The validity of the findings in qualitative research involved cautious transcriptions and frequent verification of data that the researcher collected during the investigative process, and its trustworthiness was maximized to create credible and defensible results (Cypress, 2017). To ensure validity in the study, corroboration of evidence through triangulation of multiple data sources, which include interviews, observations, and archived data, was done. This process allowed systematic categorization of the findings to discover common themes or groupings by removing overlapping information (Creswell & Poth, 2018). The researcher also clarified bias or engaged in reflexivity so that the reviewer understands the position from which the former undertook the inquiry. There was a need to acknowledge the researcher’s role in the study, including biases, assumptions, feelings, and how these affected how research was conducted, including analyses, outcomes, and conclusions (FitzPatrick, 2019). As proposed by Yin (2018), multiple sources of evidence, pattern matching, logic models, key informants review,
explanation building, and addressing rival explanations were used to enhance validity in this case study.

Bracketing, as a theoretical construct, recognized participants’ subjectivity and placed it center-stage in addition to objectivity; this helped achieve a better understanding of the phenomenon in real-time and was a powerful means to support and clarify research findings (Dörfler & Stierand, 2020). To avoid personal bias in the research, the phenomenon to study was specifically identified, bracketing out any existing assumptions and experiences, and gathering data from a number of participants who had experienced the phenomenon (Gregory, 2019). A supportive environment was provided by revering the subjects’ personhood and this required respecting participants’ autonomy and decisions (Dörfler & Stierand, 2020; McWhorter, 2019). Thereafter, the data were evaluated and analyzed by converting and saturating the information to significant quotes or accounts and incorporating these statements into pertinent themes (Gregory, 2019; McWhorter, 2019). A textural picture of the statements of the participants was created based on what they experienced, and a structural interpretation of how they experienced these accounts in terms of the situation, condition, or context was made (Creswell & Poth, 2018).

**Summary of Section 2 and Transition**

The purpose of this flexible design single case research was to understand the sustainability issue of the TQM system in a water-treatment company in the southeastern United States. The study included a review process that contained a proposal that detailed access, selection, and permission for the targeted location and participants (Creswell & Poth, 2018; Yin, 2018). The benefit of the flexible approach in this study came from its openness to unforeseen events and its flexibility to adjust to evolving evidence as the study progressed (Zapf et al., 2020). The study incorporated triangulating multiple qualitative methods by combining
observations and interviews with documentary analysis (Natow, 2020). The research participants in the study were permanent employees of the company who were familiar with the use of TQM. The study used a purposeful sampling strategy to identify and create a selection of information-rich perspectives that had relevance to the phenomenon and research problems under investigation (Ames et al., 2019). The study employed a sample size of 50 participants for the interview and quality-related documents to gather pertinent information on the TQM sustainability issue. Studies proposed that researchers utilizing participant interviews initially conduct no more than 50 interviews to allow researchers to cope with the complexity of the analytic task (Kindsiko & Poltimäe, 2019; Sim et al., 2018; Vasileiou et al., 2018). Data collection included evidence from interviews, observations, and archived documents, and was recorded using field notes, observation, and interview protocols. The interpretation process was done by creating the codes and developing the themes from the codes, and then organizing the themes into greater units of constructs to make sense of the collected data (Creswell & Poth, 2018). As suggested by the authors, a textural picture of the statements of the participants was created based on what they experienced, and a structural interpretation of how they experienced these accounts in terms of the situation, condition, or context was made. To enhance reliability in the study, comprehensive field notes using high-quality recording instruments and digital files were used. The validity of the findings involved careful recording and frequent verification of the data that was collected during the investigative process, and its trustworthiness was maximized to create reliable and defensible results (Cypress, 2017).

The third section of the study included the defense and acquisition of the Institutional Review Board approval for the research proposal. The approved baselines for Section 1 and Section 2 documents that included the problem statement, research questions, methodology,
participants, sample, data collection, data analysis, reliability, and validity were submitted. After approval of the research proposal, the qualitative investigation took place. This involved execution of what had been outlined in the research project proposal. After completion of the field study, presentation of the findings included discovered themes, interpretation, representation, and visualization of data. Qualitative research findings and presentations served important knowledge-related functions to improve the rigor, influence, and impact of such methodology (Bekker & Clark, 2018). The relationship of how the findings related to each research question, conceptual framework, anticipated theme, literature, and problem were discussed. An overview was provided on how the findings addressed the problem being studied, the purpose of the research, and the research questions. The qualitative research findings had the potential to advance the company’s ability to gain a better understanding of the specific needs of the population, tailor interventions effectively, and optimize resolutions (Wu et al., 2016). The supporting material that included overview of the study, application to professional practice, recommendation for further study, and reflections were discussed after the investigation and analysis had been completed.

**Conclusion of the Research Proposal**

The study aimed to explore and understand the sustainability issue of the TQM system in the manufacturing industry. The general problem of TQM sustainability in the manufacturing industry involved multi-level challenges in transforming TQM concepts into sustainable business practices that could be compatible with the current organizational structure (Muruganantham et al., 2018). Professional and academic literatures confirmed the existence of TQM sustainment issues in companies’ strategic business practices (Carmona-Marquez et al., 2016; Nizamidou & Vouzas, 2020). Even though studies had shown that TQM practices supported the development
and empowerment of teams to improve the quality of product and processes (Tortorella et al., 2019), there was still an underlying tension and conflict between the concept of manipulation, control, and empowerment (Banuro et al., 2017). The TQM concepts and theories confirmed the rigidity of the approach and its requirement of firm observance to its procedures (Gözükara et al., 2019). The TQM theories and concepts defined the stringency of the methodology and its requirement of strict compliance to its procedures (Gözükara et al., 2019), and the sustainment of the approach required the organizational culture to change, which might be a challenge to some organizations (Haffar et al., 2019). TQM models adapted by manufacturing industries had resulted in different outcomes (Jaeger & Adair, 2016), because there was no distinctive principle that defined TQM and there was little agreement on what its vital features could do for a specific setting (Chiarini & Vagnoni, 2017). Understanding the relationship between TQM and strategic sustainable development would explain how and to what degree investing in TQM practices contributed to realizing sustainable business objectives (Andrade Arteaga et al., 2020).

The flexible design single-case research aimed to understand the sustainability issue of the TQM system in a water-treatment company in the southeastern United States. The study included a review process that contained a proposal that detailed access, selection, and permission for the targeted location and participants (Creswell & Poth, 2018; Yin, 2018). The study incorporated triangulating multiple qualitative methods by combining interviews, observations, and documentary analysis (Natow, 2020). The use of a purposeful sampling strategy identified and created a selection of information-rich perspectives that had relevance to the phenomenon and research problems under investigation (Ames et al., 2019). Considering the data collection plan for the sample size of 50 participants, the study created a textural picture of the participants’ experiences and a structural interpretation of how they experienced these
accounts. Reliability and validity involved careful transcription and frequent verification of the data that was collected during the investigative process (Cypress, 2017).

Presentation of the findings included discovered themes, interpretation, representation, and visualization of data after the completion of the field study. The relationship of how the findings related to each research question, conceptual framework, anticipated theme, literature, and problem were deliberated. A top-level view of the study was provided on how the findings addressed the problem being studied, the purpose of the research, and the research questions.

Qualitative research served significant knowledge-related functions that improved the objectivity and impact of the methodology on the research topic (Bekker & Clark, 2018). The qualitative research had the potential to advance the company’s capability to address the specific needs of the population, customize interventions, and optimize solutions (Wu et al., 2016). The study looked inward at the company’s internal processes and culture to explore what was working, what had become irrelevant, and what had been the focus. Understanding how to sustain TQM and productivity performance provided a foundation for knowing how to sustain other business dimensions of success (Su & Linderman, 2016). Any TQM approach should consider the needs and expectations of all stakeholders, customers, the business’ competitive constraint, and CI requirements for successful integration into the organization’s core resources and dynamic capabilities (Benzaquen & Charles, 2020).

Section 3: Application to Professional Practice and Implications for Change

Research findings revealed the importance of creating coherence between TQM methodology and the organization’s strategic objectives. The participants advocated that the existing quality management system and the company’s defined set of strategic initiatives need to improve fit and alignment with each other to support a productive and interactive
environment. McAdam et al. (2019) describe this approach as a dynamic alignment of manufacturing processes and systems made by attaining a spontaneous fit instead of an exact fit. The practitioners claimed that sustaining TQM in the industry may require additional capabilities to reinforce what it takes to achieve it, and this includes DC to integrate and transform (Putri et al., 2018) and HRM to facilitate engagement and empowerment (Süßbauer et al., 2019). KM is also necessary to improve knowledge creation (Seo et al., 2016) which will help companies become more strategically adaptable to the dynamic changes in their manufacturing environment (Gutierrez-Gutierrez et al., 2018).

**Overview of the Study**

The objective of the study was to understand the sustainability issue of TQM in a water treatment company in the southeastern United States, resulting in high product warranty costs, field failure rates, and cost of quality. The presentation of the findings included discovered themes, their interpretation, data representation, and visualization. The study discussed the relationship of how the findings correlated to each research question, conceptual framework, anticipated theme, literature information, and the research problem. The semi-structured interviews of the participants from different roles revealed varied evidence of TQM sustainability in the water treatment company. Based on leadership interviews, the organizational culture’s dominant attribute was towards achievement of its strategic goals and competitiveness to attain market superiority and deliver higher customer experiences. The findings revealed that the organization’s centered focus on immediate success and business results created conflicts with TQM methodologies’ high cost and time-consuming sustainment processes that required additional activities. This was in line with the outcomes noted by Georgiev and Ohtaki (2019) in their study. Participants acknowledged that the sustainment of TQM practices was costly and
impractical in a short-term strategy, even though the methodology had a long-term potential to help the company achieve competitive advantage.

Management claimed that the company’s strategic emphasis was towards competitive advantage and dominance in the market, while its quality management system had a customer-focused process that aimed for continual support of the company’s strategic goal and objectives. Albuhisi and Abdallah (2018) noted that alignment of TQM practices could affect the preset company’s strategies and operational target variables if there was no balance or coherence between the two standards. The inability of the practitioners to sustain TQM practices revealed contributors such as complex methodology, concerns with the applicability of techniques, lack of communication, training, understanding, knowledge, and support. The incoherence between TQM practices and production targets created participant responses that led to behavioral concerns, most especially when neither quality nor production objectives were achieved due to conflicts. Practitioners experienced operational constraints due to worn tools, unreliable equipment, and poor process capability, which resulted in lack of observance to proper monitoring, noncompliance to scheduled preventive maintenance, and inattentiveness to the quality management system. While TQM practices had positive relationships with organizational performance and productivity (Sila, 2018a), in addition to providing tools and methods to reduce errors, waste, and inefficient procedures (Alkhalidi & Abdallah, 2019, 2020), management needed to give full commitment to TQM’s quality standards (Pham, 2020).

Data from the study produced relevant information that related to all research questions and supported the conceptual framework initially outlined in the foundation of the research. The findings confirmed that failure in sustaining the quality system in place resulted in high product defects, leading to excessive reject costs and loss in productivity. This supported Nasim’s (2018)
claim that the sustainment of TQM influenced the operational productivity of organizations, which also affected other dimensions of performance such as financial effectiveness and customer satisfaction. Data from the interviews confirmed that TQM methodology was not in coherence with the company’s strategic objectives that focused more on business results because of contradictions with its complex and time-consuming activities and measurement processes. It took more work and time for TQM initiatives to produce benefits that influence performance, making it costly and impractical in the short term (Qasrawi et al., 2017). This complication and suitability issue caused TQM practitioners to lose engagement, involvement, and commitment, as described by Chiarini and Vagnoni (2017). Based on leadership interviews, the organizational culture acknowledged competitiveness as a combination of strategies and quality, but it was sensitive to the methodology’s timely results and benefits designed to influence performance. Li et al. (2018) shared this same concern that when changes did start to take place in the business, the sustainment of TQM programs became a challenge because management expected immediate changes from a transformation that usually takes time to produce results. Panuwatwanich and Nguyen (2017) also stressed the same findings that organizations dominated by market and rational cultures did not support a favorable environment for the effective sustainment of TQM compared to cultures controlled by adhocracy or the group-type system.

The practitioners shared that the methodology created constraints and overwhelmed operational-enablers through its high frequency, repetitive, and labor-intensive inspection checks. The research findings aligned with each element in the conceptual framework that contributed to the sustainment issues of TQM in the company. The results also confirmed the presence of anticipated themes that cover CI, DC, HRM, and KM, and have many similarities with the information taken from professional and academic peer-reviewed literatures. Based on
the findings of the research, the water treatment company in the southeastern United States experienced TQM sustainability issues that resulted in high product warranty costs, field failure rates, and cost of quality. Even though findings showed that the company supported the development and empowerment of teams to improve the quality of products and processes (Tortorella et al., 2019), there was still an underlying tension and conflict between the concept of manipulation, control, and empowerment (Banuro et al., 2017). Practitioners confirmed the rigidity of the TQM approach and its requirement of firm observance to its procedures as noted by Gözükara et al. (2019), and the sustainment of the approach requires the organizational culture to change, which may be a challenge for the company (Haffar et al., 2019). The TQM model adapted by the company has resulted in different outcomes, because there was no distinct standard that defined TQM and little understanding on what its vital features could do for the company’s specific setting (Chiarini & Vagnoni, 2017).

**Presentation of the Findings**

The purpose of the study was to understand the sustainability issue of TQM in a water treatment company in the southeastern United States, resulting in high product warranty costs, field failure rates, and cost of quality. All participants have been verified to have the basic understanding of the meaning of TQM in the site. The study incorporated three instruments for data collection that were gathered from the selected population. These instruments included semi-structured interviews with the participants, observations of the workplace environment, and examination of the company’s archived documents related to the sustainment of TQM in the site. Member checking was used for each interview to ensure reliability and validity of the information. Bracketing was applied to preserve the participants’ subjectivity and objectivity of the information. Results from the interviews were checked against the observations collected
from the workplace and the findings in the archived documents related to TQM activities. All findings were transcribed and converted to digital word files for proper organization of the electronic database after the information therein were triangulated for accuracy, validity, and reliability. The digitized data from the three instruments were imported to the NVivo qualitative software to assist with the management aspect of the study that included data synthesis, in-depth analysis, and storage. The data from three different sources were synthesized and an open inductive coding approach was used so literature information and empirical findings were set side by side as suggested by Creswell and Poth (2018). These data collections were compared and contrasted utilizing the initial conceptual framework as a preliminary foundation of the analysis. The evolving themes and sub-themes from the coding process were then organized to present the findings in a rational manner, as suggested by Robson and McCartan (2016). Any outstanding issue was clarified by revisiting interviews with the participants. These steps were utilized in a repetitive manner to ensure accurate information in building up the findings as suggested by Yin (2018). The presentation of the findings includes discovered themes, their interpretation, data representation, and visualization. The study also discusses the relationship of how the findings relate to each research question, conceptual framework, anticipated themes, literature information, and the research problem. The presentation will discuss how the findings address the research problem, the purpose of the research, and the research questions. The findings were supported by evidence gathered from the population. To protect the identity and valuable information acquired in the study, the population was coded according to the table below.

**Table 5**

*Research Population Codes*
<table>
<thead>
<tr>
<th>Code</th>
<th>Population Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD1 to AD14</td>
<td>14 Archived Documents related to TQM activities in the site</td>
</tr>
<tr>
<td>L1 to L7</td>
<td>Participants who have leading roles in TQM</td>
</tr>
<tr>
<td>OF1 to OF18</td>
<td>18 Observation Forms taken from 18 observation points</td>
</tr>
<tr>
<td>P1 to P27</td>
<td>Participants who have practicing roles in TQM</td>
</tr>
<tr>
<td>R1 to R7</td>
<td>Participants who experienced TQM sustainment effects</td>
</tr>
<tr>
<td>S1 to S10</td>
<td>Participants who have supporting roles in TQM</td>
</tr>
</tbody>
</table>

**Themes and Resulting Constructs Discovered**

The semi-structured interviews of the participants from different roles revealed varied evidence of TQM practices in the water treatment company. The participants in the practicing roles are generally responsive to the TQM methodology only when it supports their ability to achieve their productivity goals and are less receptive of the practices that constrain them from realizing their targets. Their perspectives, actions, and behaviors are aligned with the findings from the observations made on their workstations as they practiced TQM. According to participants, their priorities were generally influenced by the centered emphasis on meeting production targets to meet internal and external demands. An apprehensive participant related,

P6: The quality system in place is practical only when it helps us achieve our targets. The inspections become unsustainable when they are used to compensate for issues with parts, machines, tooling, and suppliers. 100 percent inspections add too much work for us, and these are not 100 percent effective. It is hard to make production numbers with so many checks, and noncompliance to these requirements is common. We totally support management’s focus on speed to stay in business, and what is important to them is
important to us. This does not mean I will not do the right things for quality; I will still do my checks because it is the right thing to do, even though these inspections slow me down and add too much work.

The TQM practitioners have to deal with a lot of effort in balancing the needs of the quality requirements as well as satisfying production targets. The participants in the supporting roles shared their experiences with keeping up with the demands of operations and the opportunities with training, knowledge sharing, and communication. Based on interviews, this group understands the roles they have in sustaining processes to enable operations to achieve their targets. They experienced challenges with getting proper information and availability of time to support production personnel. One supporting participant noted,

S2: When it comes to reactive quality activities, the workload is plenty. As for preventative quality activities, it is extremely hard to find time to help as much due to day-to-day activities, so it can be overwhelming when assisting operators at times. Improper guidance and misinformation set up the potential for quality problems to recur. From a production and morale standpoint, when associates are continuously receiving good information and guidance that helps them assist with production, they are more willing to help sustain quality practices versus misinformation and poor guidance, which only create doubt and eventually more resistance to helping sustain quality.

Participants in the supporting roles struggled with the prioritization of work and lack of guidance or information to help them optimize their ability to support operations. The participants that deal directly with customers and quality issues have shared their own narratives related to missed opportunities, gains, and losses in the field. They confirmed the increased rate on the annual fluctuation of warranty cost and field failures. They have experienced increased
workload and associated costs with recovery customers’ business and loyalty. A concerned warranty service manager said,

R5: Quality issues always increase warranty dollars. Depending on the criticality of the issue, it can and often does dramatically increase workload on our service managers, sales representatives, warranty coordinators, technical service, and/or administrators. I believe ongoing quality issues affect overall sales when we do not solve these issues in a timely manner. We end up losing more customers and sales.

This claim is supported by the company’s warranty reports, which showed fluctuations in costs due to field failures and took a physical and emotional toll on field service managers. The participants in the leading roles interpreted and generated the quality management policies and guidance. The leadership required firm observance and adherence to all of the company’s business management systems. They enforced the quality policies and measurement system to gauge performance, and frequently monitored for compliances through the site’s internal business management audits. One manager claimed,

L7: We have procedures and practices that enable us to incorporate quality management practices into our yearly strategic goals. One is through change management policies that include product change orders, temporary deviation approvals, and use of the business management system (BMS). This system includes maintenance of our core practices such as internal audits, training and awareness, control of documents, corrective and preventive actions, management review, and nonconforming materials. The human resource team plays a major role in training and awareness and maintains a training matrix for the whole site. The quality group is instrumental in laying the groundwork for both hard and soft aspects of total quality management. They carry much of the
knowledge transfer of responsibilities to make sure we have sustainability in every system we implement, whether this be lean management, six sigma, continuous improvement (CI), or any process capability initiatives.

The company’s leadership acknowledged that implementation of TQM in the organization had many benefits, but its process application does have many sustainment challenges. The TQM practitioners experienced substantial adversity in sustaining TQM in the company. Major themes concerning the lived experiences of the practitioners developed in their descriptions of the sustainment of TQM were the following: (a) market-oriented organizational culture, (b) rigid TQM methodology, (c) pacesetting leadership style, (d) highly competitive strategies. The resulting constructs from these themes were high cost of quality and external warranties, inconsistent productivity and performance, impassive employee behavior, unpredictable operational constraints, and overwhelmed process enablers.

**Market-Oriented Organizational Culture.** According to leadership interviews, the company’s organizational culture aligned with its strategic objectives of improving its competitiveness and achieving its goals with its distinct orientation of utilizing market intelligence and inter-functional coordination aimed in gaining excellence in business performance. This aligned with Ali et al.’s (2020a) claim that market-oriented companies generate potential sustainable competitive advantage through information sharing and forming synchronization among all the functional divisions within the business. The company’s structure and ranking of priority was bonded on production objectives, goal positioning, risk, flexibility, and competition, while maintaining strategic emphasis on market superiority and growth innovations. McAdam et al. (2019) noted that this ranking of operational priorities played a significant role in the successful sustainment of TQM because it showed how leadership
formulated an effective plan that can optimize limited resources for its sustainment. According to leadership interviews, the company’s flexible framework supported differentiation and integration of the BMS that enabled the implementation of quality management structure to be successful. Sinha and Dhall (2018, 2020) supported this condition, noting that flexibility-oriented organization cultures with organic structures promote TQM implementation. Concerning the business orientation, a site manager affirmed,

L4: The importance of implementation of the quality management system is implied in our first company value (of six values): Customer First. The top-level corporate quality policy supports this: “We are committed to delivering world-class products and services that contribute to the success of our customers and meet or exceed their quality requirements. All employees are responsible to continuously improve the products and services we provide.” Although the site did not have a formally registered quality system, its BMS – a hybrid of International Organization for Standardization (ISO) core processes and Lean-based processes – was developed and continued to evolve to support both the ‘Customer First’ mindset and quality policy. These processes were designed to support functional and cross-functional activities at all levels of the organization.

The company used a range of quality management practices that included TQM and BMS adaptation to coordinate the process of aligning its strategic goals, including its lean and CI with quality requirements. McAdam et al. (2019) referred to this positioning as a dynamic process of adjusting to uncertainty and environmental change. However, parallel to Sachdev and Agrawal’s (2017) claim, the company’s strategy formulation focused more on business results and less on business processes, which affected the initiative’s execution, resource infrastructure, and work prioritization for TQM frontline practitioners. A participant in a leading role advised,
L5: It is important for quality to support operations and vice versa. There has to be coherence between operations and quality so both processes support each other and not constrain each other. The quality methodology should be process-focused and the more proactive it could be the better for defect prevention. We understand that poor product quality affects customer loyalty. We also understand that we need to be profitable to be competitive and stay in business. We have a responsibility to deliver returns to our shareholders. There is cost to maintain high quality, and investments to improve quality need to be fully understood and justified. Our culture, no matter what the rational orientation is, will not stand against quality standards; no one here wants to ship bad products to our customers.

The leaders in the site understood the requirement for soundness between quality and operational activities. However, they cautioned the need for justification on any quality investment. A reasonable payback period is expected to be able to deliver planned returns to the shareholders. Another company manager supported this claim,

L6: The two aspects (quality and operational objectives) of business are integral. Quality initiatives need to match the leadership’s strategic objectives and customer requirements, while manufacturing needs to operate in a fashion so as not to negatively affect the customer quality experience while achieving their goals. There are ongoing alignment opportunities with these two aspects to help improve sustainment on both sides. These aspects need to feed on each other, not consume each other, so we can flourish as a business.

The information provided by this participant in the leading role has meaningful implications. This finding concurred with Sinha and Dhall’s (2018, 2020) claim that there is a
need to align the organizational culture and the requirements of quality systems to support sustainment of the approach in the increasing complexity of manufacturing processes. The company’s leadership acknowledged the importance of TQM and the opportunities in its sustainment through alignment with strategic objectives. However, they need to see the effects of the methodology on their bottom line. TQM initiatives focus primarily on customer satisfaction and not on the company’s bottom line improvements; management needs to see tangible improvements in cost savings or increased performance, or they will lose commitment (Anthony et al., 2017). Corresponding to what Carmona-Marquez et al. (2016) claimed, the site management wants to develop and achieve a strong relationship among strategic factors and performance in order to have successful and effective TQM sustainment.

**Rigid TQM Methodology.** Based on interviews, the company maintained a structured and systematic approach to TQM to facilitate CI focused on customer satisfaction. The company’s leadership have enforced this methodology on a concentrated effort by providing necessary resources such as training, funding, staffing, and clearly defined objectives to aggressively manage product quality on a continuing basis. This customer-focused business management philosophy given emphasis to the continual enhancement of the processes and management of business systems by means of policy positioning and resource management strategies, is in alignment to Mendes and Jesus’ (2018) studies. In reviewing the company’s quality manual, the details showed,

**AD12:** The quality manual specifies firm observance and compliance to the company's TQM requirements. It lays out rules, policies, procedures, and clear expectations. The company’s management team are assigned to make sure those responsibilities and authorities are defined and communicated through individual roles in each value stream.
Each department concentrates on doing their part to ensure product quality. Any changes to the quality management system are taken into careful consideration and planned accordingly. When any changes occur, their potential consequences, the integrity of the quality management system, the availability of resources, and the allocation or reallocation of responsibilities and authorities are taken into effect immediately upon approval by management.

This document stated the company's objectives for preserving quality in operating and executing the processes within its quality management system with firm compliance to all of its policies. The site’s leadership understood the need for a process-based approach to TQM; however, the methodology is still operator-dependent, according to the practitioners. This is in alignment to what Moccia (2016) recommended, that quality management should not focus on control and sanctions of employees but should put more emphasis on management of processes. One TQM practitioner recalled,

P5: The methodology is too dependent on operators who can easily make mistakes, and we are constantly audited for compliance to make sure we are doing the checks correctly. This is a fast-paced environment, and it is hard to keep up with too many labor-intensive quality inspections. The visual checks are very subjective, and mistakes can easily happen. There are different standards between quality inspectors on what a cosmetic defect is, so it can be confusing and frustrating at times. When we have issues, it takes a lot of time to go over the process of problem-solving, and it takes more time to see the results.

The participant confirmed multiple manual and laborious quality checks that contributed to the sustainment issue of TQM practices. The site’s quality management system has required
firm adherence to policies and procedures to maintain product quality. The leadership shares the same concept with Amin et al. (2017) that TQM is a strenuous management philosophy that requires full commitment to improve product quality and processes, otherwise, a halfhearted execution will lead to failure that translates to high cost and low performance.

**Pacesetting Leadership Style.** The site’s leadership has been focused on achievement and production goals, and they set the model for performance, speed, and quality of work. The manufacturing supervisors on the shop floor share this competitive orientation and results are what counts in the end, according to the practitioners. One participant recollected,

P7: Our supervisor recognizes us for our work in the cell, and often times, he works side-by-side with us so he can understand what we are experiencing. We maintain three complex cells, so it is important to do what is expected of us from the quality standpoint. He is very focused on production numbers and he is all about standard work. He motivates us in making our targets and sets the drumbeat in producing parts. He does standard work audits frequently to make sure we are on the mark of achieving our numbers every hour. We feel the pressure to keep up with the pace because it does not take much to fall behind, and then mistakes start to add up in our attempt to recover.

Participants felt the sense of urgency to heed the needs and expectations of their pacesetting leader. This progressive leadership style is detrimental for the practitioners’ engagement, involvement, and motivation in the long term. This is in line with Campion’s (2018) claim that this pacesetting leadership style sets the pace for the team, demands a high level in performance, and expects excellence at all times with minimal supervision.

**Highly Competitive Company Strategies and Operational Targets.** Review of the company’s productivity report revealed that its strategies and operational targets have been
geared towards improving competitive advantage and market superiority. The productivity report also showed its dominant strategic attribute to achieve its goals and operational objectives. The document further exhibited the timeframe of the company’s operational objectives that were broken down into workable tasks on short term basis and had a targeted measurable and specific focus. Based on the company’s strategic transformation plan, more than half of the strategic projects were focused on improving costs and less than half on other metrics that include projects on quality, employee retention, and training. A participant shared the experience of satisfying production’s higher expectations while adhering to quality requirements:

P18: I understand the benefits of doing my quality checks, but these are additional workloads to me. I have production targets I need to satisfy and no time to waste. Why do we have to check most components from suppliers? Our number one priority is to make production targets every day, and I have to make extra time for inspections before I can complete a product. Supervisors measure me by my production numbers, and these none-value-added checks are slowing me down. Is there a way these quality checks can be made to support me in making production targets? It is hard to stay engaged and involved when these quality checks are working against my time to make production targets.

The participant noted this condition to be negatively affecting the level of engagement and involvement in sustaining the needs of TQM practices. The speed of production-oriented processes require more cohesion with the existing quality management requirements, so outputs were often time-affected according to the practitioners. Conflict in the appropriateness of the TQM application in manufacturing processes can also affect soft variables most especially if this impact production goals (Antony & Sony, 2019, 2020; Shamsi & Alam, 2018).
**High Cost of Quality and Warranty.** The company’s sales and warranty report detailed the high cost of quality and warranty experienced by the company. The quality metrics and measurements showed clear data on the process output that were calculated from internal and external sources such as scrap summaries and field reports. Aluhisi and Abdallah (2018) noted that TQM practices have direct positive relationships with cost related to quality and its sustainment issues resulted in high cost of quality and external warranties that were outcomes of failed prevention and correction initiatives. Examining the company’s warranty versus sales report, the details revealed,

AD1: The warranty data shows that the customer claims rate, which is calculated as a percentage of sales, is steadily oscillating indicating that product and service quality issues come and go, as these issues get resolved and recur. The claims trend line does not display a certain sustained period even when lower claim percentages remained below the targeted goal of the company for its quality metric. Since warranty claims rates represent an interaction between total product sales and warranty expenses, consideration is given when the percentage rates rise because the sales volume falls short. In this case, however, the data shows that the underlying warranty expenses are still high.

The company uses the scrap summaries report to track internal cost of quality in terms of defects produced by production. The data are used to determine top contributors to the scrap issue and a Pareto is created to determine the priorities and focus of the countermeasures and resources needed to resolve issues. The document displays the top scrap parts for the site and the overall year to date trend. Evaluating the company’s scrap summaries report, the details showed,

AD6: The current year-to-date scrap data shows scrap cost percentage improvement on the first quarter but exhibited an inconsistent trend in the second quarter. The document
also shows that the root-cause countermeasure actions are focused on the top 10 scrap contributors for the site, and most of these actions are designed for repeat issues that have been resolved before. Inherent to the countermeasures, there is focus on detection measures as well as preventative solutions.

The fluctuating scrap rate indicates challenges in quality control of incoming materials and unsustainable manufacturing processes. This also includes worn tools, inadequately maintained equipment, and training issues as presented in the failure and defect codes of the data. The recurrent spike in internal scrap costs indicated a sustainability issue with process capability and quality control in general.

**Inconsistent Productivity and Performance.** The company’s productivity report showed opportunities for sustainment of performance and the evidence included overtime and weekend work to catch up with missed targets and goals. Examination of the document also showed that these low performance challenges were caused by lack of resources, technical support, rework, and training issues. Further assessment of the company’s productivity report showed,

AD9: The daily productivity report displays the regular activities to improve and reduce the productivity variances between the forecasted and actual production outputs. Major inputs that affect labor productivity such as quality defects, machine downtime, material shortages, and inventory issues are common and seriously taken into consideration to make sure output per labor hours are maintained and fully supported. The current information dictates scheduling overtime and weekend work due to productivity misses. A separate countermeasure form is updated to address any input that would disrupt productivity, and a champion is assigned to lead the mitigation process.
The document captured multiple contributors to production inefficiencies, including various quality control misses. The situation supported Boikanyo and Heyns’ (2019) claim that proper sustainment of TQM improves the effectiveness of production resources and their capabilities to support the process and specific tasks tied to reject nonconformities and maintain higher productivity. Feedback from the shop floor reinforced the current condition and challenges experienced in the manufacturing environment, as one participant reminisced,

P2: We have quality issues with the parts we receive from the supplier, so we have to check these parts often, even though it is taking us longer to assemble units. We did not sustain these checks when we completed three pallets of finished goods. A quality auditor told us we could not ship these because of a crack issue found with one of the components. We wasted half a day building those, and another half a day in rework. We are now working weekends to catch up. We could have minimized the productivity problem if we had the resources to detect this issue beforehand and had communicated the problem appropriately. It is tough to make production targets consistently if we do not catch this quality condition.

The participant understood the effects of quality practices on productivity and performance. Albuhiisi and Abdallah (2018) noted that an effective implementation and sustainment of TQM relates to quality and performance success for as long as practitioners adhere properly to its methodology and guiding principles. While TQM has been effective in enhancing quality and improving performance, its sustainment in the manufacturing field involves many challenges (Bouranta et al., 2017; Carmona-Marquez et al., 2016)

**Employee Behavior and Condition.** The company’s quality manual required strict adherence to its quality management policies and fulfillment of its strategic objectives at the
same time. Based on feedback from the shop floor participants, the sustainment of TQM is mostly operator-dependent and not process-based. This condition causes workload issues that affect performance and productivity on TQM practitioners. One participant recalled,

P5: I understand the need for the change, but most times, these quality activities create confusion in my standard work and throw me out of sync. They say it is as simple as just looking for this or that, but it is not, most especially when I am primed to do things the same way over and over again. These inspections are making it harder for me to reach my hourly targets. Some of these assessments are just too hard to follow no matter how simple they say they are. Some leaders only see things from their perspectives, not from our side, and that is where most of our misunderstandings are coming from. Sometimes I feel stressed out with some of these complex quality changes; I just go ahead and carry on. I am already working the best I can, and I still cannot fulfill expectations. It is discouraging and difficult to stay engaged.

The company’s existing standard work lacks some integration of quality activities and contributes to the frustration and unwanted stress on associates who are doing their best to achieve production targets. Employees behave sensibly to gain respect and recognition while adhering to strict company regulations and policies at the workplace (Andrade et al., 2017; Kumar & Sharma, 2017). Based on observations, when the goals become unattainable because of perceived interruptions to their standard work, the operators adopt an impassive behavior.

**Unpredictable Operational Constraints.** The company has experienced unpredictable operational constraints partly due to challenges in sustaining TQM practices, according to participants in the supporting roles. The company’s quality management system also captures and measures process indicators that are detrimental to the useful life of its mold tools and
equipment. Evidence from interviews show that failure in sustaining quality practices, which safeguards equipment, leads to unpredictable operational constraints that affect both quality of parts and productivity, as one participant explained,

P4: Quality checks help me determine when it is time to change my cutting tools. It is hard to sustain quality when the machine is not making acceptable parts. I think this fixture is slowly breaking apart and it takes a while to fix it. Sometimes we are extending the life of the tools until support gets here to fix it for us. They are also busy fixing other issues in other cells. The problem with extending the tool life is that it also overloads the equipment and creates a much bigger problem. These quality inspections only help us if we sustain these and address what these are telling us to do.

The participant understood the benefits of maintaining quality checks. He struggled with support resources for helping sustain the quality requirements to avoid operational constraints. Jaeger and Adair (2016) noted that issues in sustaining TQM would create unpredictable operational constraints and overwhelm process-enablers that limit the optimization of any part of the manufacturing system or infrastructure to fulfill operational targets.

**Overwhelmed Process Enablers.** The company’s process enablers provide the foundation for the functional drivers of the business’ processes and their support is interwoven in all activities of the operation, according to participants on the supporting role. Based on observations of the shop floor, any deviation from the standard process that resulted from a quality incident because of an improperly sustained TQM practice significantly affects the company’s information system and the facilities environment. One participant elaborated on the significance of sustaining TQM:
P13: We learned hard lessons when we skip certain quality checks at the end-of-line. Those final inspections have to be sustained; if not, the condition will create a bigger problem that will involve many resources to mitigate the issue. The last time the final inspection was not done, and the audit found missing components, we had to recall everything we built that day. Finance has to create a nonconforming trailer to fit all suspect parts, shipping has to undo all the invoiced units, IT has to help us trace the serial numbers, and quality techs have to reassign the inventory. The quality incident overwhelmed everyone. It placed more work on everybody, the system, support group, and these included our IT specialist, our process technicians, and team leads who have to manipulate the system to scrap, transfer, quarantine, rework, and so on. We lost a day’s worth in production, and we have to work extra hours to recover productivity.

Participants understood the consequence of not sustaining TQM properly. The result of the quality miss overloaded the system and productivity suffered. Gaiardelli et al. (2019) explained that the operational performance of the business includes high-level quality and process leanness in terms of equipment capability, speed of delivery, and product dependability that are supported by process enablers. Observation on the shop floor confirmed the ramifications of not sustaining quality checks:

OF10: The material handler brought back pallets of finished goods and operators were opening the boxes to check the parts. They shut down production to inspect what had been produced. The team lead and quality technician were busy removing the labels and tagging the pallets for nonconformance. One of the final inspections was not done and a defect was found after the part was assembled. The line is reprocessing all the suspect assemblies instead of making their production targets.
The observation captured all the non-valued added activities that were taken to accommodate reprocessing of finished goods. The productivity setback was significant. This situation supports Boikanyo and Heyns’ (2019) claim that poor quality practices could cause multiple operational disruptions, major financial loss, and low productivity.

**Interpretation of the Themes and Resulting Constructs**

The site’s leadership believes that the sustainability of TQM practices carries a lot of benefits and advantages to the company’s performance and competitiveness. However, for the participants in the study, the sustainability of TQM practices come with opportunities and challenges. The participants experienced considerable adversity in sustaining TQM requirements to realize the benefits related to quality conformance and reduced reprocessing costs. Most participants have experienced TQM practices being in the way of their production goals and objectives. The themes concerning the live experiences of the participants emerged in their descriptions of their practice of TQM in the company, including the impact of the market-oriented organizational culture, pacesetting leadership style, firm TQM methodology, and highly competitive strategies and operational targets. The resulting constructs from these themes are high cost of quality and external warranties, inconsistent productivity and performance, impassive employee behavior, unpredictable operational constraints, and overwhelmed process-enablers.

**Market-Oriented Organizational Culture.** Based on interviews, the organizational culture’s dominant attribute has been towards achievement of its strategic goals and competitiveness to attain market superiority and deliver higher customer experience. The organization’s centered focus on immediate success and business results creates conflicts with TQM methodologies’ high cost and time-consuming implementation processes that require
additional activities as noted by Georgiev and Ohtaki (2019). Participants acknowledged that the sustainment of TQM practices is costly and unpractical in a short-term strategy even though the methodology has a long-term potential to help the company achieve competitive advantage. This condition agrees with what Haffar et al. (2019) claimed, that production and goal-oriented organizations lean towards losing commitment when TQM benefits are not readily seen in the short-term basis and leadership starts questioning the suitability of the practice. This conflict cascades to other forms of issues that include reduced involvement and engagement from the management side that in turn affects the allocation of resources necessary to support TQM initiatives. Kaur et al. (2020) noted that lack of involvement of key strategic partners in quality improvement programs is one of the main barriers that contributes to the TQM sustainability issue. The authors further added that the attributes related to this theme are extensive focus on goal achievement, competitiveness, and market superiority.

**Pacesetting Leader.** The leader’s orientation in supporting the organizational culture is an indicator of how TQM is practiced and a prime driver for achieving objectives in the manufacturing environment, as it could influence the job satisfaction and organizational performance (Polese et al., 2019). Based on observations, the company’s leadership style is oriented heavily on achieving production goals and is not in favor of supporting complex and time-consuming process measurement systems in the manufacturing lines that slow down cycle time and affect productivity. Some participants in the leading role question the suitability and appropriateness of some complicated TQM practices as they set the pace for their team to gain a high level in performance and proficiency at all times with minimal supervision. The perspectives of these pacesetters influence the way they motivate employees and their behavior in carrying out the company’s business management systems such as TQM (Bendermacher et al.,
The authors added that the pacesetting leader is considered to have a high achievement orientation, high performance expectations, decisive and influential, focused on production targets and a high-risk taker according to the practitioners.

Firm TQM methodology. Based on interviews, the company’s TQM system has maintained a vigorous management philosophy that demands full commitment to its policies and guidelines to improve product quality and processes. This philosophy has been in alignment to what Al-Ali et al. (2019) noted, that uncommitted TQM sustainment activities will lead to failure, which turns into high quality costs and low performance. According to participants, the current TQM system in place is complex and manually managed, causing poor participation from all members in all levels of the organization because of its labor intensive, perceived non-value-added activities, and time-consuming practices. These aspects support what Shafiq et al. (2019) have referred to in their studies. The practitioners referred to the methodology as complex, difficult, operator-dependent, detection-based, time-consuming, confusing, excessive, rigid, impractical, and not suitable for the processes they were managing. While the participants understood the long-term benefits, they had more focus on the current and short-term benefits needed to help quality and their performance. According to leadership interviews, the company is still in the process of converting to a process-based approach that is projected to be completed in the near future. The practitioners noted that there are opportunities in creating an appropriate supervision and understanding of the interconnectedness of organizational culture and the TQM system to help develop organizational effectiveness, claimed by Toke and Kalpande (2019) in their studies.

Highly Competitive Company Strategies and Operational Targets. Review of the company’s productivity report showed that its competitive strategies and operational targets have
been geared towards supporting their goals of achieving market superiority and competitiveness in the marketplace. The archived document also revealed that the company’s strategic emphasis has been towards competitive advantage and dominance in the market, while its quality management system has had a customer-focused process that aims for continual support of a company’s strategic goal and objectives. Albuhiisi and Abdallah (2018) noted that alignment of TQM practices could affect the preset company’s strategies and operational target variables if there is no balance or coherence between the two standards. Practitioners experienced incompatibilities and conflicts between serving operational targets and TQM system. The main reason is the lack of understanding of the trade-off between the degree of quality improvements and the potential accruing benefits towards productivity and performance, as outlined in some studies made by Anthony and Sony (2019, 2020). The authors added that company strategies involving Lean and Six Sigma methodologies have had similar sustainment issues because the models failed to deliver the anticipated results after implementation, and resources were withdrawn due to increasing costs and limited funding. According to the practitioners, conflict in the appropriateness of these models included non-value-added activities, poor time management, and unproductive use of valuable resources taken from production and manufacturing processes. Practitioners experienced low morale and engagement problems that indicated that these soft variables that Shamsi and Alam (2018) indicated in their studies, have a significant effect on the models’ sustainment and delivery.

The company has utilized CI strategies to support TQM practices and performance by using existing process-owners to sustain initiatives in addition to their regular workload. While process-owners’ in-depth knowledge and expertise over the manufacturing process have advantages in the sustainment of CI projects, they stated that their commitment, involvement,
and engagement are limited because their work priorities are vested on production needs. This is in line with what Ahmad et al. (2017) claimed that limited resources and commitment from workers are the main barriers to CI because management handles the initiatives as an optional strategy only when production resources become available and suspend it when the workload capacity is tight. According to practitioners, similar to TQM initiatives, there are no dedicated resources assigned to any of the Lean or CI initiatives, except when participants volunteer to multitask.

According to leadership interviews, the company has exercised DC to reconfigure and adapt to the changing needs of their manufacturing processes and customer needs through their “best-in-class” practices. The management stated that DC is primarily used to support and sustain the company’s BMS system, and the company combines KM and HRM to enable innovation and sustainability of processes such as the TQM system to be successful. This setup agrees with Alkhazali et al. (2019) who claimed that the combination of these systems supports the company’s initiatives to achieve a high level of business performance and total customer satisfaction. According to practitioners, company’s competitive strategies have high focus on productivity, cost effectiveness, high profit orientation, and emphasis on speed of delivery.

**High Cost of Quality and Warranty.** Based on the company’s sales and warranty charts, the claim trend’s varied fluctuation shows how unstable the events are from the warranty claims and sales activities standpoint. There is evidence of sporadic failures of some top products indicating challenges with quality management sustainability in their value streams. Even though most product lines show decent trend improvements, others are showing recurring nonconformance, product defects, and lagging support problems. The warranty chart shows temporary transformative improvements that influence favorable warranty claim trends and
sales, but not at a consistent level. This conclusion is based on the appraisal of the current and previous years’ warranty costs. The variances from the comparison of previous and current warranty costs show that some product lines have challenges with warranty costs compared to last year. The 12-month rolling average shows a recurrent and oscillating drift that indicates instability in product quality and services despite indicating a positive trend. The document also shows that productivity and performance is affected by far more than just product sales, but also the warranty expenses those sales generate. This supports Albuhiisi and Abdallah’s (2018) claim that sustainment issues with TQM, such as failed prevention and correction initiatives, result in high costs of quality and external warranties. Archive data showed that these costs on quality include high defect rates, rejects, rework, and repeat customer complaints.

**Inconsistent Productivity and Performance.** Boikanyo and Heyns (2019) asserted that failure to sustain TQM could result in poor quality and performance, which translate to high costs, inefficient productivity, and loss of competitive position. The participants identified underlying problems related to the sustainment of TQM as the cause of inconsistency in their processes, and the symptoms of this discrepancy include reprocessing of parts and overtime work, in some cases, over the weekend. The inability of the practitioners to sustain TQM practices revealed contributors such as complex methodology, concerns with the applicability of the techniques, lack of communication, training, understanding, knowledge, and support. While TQM practices have positive relationships with the organizational performance and productivity (Sila, 2018a), and provide tools and methods to reduce errors, waste, and inefficient procedures (Alkhaldi & Abdallah, 2019, 2020), management needs to give full commitment to TQM’s quality standards (Pham, 2020). Leadership commitment enables a rational and premeditated approach to maintaining TQM sustainability rather than a reactive process that requires
containment and added work according to practitioners. Observations from the shop floor supported Georgiev and Ohtaki’s (2019) claim that proper sustainment of TQM increased the effectiveness of production support resources and their capabilities to maintain processes and specific tasks to eliminate nonconformities and achieve higher productivity. According to practitioners, proper sustainment of TQM resolved excessive overtime, lowered equipment downtime, and addressed standard work issues.

**Employee Impassive Behavior.** Gaiardelli et al. (2019) defined employee behavior as the attitude or actions of an employee in the company and is affected by factors related to job satisfaction, commitment, and concern that characterize the main reasons for employees’ emotional outlook. Research findings similar to Baidoun et al.’s (2018) study showed that the impassive employee behavior, such as an apathetic reaction to follow directions, reflected their response to the TQM sustainment when these practices negatively affect achievement of their objectives. Based on observations, the incoherence between TQM practices and production targets created participants’ responses that lead to behavioral concerns most especially when neither production objectives nor quality are achieved due to conflicts. Participants find ways to overcome or resist change by modifying procedures to satisfy all production expectations, and in the process, fail to produce the intended outcomes that result in rejects or reprocessing of parts. As described by participants, these lead to frustration, stress, fatigue, low morale, and overwork that ultimately affects their involvement and engagement. This condition is in line with the claim from Aquilani et al. (2017) that employees’ main virtues represent the vital enabling elements to overcome the resistance to change that can successfully sustain TQM programs. While TQM promotes involvement of employees and builds participatory strategies that enhance the performance of employees (Al- Saffar et al., 2020), their behavior towards initiatives and
decision-making processes to achieve business objectives needs to be considered (Baidoun et al., 2018). Jiménez-Jiménez et al. (2019) suggested that TQM needs a framework in which social dynamics can develop, operate, and be successful, so the connection between hard and soft features in the methodology needs to be an ongoing business management process. Soft TQM constructs such as leadership commitment, employee involvement, and strategic quality management are critical to the successful sustainability of TQM in the company (Georgiev & Ohtaki, 2019; Hwang et al., 2020).

**Unpredictable Operational Constraints.** Based on the company’s quality manual and interviews, TQM practices play an important role in reducing the company’s operational constraints through quality measurement systems and reaction plans that detail corrective actions and escalation procedures. The leadership claims that the company’s quality management system in place not only safeguards against nonconforming products and procedures, but also protects process equipment in the manufacturing line. Practitioners experienced operational constraints due to worn tools, unreliable equipment, and poor process capability, which resulted from lack of observance to proper monitoring, inadequate preventive maintenance, and inattentiveness to the quality management system. According to practitioners, these constraints affects production, place strain on the quality system, and reduce the overall performance and productivity. This condition agrees with Jaeger and Adair’s (2016) claim that TQM practices can help normalize manufacturing processes by determining how to optimize tool changes and measuring process capabilities to improve quality and overall performance. The company’s operational performance depends on the high-level quality and process leanness in terms of adaptability to change, equipment capability, speed of delivery, product dependability, and overall costs (Gaiardelli et al., 2019). Based on interviews, the site’s quality assurance believes that the effectiveness of
process capabilities depend on the successful sustainment of quality management practices and process maintenance.

**Overwhelmed Process Enablers.** Noted in the company’s process audits, every major quality incident in the company that requires reprocessing of finish goods demands more resources that have to operate and manage the existing system to un-produce, transfer inventory, and quarantine suspect products. These activities also include re-inspection, rework, disposition, re-serialization, and repackaging of finish products. According to the practitioners, the cost and added activities get more overwhelming when suspect products have already left the site and are in distribution centers or in customers’ hands. Research findings showed that it takes multifunctional teams from production, shipping, supply chain, warranty administration, engineering, and product management to reprocess suspect products through non-standard work and change management processes. In agreement with Wei et al. (2019), the sustainment issues with TQM programs could overload the coordination of process enablers and contribute to the performance failures that can prevent the company from achieving their planned goals.

**Representation and Visualization of the Data**

All digitized files were imported into the NVivo software and upon completion of the download, a word frequency query was initially done to determine the prevalent words in the file based on frequency and relevance. The intent was to get a quick and modest visual insight that may lead to more in-depth analyses. Based on the display, length, and grouping setting calculated from all files, the word ‘quality’ (1604 count, 3.32% weighted), ‘products’ (724 count, 1.50% weighted), ‘support’ (626 count, 1.29% weighted), and ‘sustain’ (581 count, 1.20% weighted) were the most common words present in the data. Figure 3 shows the visual representation of the text in terms of their weight in a Word Cloud generated from the files.
A cluster analysis by word similarity was produce to visualize patterns in the data by groupings that share similar words. Figure 4 shows the graphical representation of files to see differences and similarities. This confirms that the groupings such as the participants in the practicing roles are more similar than they are far apart. Majority of the files for this grouping showed a Pearson coefficient of above 0.50 up to 0.779827 that proves that the strength of linear association is positive. The case is the same with participants in the leading roles and those that have experienced TQM sustainability effects. Appendix A shows the summary of the Pearson correlation coefficient generated from the files.
Figure 5 on the next page shows the input and the output constructs of TQM sustainability issue in the company. This lists the major themes concerning the lived experiences of the practitioners developed in their descriptions of the sustainment of TQM as the following: (a) market-oriented organizational culture, (b) rigid TQM methodology, (c) pacesetting leadership style, (d) highly competitive strategies. The resulting constructs from these themes were high cost of quality and external warranties, inconsistent productivity and performance, impassive employee behavior, unpredictable operational constraints, and overwhelmed process enablers. The figure also shows the attributes that relate to the major themes and constructs.
Codes were created in NVivo qualitative software based on the meaningful information from each individual files. The resulting themes were then compared to understand the impact of the input themes to the problem and the effects of the problem to the resulting constructs. Figures 6 to 9 show the comparison diagrams between the input constructs and the TQM sustainability issue. In equating the four comparison diagrams, these show that most participants considered the ‘Rigidity of the TQM Methodology’ as the major contributor to the TQM sustainment issue.
The comparison diagrams also show how closely the ‘Pacesetting Leadership Style’ and ‘Highly Competitive Strategies’ relate to each other in contributing to the problem, according to the data.

**Figure 6**

‘TQM Sustainability Issue’ and ‘Rigid TQM Methodology’ Comparison Diagram
Figure 7

‘TQM Sustainability Issue’ and ‘Market-Oriented Organizational Culture’ Comparison Diagram
Figure 8

‘TQM Sustainability Issue’ and ‘Pacesetting Leadership Style’ Comparison Diagram
Figures 10 to 14 show the comparison diagrams between the TQM sustainability issue and the output constructs. In equating the five comparison diagrams, these show that most participants considered ‘Impassive Employee Behavior’ as the output construct most affected by
the TQM sustainability issue. The figures also show that the ‘Inconsistent Productivity and Performance’ being the second construct to be affected maybe influenced by the resulting impassive behavior as suggested by most participants in the practicing roles.

**Figure 10**

‘TQM Sustainability Issue’ and ‘High Cost of Quality and Warranty’ Comparison Diagram
Figure 11

‘TQM Sustainability Issue’ and ‘Impassive Employee Behavior’ Comparison Diagram
Figure 12

‘TQM Sustainability Issue’ and ‘Inconsistent Productivity and Performance’ Comparison Diagram
Figure 13

‘TQM Sustainability Issue’ and ‘Unpredictable Operational Constraints’ Comparison Diagram
Figure 14

‘TQM Sustainability Issue’ and ‘Overwhelmed Process Enablers’ Comparison Diagram
Relationship of the Findings

The research findings revealed multiple contributors to the sustainment of TQM in the company. The analysis of the data showed that the firmness of TQM methodology, orientation of organization culture, type of leadership style, and highly competitive strategies and operational targets affected the sustainment of TQM in the site. Data from the study produced relevant information that related to all research questions and supported the conceptual framework initially outlined in the foundation of the research. Information from three research instruments showed evidence of anticipated themes and their contribution to the research topic. The results of the research also supported the academic and professional findings noted in peer-reviewed literatures and reinforced the facts that contributed to the research problem concerning the sustainability issue of TQM in the manufacturing industry.

The Research Questions. Then research findings produced information that were relevant to all the research questions. The lived experience of the TQM practitioners in the company highlighted their perception of the phenomenon and enabled the sharing of their narratives and meanings they attributed to their TQM experience. Interviews with the practitioners from cross-functional roles, combined with shop floor observations and analysis of archived documents related to the quality management system confirmed the presence of the sustainability issue with TQM.

RQ1: How does the TQM sustainability issue affect the company’s cost and productivity?

According to participants in leading roles, the organization utilizes TQM practices to help in the prevention and detection of nonconforming products in their manufacturing and assembly processes. The company quality policies require compliance to execution of quality controls by employees to protect processes and ensure conforming products. The same quality rules also
measure and monitor the effects of wear and tear of tools, fixtures, machines, and equipment of the manufacturing facility that affect the overall process capability. One assertive participant related,

P8: The quality checks and requirements, no matter how intricate, were put in place to protect us. We have seen what happens when we skip these inspections. We get more interruptions and downtime because we use parts that will not fit together or will not pass the tester when assembled. Even though these are complex and time-consuming, quality helps us avoid expensive rework and lost productivity. Inspections can catch defects before these go into production and prevent costly downtime from happening. We just wish these quality assessments were more process-friendly and not too operator-dependent.

According to the participant, failure in sustaining the quality system in place results in high product nonconformance and defects, leading to excessive reject costs and loss in productivity. Based on this interview, the TQM sustainment issue leads to loss of control and measurement of processes and products in compliance with customer requirements. This supports Nasim’s (2018) claim that the sustainment of TQM influences the operational productivity of organizations, which also affects other dimensions of performance such as financial effectiveness and customer satisfaction.

RQ1a: How does the TQM sustainability issue influence external warranties, internal costs, and performance?

The company’s external warranties, internal cost, and performance are affected in the manner it sustains its TQM practices, according to its warranty versus sales report, scrap summaries, and productivity reports. Evidence from interviews has shown that adherence to
TQM procedures safeguards product quality, which minimizes the cost of rejects and reprocessing. One participant confirmed the importance of sustaining TQM:

P12: Some molds are old and manually operated, so if we do not sustain what quality requires us to check, the odds of making rejects are very high. We can make many parts, but only the good ones count. Our ability to monitor the quality of our parts affects not only the assembly lines downstream but also the customer. If we do better in producing quality parts, the assembly cells do better in assembling these into finished goods. Our quality performance and productivity go hand-in-hand. Many of our processes depend on quality inspections and not sustaining these required activities can disrupt operations even though the quality methodology involves more work on our side. In some ways, not checking parts can slow down throughput significantly, and that eventually relates to poor performance and more warranty issues.

The participant recognized the importance of sustaining TQM and acknowledged the impact it had on quality and performance. Based on observations, absence of nonconforming products and proper execution of TQM practices in the manufacturing lines improves the flow of the processes and enhances productivity and performance. Shafiq et al. (2019) asserted that productivity increases with sustainment of quality and failure to maintain TQM can result in low quality, which translates to high costs and loss of competitive position. To support this claim further, review of the company’s warranty versus sales report showed,

AD1: The document displays the gradual seasonal and annual oscillations of the trend lines of warranty claim rates from previous to current year. Some product warranty claims continued to be high in the current year despite a positive trend, indicating some opportunities with the sustainment of quality practices. During the 2020 pandemic, both
warranty claims and sales volumes plunged almost proportionately, but then later in the year, some customer claims rose slightly along with product sales.

Reviewing data in the company's quarterly financial statements and annual reports, spending on product warranty costs is seen in a wavering trend within the target goals. By examining the expense changes from year to year, the company’s cost cutting initiatives and its effects are observable based on the unexpected spending on some product warranties. The warranty cost and service expenses reveal the effects on the results of the company’s productivity and performance.

RQ1b: How does the TQM sustainability issue affect product warranty cost, field failure rates, and cost of quality?

The company experiences high product warranty costs, field failure rates, and cost of quality for every product quality defect it was not able to contain and had already shipped out to customers, according to interviews from participants in receiving roles. The associated cost to warranty and quality includes reprocessing of orders, replacement parts, disposition of defects, labor involved in exchanging and correcting field issues, and potential loss of customers. A field technical service manager explained,

R5: A number of times, I have to drive to a customer who is two hours away only to find out when I arrive there that the product is missing an assembly kit. Just imagine driving another four hours to get the replacement from the distribution center and back to the customer. The cost of wasted time, money, effort, and customer dissatisfaction is just staggering. We went through a good season without having these issues; why are these problems happening again? We are losing customers to our competitors who are just waiting in a corner for something like this to happen.
The field service support team experiences significant cost and dissatisfied customers due to quality issues that could have been prevented. This supports Banuro et al.’s (2017) claim that failure in maintaining the TQM methodology results in increases in costs, compromised products, and unsatisfied customers. The company’s warranty versus sales report also supports the claim regarding the negative effects of poor quality practices:

AD1: The variances of previous and current warranty costs show that some product lines continue to have challenges in the current year. The 12-month rolling average shows a recurrent and oscillating drift that indicates instability in product quality and services despite indicating a positive trend. This also displays that productivity and performance is affected by far more than just product sales, but also the warranty expenses those sales generate.

The document reveals top-level warranty items of top products that have recurring issues. It also shows the year to date percentage of warranty of each product based on the corresponding cost of warranty versus sales report. The current and previous years’ warranty costs are compared to determine the performance based on the variance. The data shows the state of TQM sustainability and gaps in the process.

RQ2: Why is there a potential TQM sustainability issue in the water-treatment plant operations?

The site’s leadership has supported a structured TQM framework and maintained a standard approach in maintaining quality practices throughout the site. The TQM methodology adopted in the company requires observance to its guidelines and policies based on its quality manual. This application has aligned with Mendes and Jesus’ (2018) claim that TQM methodology is a structured approach that necessitates full engagement from all participants to
improve operational effectiveness, quality, and competitiveness of the company. However, based on interviews, the TQM methodology has not been in complete coherence with the company’s strategic objectives that focus more on business results because of contradictions with its complex and time-consuming activities and measurement processes. A participant identified one of the situations that confirmed this case:

P1: The quality tollgate is just one of the many evidence of why we cannot sustain quality. That safety net has been there longer than planned because the auditors keep finding defects after the line has inspected their parts. The recurring failures at the assembly line testers also show how defects made it through critical inspection points. The effects of these quality sustainment issues can be seen as high costs in scrap, extra labor, rework, and low productivity. We rely mostly on operators to manually check the parts, and you know that is not 100 percent effective. There are too many complex quality instructions that adds to our labor and time, making it difficult for us to achieve our targets.

The quality management system is operator-dependent, according to the practitioner, and this condition added to the sustainment issue of TQM. In addition, it takes more work and time for TQM initiatives to produce benefits that influence performance, making it costly and impractical in the short term (Qasrawi et al., 2017). This complication and suitability issue causes TQM practitioners to lose engagement, involvement, and commitment, as described by Chiarini and Vagnoni (2017). The complexity of TQM practices in the site creates other challenges to its sustainment according to participants. These include lack of operational control of manufacturing processes, lack of monitoring of process improvement, lack of information
about quality cost, and poor benchmarking of existing processes, as noted by Aamer et al. (2017) in their study.

**RQ2a: How does TQM sustainment affects the company’s operational targets?**

Based on the research findings, the TQM methodology creates too much work for the practitioners and lengthens assembly cycle times. The practitioners perceive the quality approach as having too many repetitive non-value added activities that slow down the production rate and negatively affect overall performance. To some practitioners, the quality practices have no practical short-term benefits that help with current manufacturing issues, leading to unproductive use of limited resources and costs, as described by Nguyen et al. (2017). Their perspectives were based on the fact that the methodology placed more concentration on quality inspection and control instead of prevention, and they struggled to resolve the issue that was on a detection-based system, as defined by Li et al. (2018). One participant explained,

P24: Some reasons why operators cannot sustain quality practices is the fact that these slow them down and add more work to their job. Sustaining TQM adds to the workload and stress that they already have to achieve their production targets. In this perspective, TQM sustainment negatively affects their performance and productivity. It is not because they do not want to do these checks; some of the inspections used were impractical to the process and do not always catch the nonconformance that these were designed to detect. There is too much subjectivity to most visual checks, for example. They do not trust some of the checks, and they have to do more work just to complete them. Most times, these checks help us catch bad parts but do not really help us make our targets. There are just too many conflicts. We have an automated torque driver system that ensures correct
torque and sequencing that was shut down because it was too complex and disruptive to production. We cannot stay in business using that system.

There were too many analyses done on an issue that paralyzed the process in some cases, according to participants. These quality activities included ambiguous data on process output, inappropriate measures of nonconformance issues, and wrong emphasis on solving the problem instead of recurrence prevention, as defined by Sachdev and Agrawal (2017). According to practitioners, the company’s operational targets were affected by the ruminating quality analyses that led to endless internal strife over the upsides and downsides of each action, and the failure to choose the appropriate initiative.

**RQ2b: How does sustaining TQM practices align with the company’s operational strategies?**

According to the practitioners, the current TQM methodology in place is primarily focused on customer satisfaction and not on process performance or overall productivity. This is in alignment with what Anthony et al. (2017) studied, that at some point, leadership needs to see concrete evidence in performance, productivity, and increased business, or they will lose commitment. According to interviews, this difference in focus was one of the main reasons why the sustainability of TQM practices in the site is an issue. A participant in a leading role elaborated,

L4: Quality KPIs exist at multiple levels of the organization. Some are designed to measure customer experience, costs of poor quality, and/or internal performance. Internal quality performance is primarily measured by First Pass Yield (FPY), scrap dollars, and inventory discrepancy dollars. Tools are in place to measure each of these at the cell, value stream, and site levels, and the trends are monitored by cross-functional teams with
actions developed to net improvements. These actions may be simple individual contributor tasks or may lead to longer-term projects or Kaizen events for fast and focused action. When scrap is high, or FPY is low, we lose productivity and miss on-time delivery requirements as well.

The company’s leadership reiterated the need for the business to be competitive to survive as a business unit. They emphasized the need to alignment quality practices with operational needs to optimize overall performance. Another participant in a leading role reinforced this requirement,

L5: Our tools under BMS and managing for daily improvement (MDI) allow us to design quality projects that are supposed to support productivity goals. Instead of considering the quality management as a separate system, we understand that in order to be successful in our sustainment of a quality management system, we need to synchronize with our Lean enterprise principles and “best in class” practices.

The company’s management needs to make sure the suitability of the quality system in its processes support the business goals, according to leadership interviews. The complexity of TQM causes the company’s leadership to question the appropriateness of the system in their production processes after the implementation, and this creates a barrier that causes management to lose commitment and involvement (Chiarini & Vagnoni, 2017). This situation leads to less motivated leaders that are not involved and fully integrated in supporting TQM practices (Kumar & Sharma, 2017).

RQ3: How does the organizational culture of the company affect sustainability of the TQM system?
According to leadership interviews, the company is focused on its mechanism and means of improving its ability to respond to demands and changes in the market. Its management claims that its organizational culture operates in the competitive market and decisively adjusts its internal processes and systems to achieve its objectives of market superiority and competitive advantage. This dominant attribute drives the organization’s firm orientation to its production and strategic goals, as one participant with a leading role clarified,

L5: Quality projects need to support the operational needs of the organization to sustain overall performance. There is a synergistic requirement to do so because productivity and quality work hand-in-hand in accomplishing the strategic objectives. All process performance analyses must include effectiveness, compliance, efficiency indicators, and a continuous improvement plan that is supported by continuous knowledge-transfer to promote sustainability. System-thinking is imbedded in our standard work to make this a part of our daily activities. We also cross-train staff on BMS management, reporting for sustainment, and sharing best practices between sites. Continuous review of the system for sustainability and improvement opportunities are done with management reviews and internal audits.

While the organizational culture acknowledges competitiveness as a combination of strategies and quality, it is sensitive to the methodology’s timely results and benefits designed to influence performance, as seen in its daily productivity report and interviews. Li et al. (2018) shared this concern that when changes do start to take place in the business, the sustainment of TQM programs become a challenge because management expect immediate changes from a transformation that usually takes time to produce results. Panuwatwanich and Nguyen (2017) also stressed that organizations dominated by market and rational cultures do not support a
favorable environment for the effective sustainment of TQM compared to cultures controlled by adhocracy or the group-type system.

**RQ3a: How does leadership perceive the importance of TQM sustainment in operations?**

Based on interviews, leadership plays an important role in the sustainment of TQM within the company, and they set the policies and guidance essential for TQM to flourish. Álvarez-García et al. (2016) noted that without the correct leadership to motivate and influence compliance, sustainment of TQM could not fully succeed in the long-term. Participants noted that the company employs a pacesetting leadership style to support and execute its market-oriented position and expectations by effectively executing competitive strategies and operational targets to gain market superiority. A participant related,

P8: I engage more in work when my supervisor empowers me. Leadership can stir me to whatever direction they want me to go as far as production goes. I do what the supervisor instructs me to do within the bounds of this work. If quality is important to him, it is important to me. As always, the emphasis is on takt time. He sets the pace of work and all of us will have to follow that. In most cases, his focus is so centered on what the schedule is requiring him to deliver, so depending on what that is, the priority and pace of work can differ, and so can the attention to other activities.

The leadership sees opportunities in connecting the requirements of the company’s strategies and the TQM effect on productivity and workload of line members in a high-paced manufacturing setting. This condition supports Bernardino et al.’s (2016) claim that TQM methodology has more emphasis on operational effectiveness and not as much focus on strategic positioning. According to practitioners, the approach needs more integration of appropriate quality programs and methods necessary for the sustainment of TQM.
RQ3b: How does TQM sustainment affect the behavior of employees in their current role?

According to practitioners, the sustainment of TQM practices and concern for immediate results causes unwanted anxiety for employees in manufacturing, which is stressful when the scope and impact of changes is substantial enough to affect everyone in the organization. This mirrors Bugdol’s (2020) claim related to the concerns over short-term expectations and overworking resources to satisfy quality requirements. In addition, sustainment of TQM requires too much commitment from the operations team members and too much pressure to show compliance to methodology as noted by Albuhiisi and Abdallah (2018). One participant elaborated,

P4: The existing quality assessments in my station are already time-consuming. The problem is when I am presented with many questionable components that do not assemble easily, and then the extra quality checks are added to sort out these suspects. It is just too much work for the whole shift, work becomes toxic, and it becomes very frustrating. I feel disoriented to all these extra checks that I just do them. We really need to have accountability for the quality of parts that we receive here. There seems to be no consequence to those who produced these defects, other than me, who has to inspect these. I sometimes finish my shift feeling as if I have not done anything productive. I become stressed out and disappointed.

In most cases, the practitioners noted that the situation generates a strained obligation to proceed without adequate knowledge, understanding, preparation, or training needed for the activity. Based on observations, an impassive behavior has become apparent from practitioners who felt trapped in this condition. Sustaining TQM creates a superficial pressure to achieve high quality and reduce process failure, affecting the role and behavior of participants in upholding
engagement and trust while balancing quality and production expectations (Vouzas & Katsogianni, 2018).

**RQ4: What TQM activities affect performance in each value stream that make its sustainability an issue?**

Practitioners identified TQM activities that affect their performance in their value stream as those activities that involve time-consuming and excessive assessments or inspections of systems, processes, and components. While practitioners fully understand the relevance of the activities, they see tasks that include high frequency inspection checks such as audits on processes, standard work, and quality as excessively repetitive due to unresolved recurrent incidents. Some practitioners do not see this methodology as a mechanism or tool that would solve recurring problems. Based on observations, the method of processing nonconforming material, for instance, was too time-consuming and resource-intensive for involving too many functional groups. Quality technicians claimed that data collection and data entry activities were also labor-intensive and time-consuming, and required greater attention to details to ensure integrity of the information. Quality inspectors said that daily assessments of process issues at tollgates were added layers of inspections installed because of the inability of the practitioners to sustain quality procedures. Practitioners noted that problem-solving activities take too much time and too many resources to mitigate root causes, including analyses that creep out of scope and time to close issues. For some practitioners, there is no standard or disciplined approach to risk analysis, such as identifying the root cause of potential problems and the potential cost or risk associated with taking no action to prevent its occurrence. In addition, some process performance analyses do not include effectiveness, compliance, efficiency indicators, and CI plans as documented in process audit findings.
More observations revealed that the application of rigid requirements of TQM involves the company’s compliance to its procedures, which is dependent on existing resources for continuous training, monitoring, and audits that some management leadership have difficulty providing. This condition is in alignment with the claim of Dahlgaard-Park et al. (2018) that use of the TQM methods, tools, and techniques requires dedicated and committed resources. According to practitioners, the company does not have a strategic roadmap complemented with suitable methods and techniques to ensure success with the added responsibilities. In an attempt for the company to optimize costs, TQM practitioners multitask to cover other aspects of the TQM process, leading to workload, sustainability, and performance issues. On the production floor level, TQM activities such as 100 percent inspections are used as a transient resolve to problems caused by defects that were generated due to delays in repairs of machines, tools, fixtures, and equipment. One participant operating a machine claimed,

P16: The redundancy in these quality checks does not make any sense. I just changed the inserts and the parts have been in specification for the last 24 pieces. Why are we still inspecting every three parts? The frequency on the control plan does not support the process to run effectively when it actually can, and it slows us down because of these unwanted time-consuming inspections every three parts. The frequency of quality controls is so tight that it does not match up with the higher capability of our machine, making this is a hindrance to our productivity.

According to practitioners, these activities include quality inspections for part features and attributes that require constant attention due to process reliability issues or low process capabilities, which could have been mitigated through proper training, knowledge transfer, and preventive maintenance. According to participants, some of the company’s existing quality
system checks, which is time-consuming and manually intensive, brings up the question of whether the methodology contributes to the true systemic issue by providing a short-term Band-Aid to a manufacturing problem.

**RQ4a: What process-enablers are affected by TQM sustainment activities?**

According to practitioners, the company’s process-enablers such as its information system, policies and procedures, workflow designs, and technical resources provide the framework for the functional drivers of its processes. Observations confirmed that the company’s fast-paced high volume manufacturing environment are managed by multi-skilled resources handling multiple responsibilities at the same time. Practitioners noted that sustaining quality activities such as critical scan overwhelms the system due to the need of more serialized labels of subcomponents for traceability purposes. They explained that the information system adapts by adding more resources and equipment to the quality needs. This also includes the quality management system’s handling of change management processes, upkeep in accurate reporting, maintenance of inventory after quality incidents, and reprocessing of finish goods that affects all process-enablers. Review of the company’s product non-conformity report (PNR) with a participant revealed,

**AD5:** The PNR process takes substantial time to prepare and complete because it utilizes all of value stream members’ time to identify, contain, relocate inventory, and disposition products after testing and validations. It takes an amount of time to fill the form, submit it for approval, process the contents, and finally, put it to closure. The company’s PNR disposition process involves a concentrated and onerous collaborative handover of decisions between initiators, managers, and affected team members. Product disposition is also complex to conduct without the timely capability to sample and test affected
products, making this process time-consuming that could leave risks of unresolved and unaccounted quality findings.

Practitioners noted that the expectation for instantaneous response and results to address challenges in the PNR workflow was time-consuming. This situation reinforced Bernardino et al.’s (2016) claim that there are misperceptions between TQM sustainment and its long-term results because of its highly involved training requirements, longer deployment time, and excessive focus on standardization using existing workforce.

**RQ4b: What operational constraints are created when sustaining TQM practices?**

Practitioners claimed that TQM practices create operational constraints mainly because these are time-consuming and labor-intensive to perform. The company always seeks ways to achieve its goals by reducing operating expenses, optimizing inventory, and increasing throughput. Although manual in-line inspections and audits help improve reliability of the process, these create constraints on the company’s equipment capacity and slows down production rate. The complex and time-consuming process measurement management in the company contributes to these effects because of intricate statistical techniques and checks involved in reducing the process variation and use of preventive maintenance to improve quality (Wei et al., 2019). The fundamental misunderstanding according to the support practitioners lies in the analysis of real issues and TQM actions that are not cost-effective and affect the production intent to meet customer demand. The company has set-up an internal quality examination structure at every control point of each critical station in the line to ensure conformance to product specifications, which mirrors what Aquilani et al. (2017) observed in their investigation. These types of TQM practices in the company create cascading and constraining effects that include limitation in utilities capacity, raw material flow, logistics and
transport challenges, and insufficient utilization of space according to practitioners. A participant who experienced the issue explained,

P5: We tried bypassing the critical scan before and we got into real problems with the customer missing his parts. We did it to make our work faster, but it did not do us any good in the end. Quality held all the parts for inspections and had operators rework everything. We made one-step forward and took a hundred steps backward. These quality scans are complex, but they help us in the end. Therefore, even if I complain about the quality system being too awkward and cumbersome, I will not suggest taking them off. Can you still find a better way to do this though? Love it or hate it, it is constraining our ability to make production targets faster, and it is overwhelming IT and system support.

In some cases, the company’s reactions or responses to quality incidents that exacerbate operational constraints include assigning more resources at the apparent problem immediately, without understanding the real causes of the problem. Practitioners see the same repeating pattern of making the same mistakes, responding to early warning signs, and looking for short-term, unsustainable solutions rather than thinking strategically. As a result, they often see efforts to overcome constrained capacity fail, and end up wasting a lot of resources that translate to higher costs and lower productivity.

The Conceptual Framework. The research findings aligned with each element in the conceptual framework that contributed to the sustainment issues of TQM within the company. Each input construct such as the TQM methodology, leadership style, organization culture, and competitive strategies has fundamental components that influenced actors in how they sustain the TQM system that eventually resulted in high costs of quality and low performance. According to the company’s quality manual, management maintains strict observance to the policies and
guidelines of the quality management system in the company. Based on leadership interviews, management has asserted that a sound sustainment of TQM requires firm adherence to procedures from all practitioners to have a strong causal effect on cost of quality and organizational performance. This echoes the claim from Amin et al. (2017) that TQM is a strenuous management philosophy that requires full participants’ commitment to improve product quality and processes; otherwise, a lackluster execution will lead to failure. Gözükara et al. (2019) reinforced this concept, stating that each deviation from the TQM procedures affects the level of quality and performance in manufacturing processes.

The company’s leadership style has been decisive and oriented toward realizing production goals and achievement. According to the practitioners, leaders set the drumbeat for operations and have high output expectations from each team member. As an efficient and solid performer who sets the excellence bar high, this leadership style can overwork team members (Campion, 2018). This type of leadership complements the market-oriented culture of the company that strives for market superiority and a competitive position. This management attribute influences how employees engage, participate in TQM practices, and execute compliance to overall standard procedures based on the company’s standard work audits. This confirms Kumar and Sharma’s (2017) assertion on the impact of this leadership on TQM sustainment, recognizing that when team involvement is fragmented by too many expectations, it can jeopardize the correct application of TQM and cause performance issues downstream (Bugdol, 2020; Hwang et al., 2020).

Based on interviews, the dominant attributes of the market-oriented organizational culture of the company are towards satisfying the needs of the customer and attaining market dominance. Evidence from productivity reports shows the company’s strive for business
excellence by putting more strategic emphasis on efficiency by increasing throughput and productivity. The competitive focus of the company culture influences the behaviors of their employees in supporting its business management system such as TQM, and in terms of harmonizing values and norms (Byrne et al., 2019). In line with the culture’s dominant attributes, its highly competitive strategies and operational targets support the dynamics of its organizational preferences. According to participants, the company regularly develops its core processes and competitive priorities by evaluating cost and speed of delivery; this allows proper implementation of efficient systems for allocating resources, personnel, and the work process.

The company’s productivity report shows the periodic benchmarking in analyzing the progress made and the initiation of actions to eliminate gaps in any production parameters to cope with demand changes. According to practitioners, the exceptional focus on competitiveness in a high-paced manufacturing setting creates conflicts in sustaining TQM practices due to issues in relating the priorities of the company’s strategies and the impact on productivity and workload of personnel. In addition to practitioners’ interviews and observations from the shop floor, evidence of these cases are seen in the company’s standard work and process audits, with major quality incidents cited in Critical-to-Quality forms posted in the cells. This supports Bernandino et al.’s (2016) claim that TQM has more emphasis on process effectiveness and not as much emphasis on strategic positioning, so it lacks the integration of the site’s operational objectives and strategies.

The conceptual framework also shows the impact of TQM sustainability issues on the output constructs such as cost of quality and external warranties, productivity and performance, employees’ behavior, and its consequence on operational constraints and process-enablers. Kumar and Sharma (2017) specified that TQM sustainability issues result not only in high cost
of internal and external costs, but also contribute to performance issues that affect the overall business targets. The TQM sustainability issue in the site is evident in the company’s warranty and sales report that shows a 12-month rolling average that displays a recurrent and oscillating trend indicating instability in product quality and services despite indicating a positive trend. The condition can also be seen examining the Quality Alerts that capture many workmanship issues, especially relating to incomplete assemblies and supplier defects that continue to happen consistently, on and off as reported. The Product Non-Conformity Report reveals the challenges of sustaining quality where a multitude of incidents show quality issues prevented in the past recurring multiple times after solutions were in place for a number of months. The associated internal cost of quality can be seen while reviewing the Site Scrap Summaries that show reject cost percentage improvement in the first quarter but exhibited an inconsistent trend in the succeeding quarter. This is supported by the First Pass Yield that shows irregularity in monthly trend patterns, demonstrating very strong periods of good quality output and throughput, and in various times, periods of high-quality incidents and missed productivity targets.

In support of Andrade et al. (2017), TQM practitioners noted that they cautiously conduct themselves to gain recognition and respect while observing the rules and regulations of the workplace. However, challenges in sustaining TQM that create unpredictable operational constraints and overwhelm process-enablers place too much stress on practitioners’ workload, which ultimately leads to behavioral issues. Binci et al., (2019) explained that the rigidity in the TQM practice creates tougher knowledge-conversion and concept-understanding that can result in a circle of confusing directions and interpretations of the method. According to the practitioners, they are stuck in an impassive behavior when everything else they can do, cannot fulfill operational targets. These misconceptions and misunderstandings create inconsistencies
with the way leadership sustains their intended strategies, particularly when the TQM application slows down production line rates and impacts delivery targets. In the end, the resulting vagueness of understanding formed by practitioners’ collaborations leads to contrasting methodology and outcomes (Binci, 2019).

**Anticipated Themes.** According to interviews, the company has implemented and executed lean and CI activities that have strategic emphasis on enhancing competitive advantage and market superiority. According to leadership interviews, improvement opportunities are identified, and initiatives are weighted and prioritized during the value stream mapping and transformation plan development. Similar to what Tasleem et al. (2019) noted, the company uses CI as an important tool to improve performance and quality of its processes to achieve delivery targets and customer expectations. The management’s use of CI by TQM to develop its capabilities, employees, and systems incrementally to eliminate nonconformities and improve quality agrees with Tavana et al.’s (2020) assertion. However, according to practitioners, like TQM, CI efforts face sustainment challenges because of too much focus on success factors and less on addressing process failures, adding that most of its benefits are not seen in the short-term basis. This condition confirmed McLean et al. (2017) and Brindle’s (2020) findings and supported the claim of Ahmad et al. (2017) that most CI participants perceive the approach as an added workload to their existing responsibilities.

The company management team utilizes the concept of DC by using its ‘best practices’ models to cope with the dynamic changes in its business setting. According to leadership interviews, the company uses an integrated management system that combines, transforms, and restructures internal and external core competences to address varying business environments. This is similar to Wollersheim and Heimeriks’ (2016) study that explained the importance of
creating patterns from existing practices and learnings to enable companies to adapt how they function through changes in their industry. According to the practitioners, reconfiguring timely is key to adapting and sustaining multiple processes that are subjected to regular changes, but faces opportunities in the allocation of appropriate resources to deliver the needed initiatives. Similar to sustainment of TQM, there is a challenge to include the capability to associate participant knowledge with new functional capabilities so initiatives to adapt to changes can be accomplished effectively (Kumar et al., 2020b).

Based on interviews, the company’s HRM helps in the implementation of corporate objectives related to supporting employee initiatives and engagement at all levels in the organization. According to the quality manual, the company’s HRM role supports training to develop its employees’ knowledge, skills, and abilities, and creates incentives designed to incentivize and motivate effort. This role agrees with the studies of Lee et al. (2019) and supports Cho and Linderman’s (2019) claim that HRM upholds standard practices that form a workforce that has essential company-specific skills. Based on interviews, while HRM has an important role of supporting TQM by supporting sound business strategies and a responsive organizational climate, it needs to synergize with operations departments. Parallel to what Maleki-Minbashrazgah and Shabani (2019) noted, participants think that successfully building the commitment needed from both HRM and operations management to support the company’s process strategies is beneficial in any sustainability program created by the organization.

Archived documents showed that the company’s change management process incorporates KM to aid in the development of existing business practices and processes such as TQM. According to practitioners, knowledge sharing in the company has a significant role in sustaining TQM practices by converting threats into opportunities for improvement; however,
there are gaps that affect the flow of communication between shifts and team members. Practitioners do not have enough time to incorporate knowledge sharing in their regular routine, creating a significant limitation to TQM sustainment initiatives. This supports Backlund and Sundqvist’s (2018) claim that knowledge sharing for sustainment purposes would have to be supported by a work setting and environment that allows practitioners to share openly and discuss solutions to quality issues. While the company has a systematic process of charting, organizing, and sharing of knowledge and experience of employees, retaining critical information methodically is still an ongoing challenge. Practitioners agree that there is a positive relationship between TQM sustainment and KM since both underline the importance of building knowledge from experienced employees as key sources for supporting any business management system. This understanding aligns with Abbas’ (2020) study that dynamic organizations take TQM and KM as inter-subjective constructs.

The Literature. The research findings have many similarities with the information taken from literature. The company uses TQM as part of its business management strategy aimed to improve its organizational performance and enhance customer satisfaction. The top-level TQM methodology used in the company to promote high-quality products and services supports studies made by Hwang et al. (2020), Kumar and Sharma (2017), Nasim (2018) and Qasrawi et al. (2017). The company has acknowledged soft TQM attributes such as teamwork, communication, involvement, commitment, engagement, and full participation as noted by Albuhisi and Abdallah (2018) and McLean et al. (2017) as essential factors in TQM sustainment. The practitioners have acknowledged the rigidity in TQM’s methodology and its requirement for strict adherence to its approach, as claimed by Nizamidou and Vouzas (2020) and Villanueva (2018). Furthermore, the company experienced misconstructions and misinterpretations of TQM,
which resulted in confusion and skepticism of its effectiveness on improving operational results asserted by Sfakianaki (2019) in a study that affected the success of its long-term sustainment. Chiarini and Vagnoni’s (2017) claim that many processes using the TQM system do not follow similar routes because the methodology does not have a precise roadmap or pattern, supports many of the company’s confusing and complex guidelines, according to practitioners.

Based on leadership interviews, the market-oriented culture of the company has a dominant attribute that focuses more on competitiveness and market superiority. This strategic formulation that is centered on business results affects the work prioritization for TQM frontline practitioners and is in line with Sachdev and Agrawal’s (2017) study. In agreement with the assertions of Aquilani et al. (2017) and Baidoun et al. (2018), the way management ranks its operational priorities play a significant role in successful sustainment of TQM practices. The company justifies a workable plan that optimizes its limited resources only on systems where short-term benefits are attainable, which are not always the case with quality investments that are expensive and have long-term payback, according to leadership. This management approach confirms Bouranta et al. (2017) and Vouzas and Katsogianni’s (2018) studies that showed that one of the major barriers to TQM sustainment is management’s lack of commitment to quality, who consider quality management an extra cost. While quality initiatives are part of the company’s long-term strategies according to leadership interviews, there is a need to ensure alignment of its missions to support production needs for speed and delivery in the short-term basis. This is in alignment with the contention of Li et al. (2018) that management should have realistic expectations where they could be able to pursue immediate gains in the short-term, while understanding that the greater benefits with TQM are achieved long-term.
As a key motivating factor in sustaining TQM practices, the company strives to improve training and education to support employees, according to its HRM objectives. This mission is in line with Mendes and Jesus’ (2018) study on improving employee engagement and empowerment in the workplace. To promote long-term sustainment of TQM practices in the company, the TQM practitioners incorporate KM through proper dissemination and application of quality data and related information. This supports the studies of Honarpour et al. (2017), Marchiori and Mendes (2020), and Yurs et al. (2017) that showed integration of KM contributes to the long-term sustainment of TQM practices in the organization. Based on the practitioners’ account, the influence of company’s leadership style on their involvement, engagement, and participation in quality assurance activities has a major impact on the sustainment process. This statement supports Kumar and Sharma’s (2017) claim that leadership provides guidance that can affect the sustainability of TQM in the manufacturing process. Sila (2018b) noted that TQM practices have direct relationships with productivity and organizational performance, and those issues with its sustainment result are inconsistent productivity and performance. This finding has been confirmed to be true by the experiences of practitioners who have had to spend more time reprocessing parts after experiencing compliance issues with quality controls.

Based on multiple observations, employees in the company behave cautiously to gain respect, trust, and recognition while observing strict company regulations and policies at the workplace. Similar to the conclusions of Aquilani et al. (2017), practitioners’ central virtues characterize the enabling elements that help them overcome the resistance to change that can successfully sustain the TQM programs effectively. In the interview, practitioners affirm that given the right leadership, tools, guidance, and rational expectations, they will be able to graciously perform and sustain any business management system effectively. Furthermore, they
surmise that the impracticality of many quality procedures results not only in performance inconsistencies, but also behavioral issues. The practitioners’ conclusions align with the disclosure of Gaiardelli et al. (2019) that the operational performance of the business includes high-level quality and process leanness in terms of equipment capability, flexibility, adaptability to change, and overall costs.

**The Problem.** The general problem to be addressed is the sustainability issue of the TQM system in the manufacturing industry, resulting in high external warranties, internal quality costs, and low productivity. Based on the findings of the research, the water treatment company in the southeastern United States experienced TQM sustainability issues that resulted in high product warranty cost, field failure rates, and cost of quality. Data on the site’s warranty versus sales report shows warranty claims continued to be high in the current year despite a positive trend, indicating some opportunities with the sustainment of quality practices. These external quality costs are supported by the site’s Quality Alerts, which confirmed major quality related outbreaks in the field related to manufacturing defects. High internal quality costs data can be seen in the site’s scrap summaries that displayed the percentages of top scrap contributors’ year-to-date above target. The site’s First Pass Yield and Product Non-Conformity reports revealed data on recurring defects and containment actions that affect performance and productivity.

Evidence collected from interviews, observations, and archived documents related to quality activities in the company supported the experiences of TQM practitioners with the methodology’s sustainment. Data from interviews confirmed the claims of Aamer et al. (2017) and Maistry et al. (2017) on the complexity of TQM practices in the shop floor relating to lack of operative control of manufacturing processes and lack of monitoring of process improvement. The practitioners also experienced challenges to TQM sustainment that included complex and
time-consuming process measurement techniques such as statistical and line-tester data analysis that Wei et al. (2019) outlined. Often times, practitioners see what Sachdev and Agrawal (2017) noted as ambiguous data on process output and incorrect emphasis on solving the problem instead of recurrence prevention. Evidence from the root-cause countermeasure archives showed that practitioners placed more concentration on quality inspection instead of prevention, and they struggled to move from a detection-based system to a prevention-based system (Li et al., 2018).

Based on the company’s strategic transformation plan and in line with Sachdev and Agrawal’s (2017) study, its strategy formulation is focused more on business results and market superiority, which affects resource allocation and work prioritization for TQM practitioners. Interviews confirmed that this focus affected the ranking of operational priorities in supporting TQM sustainment activities, with limited resources in favor of other operational objectives tied to production output, as noted by Baidoun et al. (2018) in their study. In agreement with the assertion of Anthony et al. (2017), the company’s leadership understands that TQM projects primarily focus on customer satisfaction and not on bottom line results; however, management needs to see tangible improvements in business results to justify investments. Some leadership interviews mirror what Haffar et al. (2019) confirmed, that sustainment of TQM practices is labor intensive, complex, costly, and not practical in a short-term strategy despite its long-term potential to achieve competitive advantages. The complexity of TQM and lack of short-term benefits causes the company’s leadership to examine the appropriateness of the methodology in their processes and this complication results in management questioning some of its applications (Chiarini & Vagnoni, 2017). The practitioners see this condition cascading into their less integrated leaders that are not fully involved in sustaining TQM (Kumar & Sharma, 2017) and in turn affects their teamwork and engagement needed for successful practice (Aamer et al., 2017).
The company policies support training and education essential to the sustainment of their business management system. The site’s leadership acknowledges these factors and their role in an effective sustainment of the quality management system (Mendes & Jesus, 2018) and agrees with Marchiori and Mendes’ (2020) findings that KM contributes to the long-term sustainment of TQM. According to leadership interviews, the company’s management totally supports KM acquisition and application, even though the practitioners see some challenges of the role in knowledge sharing of TQM practices and its benefits as noted by Qasrawi et al. (2017). The participants in the supporting role favor the support of leadership in knowledge sharing to develop a good quality culture and functioning quality management system to sustain any strategic initiatives as noted by Iqbal and Asrar-ul-Haq (2017).

**Summary of the findings.**

The semi-structured interviews of the participants from different roles revealed varied evidence of TQM practices in the water treatment company. Based on archived documents and interviews, the company’s TQM system maintains a vigorous management philosophy that demands full commitment to its policies and guidelines to improve product quality and processes. This philosophy is in alignment with what Al-Ali et al. (2019) noted, that uncommitted TQM sustainment activities will lead to failure, which turns into high quality costs and low performance. The participants showed that the current TQM system in place is complex and manually managed, causing poor participation from all members in all levels of the organization because of its labor-intensive, perceived non-value-added activities, and time-consuming practices. As company leadership explained, the organizational culture’s dominant attribute is towards achievement of its strategic goals and competitiveness to attain market superiority and deliver higher customer experiences. The organization’s centered focus on
immediate success and business results creates conflicts with TQM methodologies’ high cost and
time-consuming sustainment processes that require additional activities (Georgiev & Ohtaki,
2019). Participants acknowledged that the sustainment of TQM practices is costly and
impractical in a short-term strategy, even though the methodology has a long-term potential to
help the company achieve competitive advantages.

Research findings showed that the company’s leadership style is oriented heavily on
making production and achieving goals and are not in favor of supporting complex and time-
consuming process measurement systems in the manufacturing lines that slow down cycle time
and affect productivity. Some participants in the leading role question the suitability and
appropriateness of the complicated TQM practices as they set the pace for the team to gain high
levels in performance and proficiency at all times with minimal supervision. Interviews and
archived documents revealed that the company’s competitive strategies and operational targets
are geared towards supporting their goals of achieving market superiority and competitiveness in
the marketplace. Management maintained that the company’s strategic emphasis is towards
competitive advantage and dominance in the market, while its quality management system has a
customer-focused process that aims for continual support of a company’s strategic goal and
objectives. Albuhiisi and Abdallah (2018) noted that alignment of TQM practices could affect the
preset company’s strategies and operational target variables if there is no balance or coherence
between the two standards.

Evidence of TQM sustainability issues includes high cost of quality and warranty as
shown in the company’s sales and warranty reports, and other internal documents such as scrap
summaries and productivity reports. The participants identified underlying problems related to
the sustainment of TQM as the cause of inconsistency in their processes, and the symptoms of
this discrepancy include reprocessing of parts and overtime work, in some cases, over the weekend. The inability of the practitioners to sustain TQM practices revealed contributors such as complex methodology, concerns with the applicability of the techniques, lack of communication, training, understanding, knowledge, and support. Research findings showed that the impassive employee behavior reflects the practitioner’s response to the TQM sustainment issue when these practices negatively affect achievement of their production goals. The incoherence between TQM practices and production targets creates participant responses that lead to behavioral concerns, most especially when neither production objectives nor quality are achieved due to conflicts. The company’s quality management system in place not only safeguards against nonconforming products and procedures, but also protects process equipment in the manufacturing line.

Practitioners experienced operational constraints due to worn tools, unreliable equipment, and poor process capability, which resulted in lack of observance to proper monitoring, noncompliance to scheduled preventive maintenance, and inattentiveness to quality management system. Research findings showed that it takes multifunctional teams from production, shipping, supply chain, warranty administration, engineering, and product management to reprocess suspect products through non-standard work and change management processes. In agreement with Wei et al. (2019), the sustainment issues with TQM programs could overload the coordination of process-enablers and contribute to the performance failures that can prevent the company from achieving their planned goals. While TQM practices have positive relationships with organizational performance and productivity (Sila, 2018a), and provide tools and methods to reduce errors, waste, and inefficient procedures (Alkhaldi & Abdallah, 2019, 2020), management needs to give full commitment to TQM’s quality standards (Pham, 2020).
The analysis of the data showed that the firmness of TQM methodology, orientation of the organization culture, type of leadership style, and highly competitive strategies and operational targets affected the sustainment of TQM in the site. Data from the study produced relevant information that relates to all research questions and support the conceptual framework initially outlined in the foundation of the research. The findings confirmed the answer to the first research question that failure in sustaining the quality system in place results in high product defects, leading to excessive reject costs and loss in productivity. Based on quality reports, the TQM sustainment issue leads to loss of control and measurement of processes and products in compliance to customer requirements. This supports Nasim’s (2018) claim that the sustainment of TQM influences the operational productivity of organizations, which also affects other dimensions of performance such as financial effectiveness and customer satisfaction. The interviews provide the answer to the second research question, confirming that the TQM methodology is not in complete coherence with the company’s strategic objectives that focus more on business results because of contradictions with its complex and time-consuming activities and measurement processes. It takes more work and time for TQM initiatives to produce benefits that influence performance, making it costly and impractical in the short term (Qasrawi et al., 2017). This complication and suitability issue causes TQM practitioners to lose engagement, involvement, and commitment, as described by Chiarini and Vagnoni (2017).

The answer to the third research question shows that while the organizational culture acknowledges competitiveness as a combination of strategies and quality, it is sensitive to the methodology’s timely results and benefits designed to influence performance. Li et al. (2018) shared this same concern that when changes do start to take place in the business, the sustainment of TQM programs becomes a challenge because management expects immediate
changes from a transformation that usually takes time to produce results. Panuwatwanich and Nguyen (2017) also stressed the same findings that organizations dominated by market and rational cultures do not support a favorable environment for the effective sustainment of TQM compared to cultures controlled by adhocracy or the group-type system. The practitioners raised the awareness to the fourth research question by sharing that the methodology created constraints and overwhelmed operational-enablers through its high frequency, repetitive, and labor-intensive inspection checks. Some practitioners do not see this methodology as a mechanism or tool that would solve recurring problems. They also revealed that the method of processing nonconforming material, data collection, and daily assessments of process issues at quality tollgates were added layers of inspections installed because of the inability of other practitioners to sustain quality procedures.

The research findings aligned with each element in the conceptual framework that contributed to the sustainment issues of TQM in the company. Each input construct such as the TQM methodology, leadership style, organization culture, and competitive strategies has fundamental components that influenced actors in how they sustain the TQM system, which eventually resulted in high costs of quality and low performance. The results also confirmed the presence of anticipated themes that covers CI, DC, HRM, and KM, and have many similarities with the information taken from professional and academic peer-reviewed literatures. Based on the findings of the research, the water treatment company in the southeastern United States experienced TQM sustainability issues that resulted in high product warranty costs, field failure rates, and cost of quality. Even though findings showed that the company supported the development and empowerment of teams to improve the quality of products and processes (Tortorella et al., 2019), there is still an underlying tension and conflict between the concept of
manipulation, control, and empowerment (Banuro et al., 2017). Practitioners confirmed the rigidity of the TQM approach and its requirement of firm observance to its procedures noted by Gözükara et al. (2019), and the sustainment of the approach requires the organizational culture to change, which may be a challenge for the company (Haffar et al., 2019). The TQM model adapted by the company has resulted in different outcomes, because there is no distinct standard that defines TQM and little understanding on what its vital features can do for the company’s specific setting (Chiarini & Vagnoni, 2017). There is a need for an in-depth understanding of the relationship between TQM and the company’s strategic goals to discern how and to what degree investing in TQM practices contributes to realizing sustainable business objectives.

**Application to Professional Practice**

The study showed the importance of establishing coherence of TQM methodology and the organization’s strategic objectives. There is a need for the quality methodology to be made process-based that does not focus on control and sanctions of practitioners; the approach should have more emphasis on management of processes (Moccia, 2016). Maleki-Minbashrazgah and Shabani (2019) suggested that organizations could use DC as a course of action for advancing quality management positions and improving competitive advantage by integrating techniques that help them effectively adjust to dynamic changes in their environment. This can be reinforced by implementation of knowledge management (KM), as suggested by practitioners to help support TQM sustainability efforts. In alignment with Seo et al. (2016), the study revealed that knowledge creation, accumulation, exploration, transaction, and management directly influences quality management activities involving problem-solving and project improvement initiatives that lead to sustained learning. Practitioners noted that application of the TQM methods, policies, and techniques involves committed and dedicated resources, and some organizations do not have
a strategic roadmap supplemented with suitable methods and systems to ensure success with their operations (Chiarini & Vagnoni, 2017). These are the research findings that could benefit or improve the general business practice in the field on quality system sustainability. The study also revealed potential application strategies that could address issues related to organizational conflicts with TQM application, employee engagement, commitment, adaptability, and knowledge sharing that affect the sustainability of the quality management system in the manufacturing industry.

**Improving General Business Practice**

The results of the study showed the importance of establishing coherence of TQM methodology and the organization’s strategic objectives. Based on the interviews and participants’ feedback, the quality management system and the company’s defined set of strategic initiatives need to improve fit and alignment with each other to create a productive environment. The practitioners suggested that the development of TQM alignment to strategic objectives should be viewed as a dynamic and ongoing process in the manufacturing environment instead of a singular best approach. This perspective aligned with McAdam et al.’s (2019, p.200) view that the dynamic alignment of the processes and systems are made by attaining a “quasi” fit instead of an exact fit. The authors further noted that sustaining TQM in the industry may require additional capabilities to reinforce what it takes to achieve it. The findings in the research showed that adherence to the existing TQM system, even though it is manual and operator-dependent, helped in attaining a certain level of quality performance. However, as research evidence suggests, the means that allowed the system’s responsiveness to achieve high-quality performance in the company, may not be the same approach needed to
sustain it. The findings provided observed support for practical guidance in sustaining TQM and quality performance.

Participants surmised that there is a need for the quality methodology to be made process-based and less on being too operator-dependent. This reinforced Moccia’s (2016) claims that quality management should not focus on control and sanctions of practitioners but should have more emphasis on management of processes. This development will require more investment in advanced quality measurement equipment and justification should not only be based on long-term benefits, but also on the practicality of the equipment in supplementing production objectives. This approach addressed Bernardino et al. (2016) and Bugdol’s (2020) concerns where investment in quality creates anxiety for immediate results and causes unwanted apprehension for operations that can ultimately affect commitment from leadership. Practitioners suggested that operations needs to focus their transformation plans not just on speed and cycle time improvements of operations, but also on providing deeper emphasis on improving process capability. The Six Sigma application centers on its capability to reduce variation in processes and understanding the trade-off between the degree of variability reduction and the accruing benefits is important for the sustainment of quality (Antony & Sony, 2019, 2020). Variation reduction in the process is the foundational concept in manufacturing capability, efficiency, productivity, and performance that assists in the long-term sustainment of quality systems (Hussain et al., 2019).

Putri et al. (2018) suggested that DC is the appropriate strategy to maintain the sustainability of a business management system in a company. The company’s capability to integrate, transform, and reorganize internal and external core competences to adapt to rapidly fluctuating manufacturing environments creates patterns from existing practices and knowledge
to allow them to adapt how they operate through changes (Wollersheim & Heimeriks, 2016). The authors further suggested that companies can incorporate DC in their exiting ‘best-in-class’ practices to help sustain quality systems in place. This is in line with Kumar et al.’s (2020b) claim that the dimensions of DC and quality management capabilities have a positive impact on performance; DC helps a company in sustaining its competitiveness and effectiveness in its market’s dynamic environment. Laaksonen and Peltoniemi (2018) explained that DC includes sensing, seizing, and reconfiguring to modify current information to produce new knowledge, which supports the company’s adaptability to change (Su & Linderman, 2016) so they can sustain a consistent quality performance. DC permits the company to detect and seize developing process opportunities and convert these to new value-creating strategies by transforming ordinary capabilities (Laaksonen & Peltoniemi, 2018) to help adapt and align quality systems to the evolving changes. Maleki-Minbashrazgah and Shabani (2019) recommended DC as a course of action for optimizing existing resources, advancing the quality management position, and improving competitive advantage by integrating techniques that help the company effectively adjust to dynamic changes in its environment.

Most practitioners suggested the creation of initiatives to support long-term commitment and motivation of employees to excel, most especially in quality and performance-related initiatives planned by the organization. Süßbauer et al. (2019) suggested using HRM as a strategic management tool for the effective implementation of corporate objectives and sustainability that requires engagement and empowerment by employees at all levels of the organization. The role designs training to advance employees’ skills, knowledge, and abilities, and constructs incentives intended to motivate effort (Baidoun et al., 2018; Lee et al., 2019), which contributes to better quality and performance by increasing employee preference and
involvement in decision-making. Ali et al. (2020b) together with Cho and Linderman (2019) reinforced this concept that HRM promotes standard practices that form a workforce that has important company-specific skills and provides the opportunity to use those abilities successfully through organizational design. The integration of effective HRM practices and sustainment of TQM practices within the business management system supports the company's initiatives to achieve total customer satisfaction and a high level of business performance (Alkhazali et al., 2019). Based on leadership interviews, implementation of KM amongst practitioners will help support TQM sustainability efforts. Calvo-Mora et al. (2016) noted that KM and TQM share the same components such as teamwork, training, empowerment, performance measurement, leadership commitment, benchmarking, and a supportive organizational culture to be successful in their implementation and sustainment. Seo et al. (2016) emphasized that knowledge creation, accumulation, exploration, transaction, and management directly influence quality management activities involving problem-solving and project improvement initiatives that lead to sustained learning.

**Potential Application Strategies**

Chiarini and Vagnoni (2017) noted that application of the TQM methods, policies, and techniques involves committed and dedicated resources, and some organizations do not have a strategic roadmap supplemented with suitable methods and systems to ensure success with their operations. One potential application strategy to address this issue is to have leadership acquire an in-depth understanding of the significance of constructing a suitable organizational culture with a focus on the TQM basic principles (Álvarez-García et al., 2016; Haffar et al., 2019; Nasim, 2018). Polese et al. (2019) suggested that leadership through the HRM has a key role in enabling KM and sharing in TQM methodology, engaging in sustainability practices, enriching
job motivation, and subsequently enhancing performance effectiveness. The authors noted that it is necessary for leadership to understand how the manufacturing elements and TQM fit together to improve the cohesiveness of management control that may result in the successful sustainment of TQM on the company’s processes. Arunachalam and Palanichamy (2017) claimed that sustainment is achievable when manufacturing processes integrate quality management with pure focus on the customers and productivity. Adapting the central purpose of TQM in meeting customer requirements regardless of whether they are external or internal customers (Ratny et al., 2018) meets the primary objective and sustainment of a quality management system.

Total participation is a significant factor in the sustainment of TQM because it motivates employees to innovate and support the company in maintaining its long-term vision and planning (Amin et al., 2017; Dahlgaard et al., 2019; Psomas & Jaca, 2016). This includes employee participation that provides high performance work configurations and incorporates CI efforts with common business operations (Arunachalam & Palanichamy, 2017; Iqbal & Asrar-ul-Haq, 2018). Another potential application strategy is for leadership to facilitate employees’ engagement and involvement in helping restructure the organizational culture that supports the practice of sharing the accountability and responsibility for providing high quality products and services to customers (Alshourah, 2020, 2021; Boikanyo & Heyns, 2019). The envelopment includes employees’ full commitment and a shared mission as motivation for attaining efficient accomplishments in CI and TQM sustainment (Phan et al., 2019; Polese et al., 2019). This strategy requires top management commitment that is extremely important for TQM sustainment in the organization (Mehralian et al., 2016; Ratny et al., 2018; Tsironis, 2018), and supports Deming’s system of profound knowledge that solicit active engagement and commitment to the TQM process (Agrawal, 2019b; Sila & Walczak, 2017; Villanueva, 2018).
DC supports sustainment of new processes by quantifying new strategic designs and initiatives to benefit a quick and timely resolution on concerns like resource allocation, organizational structure changes, process development, and alliances (Putri et al., 2018). Another potential application strategy would be to develop the ability to reconfigure the quality system responses in a timely manner as processes evolve or are being developed to adapt to customers’ changing needs. Laaksonen and Peltoniemi (2018) asserted that this type of transformation strengthens TQM practices to positively influence practitioners’ adaptation to change and complements their overall performance to adjust to customers’ varying demands. The organization needs to have a structured ability to renew their endowment of resources by developing new resources and reinstating the mix of both internal and external resources (Salvato & Vassolo, 2018) to have a reliable mechanism for process adaptation. Putri et al. (2018) stressed that it is a strategic responsibility of management to develop DC to reconfigure effectively whenever any changes occur and to keep up with the needs of re-allocation of resources and realignment of affected systems and processes.

KM is a structured process of configuring, sharing, and retaining of knowledge and experience of employees to give the organization the capability to turn threats into opportunities (Abbas, 2020) and adapt to dynamic changes in the business environment. This strategic organizational resource, which has a significant and positive impact on all the dimensions of TQM, is associated with business success where knowledge sharing supports creation of innovation, process sustainability, and achievement of competitive advantages (Calvo-Mora et al., 2016). The potential application strategy would be to manage TQM and KM as inter-subjective constructs and highlight the importance of building knowledge from experienced workers as strategic sources of TQM sustainment to achieve success based on research findings.
Management has recognized lessons learned and KM as essential and valuable elements of any sustainment process, but do not have enough time to integrate this approach in their regular routine (Backlund & Sundqvist, 2018), which causes significant limitation of any sustainability program. For the application strategy to be successful, the organization needs to create an inclusive work setting and environment that enables team members to share openly and discuss solutions to opportunities, according to participants in the study. Integration of KM benefits the sustainment of any quality management system because it evaluates vital points in quality management applications that assist companies to be more strategically flexible to the dynamic changes in their business environment (Gutierrez-Gutierrez et al., 2018).

**Summary of Application to Professional Practice**

Evidence from the study showed the importance of establishing coherence of TQM methodology and the organization’s strategic objectives. The practitioners suggested that the development of TQM alignment to strategic objectives should be viewed as a dynamic and ongoing process in the manufacturing environment instead of a singular best approach. The perspective aligned with McAdam et al.’s (2019) view that the dynamic alignment of the processes and systems are made by attaining a “quasi” fit instead of an exact fit. The authors added that there is a need for the quality methodology to be made process-based and less on being too operator-dependent. This reinforces Moccia’s (2016) claims that quality management should not focus on control and sanctions of practitioners but should have more emphasis on the management of processes. Putri et al. (2018) suggested that DC is the appropriate strategy to maintain the sustainability of a business management system in a company. The authors suggested that companies can incorporate DC in their exiting ‘best-in-class’ practices to help sustain quality systems in place. This is in line with Kumar et al.’s (2020b) claim that the
dimensions of DC and quality management capabilities have a positive impact on performance; DC helps a company in sustaining its competitiveness and effectiveness in its market’s dynamic environment. Maleki-Minbashrazgah and Shabani (2019) recommended DC as a course of action for optimizing existing resources, advancing the quality management position, and improving competitive advantage by integrating techniques that help the company effectively adjust to dynamic changes in its environment.

The integration of effective HRM practices and sustainment of TQM practices within the business management system supports the company's initiatives to achieve total customer satisfaction and a high level of business performance (Alkhazali et al., 2019). Implementation of KM amongst practitioners will help support TQM sustainability efforts. Seo et al. (2016) emphasized that knowledge creation, accumulation, exploration, transaction, and management directly influences quality management activities involving problem-solving and project improvement initiatives that lead to sustained learning. Chiarini and Vagnoni (2017) noted that application of the TQM methods, policies, and techniques involves committed and dedicated resources, and some organizations do not have a strategic roadmap supplemented with suitable methods and systems to ensure success with their operations. One potential application strategy to address this issue is to have leadership acquire an in-depth understanding of the significance of constructing a suitable organizational culture with a focus on the TQM basic principles (Haffar et al., 2019; Nasim, 2018).

Total participation is a significant factor in the sustainment of TQM because it motivates employees to innovate and support the company in maintaining its long-term vision and planning (Dahlgaard et al., 2019). Another potential application strategy is for leadership to facilitate employees’ engagement and involvement in helping restructure the organizational culture that
supports the practice of sharing the accountability and responsibility for providing high quality products and services to customers (Alshourah, 2020, 2021). This strategy requires top management commitment that is extremely important for TQM sustainment in the organization (Ratny et al., 2018; Tsironis, 2018), and supports Deming’s system of profound knowledge that solicits active engagement and commitment to the TQM process (Agrawal, 2019b). DC supports sustainment of new processes by quantifying new strategic designs and initiatives to benefit a quick and timely resolution on concerns like resource allocation, organizational structure changes, process development, and alliances (Putri et al., 2018). Another potential application strategy would be to develop the ability to reconfigure the quality system responses as processes evolve or are being developed to adapt to customers’ changing needs as suggested by research participants. The organization needs to have a structured ability to renew their endowment of resources by developing new resources and reinstating the mix of both internal and external resources (Salvato & Vassolo, 2018) to have a reliable mechanism for process adaptation. KM is a strategic organizational resource, which has a significant and positive impact on all the dimensions of TQM and is associated with business success where knowledge sharing supports creation of innovation, process sustainability, and achievement of competitive advantages (Calvo-Mora et al., 2016). The potential application strategy would be to manage TQM and KM as inter-subjective constructs and highlight the importance of building knowledge from experienced workers as strategic sources of TQM sustainment to achieve success. According to practitioners, for the application strategy to be successful, the organization needs to create an inclusive work setting and environment that enables team members to share openly and discuss solutions to opportunities.
Recommendations for Further Study

The single case study is limited to the understanding of TQM sustainability challenges in the manufacturing industry and the findings will not be generalizable to other business groups or sectors in the same context. A lack of generalization to a larger scale is a limitation for the use of qualitative research (Du et al., 2020). The data derived from the study originated mainly from the frontline level of manufacturing processes where TQM methodologies are implemented, practiced, and sustained. The results may not be applicable to the businesses’ divisions or segments level of the organization. The formative input and output constructs used in the study might not cover all the underlying dimensions that affect the sustainability issue of TQM in other forms of business. Further study is recommended to investigate a revised model as replication research using different constructs or to utilize applicable data from other industries to examine and compare the generalizability of the outcomes (Su & Linderman, 2016).

More research is also needed specifically on larger corporations with extensive horizontal and vertical segments to fully understand the various challenges of quality management sustainability on an extensive scale. Larger and more complex companies have multifaceted subcultures and diverse groups of employees with different real-world knowledge, awareness, experience, and understanding of their organization’s perceptions of quality management sustainability and how systems co-exist within their environment (Süßbauer et al., 2019). The future study could focus on a broader field of prevailing conflicts between opposing objectives, logics, interests, and missions within one multinational organization or within its line companies. Such conflicts between TQM methodology and its sustainment between multiple participants from three major departments and four functional roles could have different outcomes if taken on a broader scope. This recommendation will encourage several concept designs and perspectives
to be considered and investigated that are pertinent to the sustainment of a quality management system in the manufacturing industry.

Reflections

The impact of the research proposal centered more on cultivating responsibility and accountability, and the actual field study with the participants enhanced one’s emotional intelligence, which included thoughtful understanding and empathizing with other people’s feelings. The data analysis process developed one’s critical thinking, which included listening, questioning viewpoints, articulating, and clarifying beliefs and values while engaging with participants. The dynamics of participating, engaging, empowering, and decision-making that were a part of completing the study, as well as embracing uncertainty, coping with changes, and adapting to them, assisted one in becoming a well-rounded and better person in general. The personal and professional skills developed during the study helped in making one a better leader and employee, as well as a more cognizant, accountable, and productive member of society. Participants in the study conveyed the need of nurturing compassionate behaviors that are consistent with what they believe to be most important when working effectively with their teams. According to Erdvig (2020), when employees and their efforts are appreciated, their engagement, satisfaction, and productivity increases, and they are inspired to sustain and improve their valued performance. The biblical Christian principle of caring that is in line with the most outstanding theme of the Bible, starts with God as the source of caring (Newbanks et al., 2018). Brown (2018) noted that uniting with Christ enabled the self-actualization of human development, and salvation was the remuneration of a person’s union with Christ, where the process of sanctification or redemptive development positively influenced one’s thinking and
emotional patterns. A biblical foundation stresses the intrinsic worth of all individuals and asserts that the dignity and worth of the person is the core value of the profession (Kash, 2020).

**Personal & Professional Growth**

Conducting the research with the participants and support groups has opened a lot of avenues for personal and professional growth. Carrying out the study took a tremendous amount of time, effort, and understanding from the entire support system to achieve the level of accomplishments it was designed to produce. Building the foundation of the research required persistent courage and diligence in exploring, investigating, and examining existing theories, concepts, and constructs that would form the framework of the study (Creswell & Poth, 2018).

The impact of constructing the research proposal on the personal side centered more on responsibility and accountability for every action that would protect the participants and their environment. The actual field study with the participants enhanced one’s emotional intelligence that included thoughtful understanding and empathizing with other people’s feelings, which are key to forming healthy, balanced, and satisfying relationships with them. The data analysis process required critical thinking, which included listening, understanding, testing, questioning viewpoints, articulating, and clarifying beliefs and values while engaging with participants.

Experience with the research has shown how successful it would be by being part of the team. The significance of the support group, from the Dissertation Chair, Committee, Administration, institutional resources, family, friends, and colleagues at work revealed how essential teamwork is for any major endeavor. The dynamics of participating, engaging, empowering, and decision-making that were a part of completing the study, as well as embracing uncertainty, coping with changes, and adapting to them, assisted one in becoming a well-rounded and better person in general (Robson & McCartan, 2016). Trust, commitment, and acceptance
developed the needed confidence that allowed one’s professional attributes to develop and mature. The personal and professional skills developed during the study will help in making one a better leader and employee, as well as a more cognizant, accountable, and productive member of society. The result of the competitive challenge of the study was not only professionally rewarding, but it also gave the researcher a moment of reflection to answer questions relating to the personal betterment of oneself.

**Biblical Perspective**

The majority of the participants in the study conveyed the need of nurturing and promoting compassionate behaviors that are consistent with what they believe to be most important when working and responding effectively with their teams. Along with their desire for respect, admiration, and integrity, they responded to appreciation articulated through recognition of their good contributions because it confirmed that their colleagues and leaders valued their work. According to Erdvig (2020), when employees and their efforts are appreciated, their engagement, satisfaction, and productivity increases, and they are inspired to sustain and improve their valued performance. Employees make choices based off their values, and biblical perspectives help in the understanding of how this worth and these values are used to serve, care, and interact with others in a moral way (Rajamohan, 2021). One concerned participant related,

P22: All employees are already doing the best they can to adapt to the needs of the business, and with the Covid-19 crisis affecting everyone, we have to cover each other to keep things going. It is very important to acknowledge that everybody is already doing the very best that he or she can. It is so hard to care about work when we are stretched thin, but when I see others doing their best to help despite all these challenges, it makes me feel I need to do my share too. Those who care unconditionally inspire me and make
me feel like we are on a mission where every ounce of our contribution counts, and every bit of our efforts makes a difference for everyone. It may almost be biblical to say that I feel I have worth and value as an employee and it motivates me to do more good things for others. This situation helps me redeem myself from all the negativities and actually helps me grow more as an ethical person, while improving my relationship with my co-workers and the Almighty.

The biblical Christian principle of caring that is in line with the most outstanding theme of the Bible, starts with God as the source of caring (Newbanks et al., 2018). Brown (2018) noted that uniting with Christ enabled the self-actualization of human development, and salvation was the remuneration of a person’s union with Christ, where the process of sanctification or redemptive development positively influenced one’s thinking and emotional patterns. In the course of interviews, some participants had the prevailing modality of integrating biblical principles in actions that helped in the deeper understanding of the research problem from their Christian biblical worldview. Consideration of participants’ worldview through inclusion and building of interpersonal relationships at any level by leadership takes advantage of values, judgments, and priorities to strengthen beneficial transformation and success (Curtis, 2018; Thomas et al., 2020). Accounts of the Bible show that God makes known his leadership through his providence to achieve his objective according to his pleasing will, as God is the only source to multicultural diverse leadership (Hah, 2019).

In the participants’ unique experiences, which are influenced by their personal life and culture, self-awareness of inherent worth was important because their values influenced the organization and how the business operated. The capacity for rational thought or individuals’ intellectual development are existent because they are created in the image of God, so that they
can fulfill their main purpose of glorifying God (Brown, 2018). This same capacity induces biblical inspiration and enhances one’s relationship with God (Van der Walt, 2017). A biblical foundation stresses the intrinsic worth of all individuals and asserts that the dignity and worth of the person is the core value of the profession (Kash, 2020). The author further noted that this model is taken from the biblical implication that all individuals are created in the image of God.

**Summary of Reflections**

Constructing the foundation of the study required persistent courage and diligence in exploring existing theories, concepts, and constructs that would form the framework of the study. The effect of the research proposal on the personal side centered more on responsibility and accountability and the actual field study with the participants enhanced one’s emotional intelligence, which included thoughtful understanding and empathizing with other people’s feelings. The data analysis process required critical thinking, which included listening, understanding, testing, questioning viewpoints, articulating, and clarifying beliefs and values while engaging with participants. Experience with the research has shown how successful it would be by being part of the team and the significance of the support group revealed how essential teamwork was for any major endeavor. The dynamics of participating, engaging, empowering, and decision-making that were a part of completing the study, as well as embracing uncertainty, coping with changes, and adapting to them, assisted one in becoming a well-rounded and better person in general. The personal and professional skills developed during the study will help in making one a better leader and employee, and a more cognizant, more accountable, and more productive member of society. The result of the study was not only professionally rewarding, but it also gave the researcher a moment of reflection to answer questions related to the personal betterment of oneself.
Most participants in the study conveyed the need for nurturing and promoting compassionate behaviors that were consistent with what they believed to be most important when working and responding effectively with their teams. According to Erdvig (2020), when employees and their efforts are appreciated, their engagement, satisfaction, and productivity increases, and they are inspired to sustain and improve their valued performance. Employees make choices based off their values, and biblical perspectives help in the understanding of how this worth and these values are used to serve, care, and interact with others in a moral way (Rajamohan, 2021). The biblical Christian principle of caring that is in line with the most outstanding theme of the Bible, starts with God as the source of caring (Newbanks et al., 2018). Brown (2018) noted that uniting with Christ enabled the self-actualization of human development, and salvation was the remuneration of a person’s union with Christ, where the process of sanctification or redemptive development positively influenced one’s thinking and emotional patterns. Consideration of participants’ worldview through inclusion and building of interpersonal relationships at any level by leadership takes advantage of values, judgments, and priorities to strengthen beneficial transformations and success (Curtis, 2018; Thomas et al., 2020). Accounts of the Bible show that God makes known his leadership through his providence to achieve his objective according to his pleasing will, as God is the only source to multicultural diverse leadership (Hah, 2019). A biblical foundation stresses the intrinsic worth of all individuals and asserts that the dignity and worth of the person is the core value of the profession (Kash, 2020). The author further noted that this model is taken from the biblical implication that all individuals are created in the image of God.
Summary of Section 3

The purpose of the research was to understand the sustainability issue of TQM in a water treatment company in the southeastern United States, resulting in high product warranty costs, field failure rates, and cost of quality. The study discussed the relationship of how the findings correlated to each research question, conceptual framework, anticipated theme, literature information, and the research problem. The semi-structured interviews of the participants from different roles revealed varied evidence of TQM sustainability in the water treatment company. The findings confirmed that failure in sustaining the quality system in place resulted in high product defects, leading to excessive reject costs and loss in productivity. This supported Nasim’s (2018) claim that the sustainment of TQM influenced the operational productivity of organizations, which also affected other dimensions of performance such as financial effectiveness and customer satisfaction. The research findings aligned with each element in the conceptual framework that contributed to the sustainment issues of TQM in the company. The results also confirmed the presence of anticipated themes that cover CI, DC, HRM, and KM, and have many similarities with the information taken from professional and academic peer-reviewed literatures.

Based on the findings of the research, the water treatment company in the southeastern United States experienced TQM sustainability issues that resulted in high product warranty costs, field failure rates, and cost of quality. Practitioners confirmed the rigidity of the TQM approach and its requirement of firm observance to its procedures as noted by Gözükara et al. (2019), and the sustainment of the approach requires the organizational culture to change, which may be a challenge for the company (Haffar et al., 2019). The TQM model adapted by the company has resulted in different outcomes, because there was no distinct standard that defined TQM and
little understanding on what its vital features could do for the company’s specific setting (Chiarini & Vagnoni, 2017). The analysis of the data showed that the firmness of TQM methodology, orientation of the organization culture, type of leadership style, and highly competitive strategies and operational targets affected the sustainment of TQM in the site. Each input construct such as the TQM methodology, leadership style, organization culture, and competitive strategies has fundamental components that influenced actors in how they sustain the TQM system, which eventually resulted in high costs of quality and low performance.

Practitioners confirmed the rigidity of the TQM approach and its requirement of firm observance to its procedures noted by Gözükara et al. (2019), and the sustainment of the approach requires the organizational culture to change, which may be a challenge for the company (Haffar et al., 2019). Evidence from the study showed the importance of establishing coherence of TQM methodology and the organization’s strategic objectives. The practitioners suggested that the development of TQM alignment to strategic objectives should be viewed as a dynamic and ongoing process in the manufacturing environment instead of a singular best approach. The perspective aligned with McAdam et al.’s (2019) view that the dynamic alignment of the processes and systems are made by attaining a “quasi” fit instead of an exact fit. The authors added that there is a need for the quality methodology to be made process-based and less on being too operator-dependent. This reinforces Moccia’s (2016) claims that quality management should not focus on control and sanctions of practitioners but should have more emphasis on the management of processes. There is a need for an in-depth understanding of the relationship between TQM and the company’s strategic goals to discern how and to what degree investing in TQM practices contributes to realizing sustainable business objectives.
Chiarini and Vagnoni (2017) noted that application of the TQM methods, policies, and techniques involves dedicated resources, and some organizations do not have a strategic roadmap supplemented with suitable methods and systems to ensure success with their operations. One potential application strategy to address this issue is to have leadership acquire an in-depth understanding of the significance of constructing a suitable organizational culture with a focus on the TQM basic principles (Haffar et al., 2019; Nasim, 2018). Leadership also need to facilitate employees’ engagement and involvement in helping restructure the organizational culture that supports the practice of sharing the accountability and responsibility for providing high quality products and services to customers (Alshourah, 2020, 2021). The authors also noted that management should develop the ability to reconfigure the quality system responses as processes evolve or are being developed to adapt to customers’ changing needs as suggested by research participants. Managing TQM and KM as inter-subjective constructs highlights the significance of building knowledge from experienced workers as strategic sources of sustainment to achieve success.

The single case study is limited to the understanding of TQM sustainability challenges in the manufacturing industry and the findings will not be generalizable to other business groups or sectors in the same context. A lack of generalization to a larger scale is a limitation for the use of qualitative research (Du et al., 2020). The results may not be applicable to the businesses’ divisions or segments level of the organization. Further study is recommended to investigate a revised model as replication research using different constructs or to utilize applicable data from other industries to examine and compare the generalizability of the outcomes (Su & Linderman, 2016). The future study could focus on a broader field of prevailing conflicts between opposing objectives, logics, interests, and missions within one multinational organization or within its line
companies. This recommendation will encourage several concept designs and perspectives to be considered and investigated that are pertinent to the sustainment of a quality management system in the manufacturing industry.

Experience with the research has shown how successful it would be by being part of the team and the significance of the support group revealed how essential teamwork was for any major endeavor. The dynamics of participating, engaging, empowering, and decision-making that were a part of completing the study, as well as embracing uncertainty, coping with changes, and adapting to them, assisted the researcher in becoming a well-rounded person in general. Most participants in the study conveyed the need for nurturing and promoting compassionate behaviors that were consistent with what they believed to be most important when working and responding effectively with their teams. Employees make choices based off their values, and biblical perspectives help in the understanding of how this worth and these values are used to serve, care, and interact with others in a moral way (Rajamohan, 2021). The biblical Christian principle of caring that is in line with the most outstanding theme of the Bible, starts with God as the source of caring (Newbanks et al., 2018). Consideration of participants’ worldview through inclusion and building of interpersonal relationships at any level by leadership takes advantage of values, judgments, and priorities to strengthen beneficial transformations and success (Curtis, 2018; Thomas et al., 2020). A biblical foundation stresses the intrinsic worth of all individuals and asserts that the dignity and worth of the person is the core value of the profession (Kash, 2020).

**Summary and Study Conclusions**

The manufacturing industry has applied the TQM approach to their processes for decades but experienced problems in translating and aligning TQM concepts with their existing
organizational structure (Muruganantham et al., 2018; Wei et al., 2019). The purpose of the study was to understand the sustainability issue of the TQM system in a water-treatment company in the southeastern United States, which has resulted in high cost of quality and low performance. A flexible design single case study was used to discover, explore, and recognize the challenges of sustaining the TQM system in manufacturing processes to provide a complete picture of the phenomenon in its natural setting. The study incorporated triangulating multiple qualitative methods by combining observations and interviews with documentary analysis (Natow, 2020) and used a purposeful sampling strategy to collect information-rich perspectives that had relevance to the phenomenon and research problems under investigation (Ames et al., 2019). The study employed a sample size of 50 participants who were permanent employees of the company for the interview and quality-related documents to gather pertinent information on the TQM sustainability issue. Data collection included evidence from interviews, observations, and archived documents, and was recorded using field notes, observation, and interview protocols. The interpretation process was done by creating the codes and developing the themes from the codes, and then organizing the themes into greater units of constructs to make sense of the collected data (Creswell & Poth, 2018). The reliability and validity of the findings involved careful transcription and frequent verification of the data that was collected during the investigative process, and its trustworthiness was maximized to create defensible results (Cypress, 2017). The study authenticated the contributing and resulting constructs to the TQM sustainability issue by understanding their level of influence and impact on the site.

The research findings aligned with each element in the conceptual framework that contributed to the sustainment issues of TQM in the company. The results confirmed the presence of anticipated themes that cover CI, DC, HRM, and KM, and have many similarities
with the information taken from professional and academic peer-reviewed literatures. Based on the findings of the research, the water treatment company in the southeastern United States experienced TQM sustainability issues, which resulted in high product warranty costs, field failure rates, and cost of quality. Practitioners confirmed the rigidity of the TQM approach and its requirement of firm observance to its procedures as noted by Gözükara et al. (2019), and the sustainment of the approach requires the organizational culture to change, which may be a challenge for the company (Haffar et al., 2019). The analysis of the data showed that the firmness of TQM methodology, orientation of the organizational culture, type of leadership style, and highly competitive strategies and operational targets affected the sustainment of TQM in the site. Each input construct such as the TQM methodology, leadership style, organizational culture, and competitive strategy has fundamental components that influenced actors in how they sustain the TQM system, which eventually resulted in high costs of quality and low performance.

There is a need for an in-depth understanding of the relationship between TQM and the company’s strategic goals to discern how and to what degree investing in TQM practices contributes to realizing sustainable business objectives. One potential application strategy to improve TQM sustainability is to have leadership acquire an in-depth understanding of the significance of constructing a suitable organizational culture with a focus on the TQM basic principles (Haffar et al., 2019; Nasim, 2018). Leadership also needs to facilitate employees’ engagement and involvement in helping restructure the organizational culture that supports the practice of sharing the accountability and responsibility for providing high quality products and service to customers (Alshourah, 2020, 2021). The author also noted that management should develop the ability to reconfigure the quality system responses as processes evolve or are being developed to adapt to customers’ changing needs as suggested by research participants.
Managing TQM and KM as inter-subjective constructs highlights the significance of building knowledge from experienced workers as strategic sources of sustainment to achieve success.

Most participants in the study conveyed the need for nurturing and promoting compassionate behaviors that were consistent with what they believed to be most important when working effectively with their teams. Employees make choices based off of their values, and their biblical perspectives help in the understanding of how this worth and these values are used to serve, care, and interact with others in a moral way (Rajamohan, 2021). Consideration of participants’ worldview through inclusion and building of interpersonal relationships at any level by leadership takes advantage of values, judgments, and priorities to strengthen beneficial transformations and success (Curtis, 2018; Thomas et al., 2020). A biblical foundation stresses the intrinsic worth of all individuals and asserts that the dignity and worth of the person is the core value of the profession (Kash, 2020). The single case study is limited to the understanding of TQM sustainability challenges in the manufacturing industry and the findings would not be generalizable to other business groups or sectors in the same context. Further study is recommended to investigate a revised model as replication research using different constructs or to utilize applicable data from other industries to examine and compare the generalizability of the outcomes (Su & Linderman, 2016). The future study could focus on a broader field of prevailing conflicts between opposing objectives, logics, interests, and missions within one multinational organization or within its line companies.
References


Ershadi, M. J., Najafi, N., & Soleimani, P. (2019). Measuring the impact of soft and hard total quality management factors on customer behavior based on the role of innovation and


https://doi.org/10.1108/ijlss-08-2017-0094


https://doi.org/10.1108/BIJ-01-2019-0037

https://doi.org/10.1016/j.jclepro.2016.12.048


material methods. *International Journal of Qualitative Methods, 17*(1),
160940691878636. https://doi.org/10.1177/1609406918786362
Maistry, K., Hurreeram, D. K., & Ramessur, V. (2017). Total quality management and
innovation: Relationships and effects on performance of agricultural R&D organizations.
https://doi.org/10.1108/IJQRM-04-2015-0061
Malek, J. (2019). The appropriate role of a clinical ethics Consultant’s religious worldview in
s10730-018-9363-6
manufacturing enablers. *Journal of Cleaner Production, 238*, 117996.
https://doi.org/10.1016/j.jclepro.2019.117996
performance: Natural-resource-based view and dynamic capabilities paradigm.
*Management of Environmental Quality, 30*(1), 137-156. https://doi.org/10.1108/MEQ-
07-2017-0073
Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview
studies: Guided by information power. *Qualitative Health Research, 26*(13), 1753-
1760. https://doi.org/10.1177/1049732315617444
Manankil-Rankin, L. (2016). Moving from field text to research text in narrative inquiry: A
10.1177/0844562116684728


Newham, J., Schierhout, G., Bailie, R., & Ward, P. R. (2016). 'There’s only one enabler; come up, help us': Staff perspectives of barriers and enablers to continuous quality improvement in aboriginal primary health-care settings in South Australia. *Australian Journal of Primary Health, 22*(3), 244-254. https://doi.org/10.1071/PY14098


evidence from international manufacturing plants. *Sustainability (Basel, Switzerland), 11*(11), 3093. https://doi.org/10.3390/su11113093


Ravitch, S. M., & Mittenfelner Carl, C. N. (2016). *Qualitative research: Bridging the conceptual, theoretical, and methodological*. Sage


Scheffelaar, A., Bos, N., Triemstra, M., de Jong, M., Luijkx, K., & van Dulmen, S. (2020). Qualitative instruments involving clients as co-researchers to assess and improve the


ophthalmologic patients. *Patient Preference and Adherence, 10*, 993-1002.

https://doi.org/10.2147/PPA.S101584


Yang, H., & Van Gorp, B. (2019). Framing the Asian infrastructure investment bank: A qualitative analysis of the political debate and media coverage on a China-led multilateral
297


Appendix A: Interview Guide for Participants with Leading Roles

<table>
<thead>
<tr>
<th>Date:</th>
<th>Place:</th>
<th>Time:</th>
<th>Interviewer:</th>
</tr>
</thead>
</table>

Interview Protocol Project: Sustainability Issue of the Total Quality Management (TQM) System in the Manufacturing Industry

Interviewee (Participant): | Years with Company: | Position of Interviewee: |
|---------------------------|---------------------|--------------------------|

Brief of the Project:

The aim of the project is to understand the sustainability issue of the TQM system in the company that results in high product warranty cost, field failure rates, and cost of quality.

Interview Question 1: How are quality management practices integrated into the company’s strategic goals?

Interview Question 2: How does management measure the effects of quality management practices in their processes, and in what way does management respond to the results of this measurement?
<table>
<thead>
<tr>
<th>Interview Question 3:</th>
<th>How are quality-related initiatives designed to support productivity goals and targets?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Question 4:</td>
<td>Why is it important to align quality related projects with the company’s operational objectives?</td>
</tr>
<tr>
<td>Interview Question 5:</td>
<td>How are quality initiatives aligned to the company’s core practices and values?</td>
</tr>
<tr>
<td>Interview Question 6:</td>
<td>In what way is employee performance tied to quality management practices?</td>
</tr>
<tr>
<td>Interview Question 7:</td>
<td>How does the company implement system thinking and sustainability practices to support specific quality practices either through lean and continuous improvement activities?</td>
</tr>
</tbody>
</table>
Appendix B: Interview Guide for Participants with Practicing Roles

<table>
<thead>
<tr>
<th>Date:</th>
<th>Place:</th>
<th>Time:</th>
<th>Interviewer:</th>
</tr>
</thead>
</table>

Interview Protocol Project: Sustainability Issue of the Total Quality Management (TQM) System in the Manufacturing Industry

Interviewee (Participant): | Years with Company: | Position of Interviewee: |
|----------------------------|---------------------|-------------------------|

Brief of the Project:
The aim of the project is to understand the sustainability issue of the TQM system in the company that results in high product warranty cost, field failure rates, and cost of quality.

Interview Question 1: How do TQM activities affect your job performance?

Interview Question 2: Can you explain the benefits and challenges of sustaining TQM practices in your job?

Interview Question 3: How is the sustainment of TQM activities practical to your job?
Interview Question 4: How does the quality of support you receive influence the way you sustain TQM practices?

Interview Question 5: How do your leaders support and recognize you in sustaining TQM practices?

Interview Question 6: In what way do you feel engaged or empowered to improve TQM activities?

Interview Question 7: Is there a specific TQM activity that prevents you from achieving your target? If so, why is this practice an issue?
Interview Guide for Participants with Supporting Roles

<table>
<thead>
<tr>
<th>Date:</th>
<th>Place:</th>
<th>Time:</th>
<th>Interviewer:</th>
</tr>
</thead>
</table>

Interview Protocol Project: Sustainability Issue of the Total Quality Management (TQM) System in the Manufacturing Industry

<table>
<thead>
<tr>
<th>Interviewee (Participant):</th>
<th>Years with Company:</th>
<th>Position of Interviewee:</th>
</tr>
</thead>
</table>

Brief of the Project:

The aim of the project is to understand the sustainability issue of the TQM system in the company that results in high product warranty cost, field failure rates, and cost of quality.

Interview Question 1: How do you address recurring quality findings reported from the production floor?

Interview Question 2: Why is it important to support the associates in the sustainment of TQM practices?

Interview Question 3: How do your current training and skills help you respond appropriately to the quality needs of manufacturing?
<table>
<thead>
<tr>
<th>Interview Question 4: Why is proper guidance and information important in addressing quality problems?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Question 5: How would you describe your workload in supporting quality-related activities?</td>
</tr>
<tr>
<td>Interview Question 6: How are priorities defined when supporting the quality needs of operations?</td>
</tr>
<tr>
<td>Interview Question 7: How do you determine the appropriateness of your responses to a specific quality issue that needs to be addressed without creating constraints in operation?</td>
</tr>
</tbody>
</table>
## Appendix D: Interview Guide for Participants with Receiving Roles

<table>
<thead>
<tr>
<th>Date:</th>
<th>Place:</th>
<th>Time:</th>
<th>Interviewer:</th>
</tr>
</thead>
</table>

Interview Protocol Project: Sustainability Issue of the Total Quality Management (TQM) System in the Manufacturing Industry

<table>
<thead>
<tr>
<th>Interviewee (Participant):</th>
<th>Years with Company:</th>
<th>Position of Interviewee:</th>
</tr>
</thead>
</table>

**Brief of the Project:**

The aim of the project is to understand the sustainability issue of the TQM system in the company that results in high product warranty cost, field failure rates, and cost of quality.

**Interview Question 1:** How do you handle recurring customer complaints related to quality?

**Interview Question 2:** How are these quality issues affecting warranty returns and sales?

**Interview Question 3:** How do quality related problems continue to be a challenge with your job?
<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Question 4: Why are these quality issues reaching the customers?</td>
</tr>
<tr>
<td>Interview Question 5: How does the company’s customer orientation affect the way you serve clients?</td>
</tr>
<tr>
<td>Interview Question 6: How do the customer support structures in the company help you do your job?</td>
</tr>
<tr>
<td>Interview Question 7: Is there a specific quality issue that stands out from the rest? How does this specific quality issue affect your job performance?</td>
</tr>
</tbody>
</table>
## Observation Protocol

<table>
<thead>
<tr>
<th>Observation Form</th>
<th>Department:</th>
<th>Date:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Shift:</th>
<th>Standard Operating Procedure – Manufacturing Process</th>
<th>Participant:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Descriptive Notes

<table>
<thead>
<tr>
<th>Station 1</th>
<th>Reflective Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Station 2</th>
<th>Reflective Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Station 3</th>
<th>Reflective Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Station 4</th>
<th>Reflective Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Layout of Cell

<table>
<thead>
<tr>
<th>Additional Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
Appendix F: Pearson Correlation Coefficient