Leadership Characteristics as Predictors of Juran Trilogy Principles and Influence on Leaders' Business Decisions

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This research examined the relationships among leadership styles, traits, ethics, and Juran Trilogy principles. A non-probability, purposive sampling approach was used to collect survey data from 91 leaders responsible for influencing organizational quality decisions in industries such as manufacturing, business, healthcare, and others. A correlational research design was used to examine how leadership influences business decisions and if there was a preference for leadership styles over leadership traits and whether ethics and ethical leadership affect these preferences. The results indicate that leadership traits have a significant and positive impact on the components of the Juran Trilogy, whereas leadership and duty ethics have a significant and positive impact on quality. The research findings provide useful information that may assist businesses in developing and growing organizational leaders capable of effectively influencing organizational decisions.

Keywords: leadership characteristics, leadership styles, leadership traits, leadership ethics, Juran Trilogy principles, consumers, goods

INTRODUCTION

With the ever-expanding boundaries of globalization, quality, and quality products are in a state of uncertainty (Bruccoleri et al., 2019; Cho et al., 2015; Holijah, 2020; Juran, 1986a). Quality concerns left unchanged and unmanaged, with the root causes of those concerns not adequately identified, result in unethical behaviors, poor leadership, and poor quality of goods (Antonopoulos et al., 2017). These ethical lapses increase the probability of harm and safety concerns to consumers and the potential for the loss of consumers due to poor quality and the unfitness of goods. To address systemic concerns surrounding the state of uncertainty within the context of globalization, quality, and quality products, organizations can seek opportunities to understand better which leadership characteristics may serve as predictors of the various components of the Juran Trilogy (i.e., quality planning, quality control, and quality improvement) of Total Quality Management (TQM). When organizations have a better understanding of how leadership characteristics interact with quality principles, businesses can better adapt and succeed.

TQM cultivates a strong leadership commitment dedicated to building an organizational quality culture and increasing customer satisfaction levels (Kessler, 2013). Notably, TQM is a process of ameliorating efficacy issues of an entire organization allowing for each business section to work together harmoniously (Dahlgaard-Park, 2015). Further analysis of these leadership characteristics can help organizations assess the traits and styles of persons placed in leadership positions related to TQM, especially related to Juran

Trilogy principles. An additional review of ethical leadership and ethics also directs organizations to reinforce ethical leadership in the area of TQM by encouraging their leaders to do what is right.

A company's organizational success depends on its leadership structure and leaders to implement solid quality management to create a customer-focused organization. Further, these leaders must look past organizational culture and stock prices to make strategic, long-term decisions for all stakeholders through social and ethical behavior. Leaders are responsible for emphasizing corporate goals that do not negatively affect or influence the group (Northouse, 2016). Therefore, leadership and quality management are paramount for organizational growth and success.

This study sought to understand the relationship between individual leadership characteristics (leadership styles, leadership traits, leadership ethics), and the Juran Trilogy (quality planning, quality control, and quality improvement). Exploring these relationships helps inform leaders about the extent to which product quality is related to leadership styles, leadership traits, and leadership ethics. This study further shows how leadership influences business decisions that affect the quality and the safety of goods that consumers use. When leaders have a better understanding of the relationship between leadership styles, leadership traits, leadership ethics, and the Juran Trilogy, organizations are better able to address consumer quality and safety concerns and maintain profitability. This study is timely because there is a need to understand leadership's awareness of quality, the cost of poor quality, and an overall crisis in quality disciplines (Caldwell, 2009; Gok et al., 2017; Juran, 1986a). The study was undertaken with the intent that insights regarding the relationship between the leadership characteristics variables and the Juran Trilogy quality principles could inform professional preparation and ongoing development and policies.

This study focused on numerous sectors, though industries like healthcare, manufacturing, the automotive industry, and food made up a large part of the study's population due to their substantial effect on consumer satisfaction and because goods from these sectors are measurable, traceable, and can be recalled. These sectors have a significant effect on most consumers' health, well-being, and quality of life (International Labor Organization [ILO], 2021; Miller & Sirgy, 2011; Nesheim et al., 2015). The research positions customers as central to organizational success and the use of TQM as a best practice for maintaining organizational effectiveness and consumer satisfaction (Ehigie & McAndrew, 2005).

BACKGROUND AND PROBLEM STATEMENT

Joseph M. Juran introduced what has become known as the Juran Trilogy at the ASQC 40th Annual Quality Congress in 1986 as the tools and principles constructed to help recede the tide of poor quality (Juran, 1986b). The Juran Trilogy constructs include quality control, quality planning, and quality improvement as a foundation for organizational quality management. These three tenets are based upon Juran's view that quality must be planned, rather than occurring by accident, and that leaders need to control product and performance variations, establish quality plans, and continually improve organizational processes and systems to develop better quality products (Howarth & Greenwood, 2018; Juran, 1988; Juran & De Feo, 2010; Juran & Godfrey, 1998). The rates of nonconforming products and the cost of poor quality, as it relates to understanding Juran Trilogy, bring into question issues related to leadership, leadership styles, leadership traits, and leadership ethics. Leaders and teams are responsible for cost-effectiveness and productively managing the successful integration of the Juran Trilogy principles (quality planning, quality control, and quality improvement) into the production of consumer goods and products. This integration improves quality and efficiency so that companies can better compete in their respective markets.

This study is timely because there is a need to increase leadership's awareness of the decline in quality and increase in poor quality costs, coupled with a need for transformational changes within Western management styles (Deming, 2000; Gao et al., 2011; Juran, 1986a; Shiramizu & Singh, 2007; Wood & Wood, 2005). Within the healthcare, food, and automotive industries, organizational leaders can better understand quality challenges as these industry sectors provide measurable and traceable goods (Dunchenko et al., 2018; Ettorchi-Tardy et al., 2012; Hibbert et al., 2020; National Highway Traffic Safety Administration [NHTSA], 2018). The ability of goods to be measurable, traceable, and in some cases recalled, does put barriers in place, and limits the ability of leadership characteristic flaws to bypass

organizational constraints and systematic checks and balances. That said, even within these industries, some goods cannot be recalled, demonstrating the importance of quality.

Global competition from other businesses often requires producing and selling at lower costs, resulting in a negative shift in the TQM of goods sold worldwide (Tisdell, 2008). In general, businesses will continue to seek ways to compete in an ever-growing global market, with potential narrow margin results. As companies try to remain competitive, consumers still need to trust the quality of their goods, especially goods that affect public safety. Ethical behaviors and strong leadership characteristics will be needed to adhere to TQM principles.

One key consideration that has emerged related to the negative shift in TQM is leadership characteristics. According to Kumar and Sharma (2017), leadership characteristics are a significant factor in achieving TQM. However, it is not known the extent to which nonconforming products reflect differences in leadership styles, leadership traits, and leadership ethics.

There are many schools of thought on leadership, and leadership styles and traits are often categorized together under the umbrella term leadership characteristics. While terminology like leadership styles and leadership traits are commonly conflated, these two characteristics are intrinsically distinct. The leadership traits theory focuses on a leader's personality traits, such as how these leaders purport to feel, comport, and think. In contrast, the concept of leadership styles can be identified as the behavior patterns of leaders who attempt to influence others and their results through the motivation and guidance of their followers (Kessler, 2013; Northouse, 2016).

For the purposes of this study, the researcher explored the relationship among leadership styles, leadership traits, leadership ethics, and the Juran Trilogy as it relates to quality planning, quality control, and quality improvement. Initial data analyses produced supplemental research questions to more fully consider the individual components of the Juran Trilogy (quality planning, quality control, and quality improvement) as distinct variables against the measures of leadership style, leadership traits, and leadership ethics as one measure called "leadership characteristics".

Conceptual Framework

Increased competition from global competitors who produced and sold items at lower costs has resulted in a negative shift in the quality of goods sold worldwide (Antonopoulos et al., 2017). In addition, fraudulent business practices have emerged as poor-quality products have been manufactured and sold in the global market. Furthermore, the modern global economy requires a high level of consumer trust in products because many products that have migrated into the United States' supply chain—including lifesaving medications, critical car parts that affect public safety, and defense products—ship from overseas factories (Antonopoulos et al., 2017).

Organizational leadership must be the driver of cultural shifts. Leadership is a progression of actions that affect a core group of individuals. Ethical and moral issues are important to consumers because different leaders' intentions may not be the same. Leaders are responsible for emphasizing corporate goals that do not negatively affect or influence the group (Northouse, 2016). Therefore, to achieve organizational growth and success, strong leadership guidance and a quality management focus and culture are imperative.

This study explored whether leadership characteristics (for the purposes of this study, defined as comprising leadership styles, traits, and ethics) influence organizational decisions that lead to the production and delivery of low-quality goods. Furthermore, the study surveyed whether there may be an association between these three respective leadership characteristics and TQM, and if there are any influencing decisional factors in the potential relationship between leadership characteristics and TQM. This study sought to aid in the evaluation of whether the Juran Trilogy influences this relationship.

A variety of leadership theories were explored to develop the conceptual framework for this study. The trait theory of leadership was introduced in 1841 by Thomas Carlyle, with the great man theory of leadership, and has been further developed by theorists Carlyle, Galton, and Stogdill (Raza & Sikandar, 2018). Max Weber introduced transactional leadership theory in 1947, which was further developed by Bernard Bass in 1981 (Duemer, 2017). Burns (1978) and Bass (1985) offered a comparative analysis of the transformational theory of leadership (Kessler, 2013). Immanuel Kant introduced ethical leadership theory

in works published between 1785 and 1797. Theorists including Mill, Northouse, Rawls, Ross, Sidgwick, and Wood further developed ethical leadership theory (Mill, 1861/2001; Northouse, 2016; Rawls, 1971; Ross, 1954; Sidgwick, 1981; Wood, 1999, 2008).

The Juran Trilogy's introduction in 1986 was the beginning of a new era in quality control and quality leadership. Juran's request was for leaders to take up the mantle of leadership and contribute to the change of quality improvement (Juran, 1986a). The Juran Trilogy's primary influence on quality, and the research surrounding the discipline, focused on three central points of quality control, quality planning, and quality improvement. Wood and Wood (2005) expounded on the trilogy and its potential effects, advocating the Juran Trilogy as an acknowledgment that there is a crisis in quality, that the crisis is not immediately going away, and that innovation and new approaches to problem-solving are necessary. Wood and Wood called for tradition to be cast aside, creating a new global approach, committed management, and asserted that managerial excuses should not be accepted.

Quality management systems are the foundation of any organization that is quality-centric, customer-focused, in which data are key to the business's success, and leadership can make proper managerial decisions. Moreover, organizational success is rooted in the Juran Trilogy and is a baseline for organizational success. It is key to helping leaders make educated business decisions based upon fact (Juran, 1989; Juran & Godfrey, 1998; Juran, 1986b). There are many theorists in the quality discipline, including Ishikawa, Deming, Shewhart, Juran, Feigenbaum, Crosby, Taguchi, Taylor, Shingo, Goldratt, and Ohno (Kumar et al., 2018). The foundational work created by theorists helped develop tools that leaders use to implement organizational change in the quest for organizational success.

Many studies have examined leadership styles, quality planning, control, and improvement (the Juran principles), and TQM within various settings and in various countries (Alharb & Yusoff, 2012; Alloubani et al., 2019; Cho & Jung, 2014; Laohavichien et al., 2011; McFadden et al., 2015; Sfantou et al., 2017). In exploring leadership styles, most of these studies focused on the transformational leadership style. According to Kumar and Sharma (2017), selecting the appropriate leadership style is the most significant factor for achieving TQM. The transformational leadership style is associated with positive outcomes in TQM, continuous improvement, and innovation. Organizational leadership is still charged with doing the right thing, promoting quality in the organization, and guiding change.

Leaders must understand the different traits and characteristics defined in the leadership trait theory and have knowledge and understanding of transformational leadership to continue to develop and grow as leaders. Research on effective leadership has produced theories that include the theory of behavioral styles, as introduced by Lindell and Rosenqvist (1992). Additionally, extant research includes the transformational or charismatic leadership theories introduced by Bass and Avolio (1994) and reintroduced by Klein and House (1995). In response to the studies mentioned previously, Graen and Uhl-Bien (1995) developed the leader-member exchange theory (Mumford et al., 2000). The aforementioned theories are focused on behavior patterns and implications associated with leader performance and have helped align leadership studies and the development of other theories and research associated with leadership. Leader trait evolution has emerged from other views of leadership. Furthermore, the conversations associated with leader traits tend to end with an analysis of the trait's ambiguity. Zaccaro et al. (2004) posited that "leader traits contribute significantly to the prediction of leader effectiveness, leader emergence, and leader advancement" (p. 119). Effective leadership is central to leaders' growth; leaders with an understanding of the different attributes defined in the leadership trait theory are better able to grow and advance.

Understanding the relationships between leadership ethics and accompanying leadership characteristics (e.g., leadership traits and leadership styles) helps leaders develop better relationships with followers and subordinates, as well as better understand their need to do what is ethically correct. Schuh et al. (2013) explored the relationship between the combined effects of transformational leadership, authoritarian leadership activities, and moral leadership activities, revealing that the effects of moral leadership associated with transformational leadership behaviors could strengthen the behaviors of followers' in-role and extra-role efforts while heightening the antagonistic effects of authoritarian leadership. Adverse consequences occur if leaders discount moral and authoritarian aspects while promoting the virtues of

transformational leadership. Additionally, the practices focused on augmenting moral leadership behaviors while decreasing authoritarian conduct behavior, which is essential in organizations (Schuh et al., 2013).

Research Questions

Based on a comprehensive review of the extant literature, the following research questions were identified.

RQ1. *What is the relationship between leadership styles and the Juran Trilogy (quality planning, quality control, and quality improvement)?*

RQ2. *What is the relationship between leadership traits and the Juran Trilogy (quality planning, quality control, and quality improvement)?*

RQ3. *What is the relationship between leadership ethics and the Juran Trilogy (quality planning, quality control, and quality improvement)?*

After initiating the data analysis phase of the research, supplemental research questions were developed to more fully consider the individual components of the Juran Trilogy (quality planning, quality control, and quality improvement) as distinct variables against the measures of leadership style, leadership traits and leadership ethics as one measure called "leadership characteristics." The three supplemental research questions used were:

SRQ1. *What leadership characteristics (leadership styles, leadership traits, and leadership ethics) are predictors of the quality planning variable of the Juran Trilogy?*

SRQ2. *What leadership characteristics (leadership styles, leadership traits, and leadership ethics) are predictors of the quality planning control variable of the Juran Trilogy?*

SRQ3. *What leadership characteristics (leadership styles, leadership traits, and leadership ethics) are predictors of the quality improvement variable of the Juran Trilogy?*

Identification of Variables

The independent variables identified for this study were:

- IV1. Leadership styles (MLQ);
- IV2. Leadership traits (LTQ); and
- IV3. Leadership ethics (ELSQ).

The dependent variables selected were:

- DV1. Juran Trilogy (JT);
- DV2. Quality planning (JT-QP);
- DV3. Quality control (JT-QC); and
- DV4. Quality improvement (JT-QI).

Hypotheses

Based on these objectives and variables, hypotheses were formulated for several different purposes, described in the following subsections.

To Test the Relationship Between Leadership Styles and the Juran Trilogy

$H1_{1a}$. *There is a significant relationship between leadership styles and the Juran Trilogy (i.e., quality planning, quality control, and quality improvement)*

$H1_{1b}$. *There is a significant relationship between leadership styles and the quality planning component of the Juran Trilogy.*

$H1_{1c}$. *There is a significant relationship between leadership styles and the quality control component of the Juran Trilogy.*

$H1_{1d}$. *There is a significant relationship between leadership styles and the quality improvement component of the Juran Trilogy.*

To Test the Relationship Between Leadership Traits and the Juran Trilogy

$H1_{1a}$. *There is a significant relationship between leadership traits and the Juran Trilogy (i.e., quality planning, quality control, and quality improvement)*

$H1_{1b}$. *There is a significant relationship between leadership traits and the quality planning component of the Juran Trilogy.*

$H1_{1c}$. *There is a significant relationship between leadership traits and the quality control component of the Juran Trilogy.*

$H1_{1d}$. *There is a significant relationship between leadership traits and the quality improvement component of the Juran Trilogy.*

To Test the Relationship Between Leadership Ethics and the Juran Trilogy

$H1_{1a}$. *There is a significant relationship between leadership ethics and the Juran Trilogy (i.e., quality planning, quality control, and quality improvement)*

$H1_{1b}$. *There is a significant relationship between leadership ethics and the quality planning component of the Juran Trilogy.*

$H1_{1c}$. *There is a significant relationship between leadership ethics and the quality control component of the Juran Trilogy.*

$H1_{1d}$. *There is a significant relationship between leadership ethics and the quality improvement component of the Juran Trilogy.*

METHODOLOGY

This research utilized a correlational research design to explore the extent to which there was a relationship between leadership characteristics (leadership traits, leadership styles, and leadership ethics), and the Juran Trilogy quality principles (quality planning, quality control, and quality improvement). A correlational design was used to consider the consequences or significance of the relationship between two or more variables and further investigate whether these variables are related (Rumrill et al., 2011). The choice to employ correlational research helped the researcher avoid proposing any assumptions or analysis of a desirable leadership characteristic.

Sample

This study utilized a non-probability, purposive sampling approach. The population for this study consisted of organizational leaders who influence organizational product quality decisions within several industries, including manufacturing, business, healthcare, the automotive industry, and others. Participants

held titles including CEO, President, Vice-President, Director, Quality Manager, and Research and Development Manager, to name a few. The inclusion criteria limited the population set to leaders who influence organizational quality decisions and product quality. Study participants were recruited from multiple professional associations, including the American Society for Quality, the Institute of Industrial and Systems Engineers, and the Society of Manufacturing Engineers (SME), as well as from the researcher's participation on social media sites associated with these associations and professional communities of practice and inclusion on associated mailing lists. These organizations were chosen due to their influence on the promotion of quality principles, manufacturing technology, technological innovation, and the design and improvement of systems and products in workplaces. The size of the sample for a correlation analysis exceeded 30 participants per variable, and the confidence interval for the population mean was set at a 95% confidence level.

Survey Instrument

A questionnaire was developed from a variety of existing instruments. The Leadership Trait Questionnaire (LTQ) measures the personal characteristics of leadership and provided 14 five-point Likert-scale questions for this survey (Northouse, 2018); 10 seven-point Likert-scale questions were derived from the Ethical Leadership Style Questionnaire (ELSQ), which measures six types of ethical practices: (1) duty ethics, (2) utilitarian ethics, (3) virtue ethics, (4) caring ethics, (5) egoism ethics, and (6) justice ethics (Northouse, 2018). The MLQ-5X-Short measures a range of leadership types: (1) idealized attributes (IA), (2) inspirational motivation (IM), (3) management by exception (active) (MBEA), (4) individual consideration (IC), (5) idealized behaviors (IB), (6) intellectual stimulation (IS), and (7) contingent reward (CR) (Avolio & Bass, 2004). From this instrument, 28 six-point Likert-scale questions were added to the survey for this study. And finally, the Juran Trilogy Survey added three additional three-point Likert-scale questions. This instrument produces Juran Trilogy frequencies (not passing, passing, and good) and are considered performance rating indicators that measure how leaders view / judge the performance levels of their organizations against the Juran Trilogy principles (Juran, 1989).

The Leadership Trait Questionnaire (LTQ), the Ethical Leadership Style Questionnaire (ELSQ), the Juran Trilogy Survey, and the Multifactor Leadership Questionnaire (MLQ-5X-Short) survey instruments were used for the collection of data related to leadership traits, leadership ethics, Juran Quality Trilogy principles, and leadership styles. All permissions for use of the instruments were received by the researcher from the authors or managing entities. Additionally, 12 demographic questions were added by the researcher.

Data Collection

The survey was created and distributed using an online survey system. Invitations were sent electronically, with periodic email reminders. The survey link was automatically closed by the survey application after 30 days. Participant's information was collected in such a way as to maintain the highest level of privacy. Aggregate data was exported from the survey software into statistical software for data analysis.

RESULTS

Data Analyses

Descriptive and inferential statistical tests were calculated using statistical software to determine relationships and significance among the independent and dependent variables. The descriptive analysis looked at frequencies and proportions relating to each of the variables measured on the nominal or ordinal scale measurements. Measures of central tendency (mean and median) and measures of variability were reported for the continuous measures included in this study. Additionally, skewness and kurtosis were also calculated and reported to present an indication of the level of normality present with respect to these measures (Argyrous, 2014; Wheeler, 2011). For the purposes of answering this study's research questions, bivariate analyses, represented by Spearman's correlations, were conducted between the Juran Trilogy

principles, because they were ordinal and would have violated the normality assumption of Pearson's correlation, and the various measures of leadership included in this study (Hauke & Kossowski, 2011; Sekaran and Bougie, 2016). A series of ordinal logistic regressions with associated Brant (1990) tests of the assumption of parallel lines were also conducted in order to explore this study's research questions further, and to examine the impact of each of these independent variables while holding all other predictors in the model constant.

Relationship Between Leadership Styles and the Juran Trilogy

The results indicate a statistically significant relationship between quality planning and transformational leadership styles. The findings also revealed a positive and moderate correlation between quality control and transformational leadership styles and a positive and weak correlation between quality control and transactional leadership styles. There was also a moderate positive correlation with transformational leadership styles, and positive and weak correlations with the remaining measures found to be significantly correlated with quality improvement.

A series of Spearman's rank correlations were conducted to examine the associations between the Juran Trilogy and leadership styles, as well as between the Juran Trilogy and the Multifactor Leadership Questionnaire (MLQ). Table 1 reports calculations for all Spearman rank correlations for the three Juran principles of quality planning, quality control, and quality improvement, with the individual leadership styles in the MLQ. The initial set of Spearman's rank correlations conducted with quality planning found statistical significance with respect to inspirational motivation, $\rho\ (89) = .283$, $p < .01$, and management by exception (Active), $\rho(89) = .198$, $p < .05$. This correlation, while weak, indicated a significant and positive association between quality planning and inspirational motivation. For the Spearman's rank correlations conducted for quality control, significance was indicated with respect to the correlations conducted with inspirational motivation, $\rho(89) = .325$, $p < .01$, idealized attributes, $\rho(89) = .205$, $p < .05$, and contingent reward, $\rho(89) = .209$, $p < .05$. These results indicate a positive and moderate association between quality control and inspirational motivation and a positive and weak association between quality control and contingent reward. The final set of correlations conducted with the MLQ focused upon the third component of the Juran Trilogy, quality improvement. Among this set of correlations, a total of five significant results were found, which consisted of the correlations between quality improvement and idealized attributes, $\rho(89) = .263$, $p < .05$, inspirational motivation, $\rho(89) = .349$, $p < .001$, intellectual stimulation, $\rho(89) = .222$, $p < .05$, individual consideration, $\rho(89) = .244$, $p < .05$, and management by exception (Active), $\rho(89) = .223$, $p < .05$. These results indicate a moderate, positive correlation with inspirational motivation and positive and weak correlations with the remaining measures found to be significantly correlated with quality improvement. None of the "planning, control of improvement" correlations were statistically significant.

Relationship Between Leadership Traits and the Juran Trilogy

The results identified a statistically significant correlation between quality planning, quality control, and quality improvement and leadership traits. The finding also revealed a moderate correlation between quality planning, quality control, and quality improvement and leadership traits. There was also a significant and moderate correlation between leadership traits and quality improvement.

A series of Spearman's rank correlations were conducted to examine the associations between the Juran Trilogy and leadership traits. For this correlation, the mean score of the LTQ was used to examine the association (See Table 2). Regarding leadership traits, significant positive correlations were found with quality planning, $\rho(89) = .365$, $p < .001$, quality control, $\rho(89) = .300$, $p < .01$, and quality improvement, $\rho(89) = .390$, $p < .001$. In all three cases, correlations were found to be moderate. These results indicate a significant and moderate association between leadership traits and quality improvement.

TABLE 1
SPEARMAN RANK CORRELATION FOR JURAN'S TRILOGY QUALITY PLANNING, QUALITY CONTROL, AND QUALITY IMPROVEMENT, AND LEADERSHIP STYLES

Variables	QP QC QI	MLQ_IA	MLQ_IB	MLQ_IM	MLQ_IS	MLQ_IC	MLQ_CR	MLQ_ MBEA
Quality Planning (QP)	-							
Quality Control (QC)	-							
Quality Improvement (QI)	-							
MLQ_IA (QP)	0.097	-						
MLQ_IA (QC)	0.205*	-						
MLQ_IA (QI)	0.263*	-						
MLQ_IB (QP)	0.083	0.477**	-					
MLQ_IB (QC)	0.094	0.477**	-					
MLQ_IB (QI)	0.087	0.477**	-					
MLQ_IM (QP)	0.283*	0.458**	0.567**	-				
MLQ_IM (QC)	0.325*	0.458**	0.567**	-				
MLQ_IM (QI)	0.349**	0.458**	0.567**	-				
MLQ_IS (QP)	0.113	0.385**	0.612**	0.448**	-			
MLQ_IS (QC)	0.118	0.385**	0.612**	0.448**	-			
MLQ_IS (QI)	0.222*	0.385**	0.612**	0.448**	-			
MLQ_IC (QP)	0.092	0.466**	0.595**	0.454**	0.653**	-		
MLQ_IC (QC)	0.083	0.466**	0.595**	0.454**	0.653**	-		
MLQ_IC (QI)	0.244*	0.466**	0.595**	0.454**	0.653**	-		
MLQ_CR (QP)	0.120	0.563**	0.452**	0.572**	0.185	0.355**	-	
MLQ_CR (QC)	0.209*	0.563**	0.452**	0.572**	0.185	0.355**	-	
MLQ_CR (QI)	0.201	0.563**	0.452**	0.572**	0.185	0.355**	-	
MLQ_MBEA (QP)	0.198*	0.215*	0.248*	0.017	0.125	0.129	0.184	-
MLQ_MBEA (QC)	0.181	0.215*	0.248*	0.017	0.125	0.129	0.184	-
MLQ_MBEA (QI)	0.223*	0.215*	0.248*	0.017	0.125	0.129	0.184	-

Note. MLQ_IA= idealized attributes; MLQ_IB= idealized behaviors; MLQ_IM= inspirational motivation; MLQ_IS= intellectual stimulation; MLQ_IC= individual consideration; MLQ_CR= contingent reward; MLQ_MBEA= management by exception (Active); *p<.05, **p<.01, ***p<.001; N = 91.

TABLE 2
SPEARMAN RANK CORRELATION FOR JURAN'S TRILOGY PRINCIPLES AND LEADERSHIP TRAITS

Variables	Spearman's Rho (ρ)	p-value
Quality Planning (QP)	0.3651	.0004 ***
Quality Control (QC)	0.3004	.0038 **
Quality Improvement (QI)	0.3896	.0001 ***

Note. *p<.05, **p<.01, ***p<.001; N = 91.

Relationship Between Leadership Ethics and the Juran Trilogy

The results identified a statistically significant positive and weak correlation between quality planning, as well as quality control, and duty ethics. The findings also revealed a significant negative and weak correlation between quality planning and virtue ethics. There was also no statistically significant correlation found between quality planning and any of the other leadership ethics measures. A significant negative and weak correlation between quality control and justice ethics was found. There was also no statistically significant correlation found between quality improvement and any ethics or leadership ethics measures.

To further explore whether the leadership characteristics (i.e., leadership styles, leadership traits, and leadership ethics) were predictors of the Juran Trilogy (i.e., quality planning, quality control, and quality improvement), a series of ordinal logistic regressions with associated Brant tests of the assumption of parallel lines were also conducted on each of the three components of the Juran Trilogy. The Brant test was selected as the most appropriate way to test the assumption of parallel lines as upheld in relation to each of the three components of the Juran Trilogy. The researcher was thereby able to examine the impact of each of these independent variables while holding all other predictors in the model constant.

Table 3 reports calculations for all Spearman rank correlations for the three Juran principles of quality planning, control, and improvement, with the individual measures of the Ethical Leadership Styles. The table shows that for quality planning, a significant, positive, and weak correlation was found with duty ethics, $\rho(89) = .239$, $p < .05$, with a significant, negative, and weak correlation found with virtue ethics, $\rho(89) = -.206$, $p < .05$. None of the remaining planning correlations were statistically significant. Concerning quality control, a significant, positive, and weak correlation was found with duty ethics, $\rho(89) = .243$, $p < .05$, with a significant, negative, and weak correlation found with justice ethics, $\rho(89) = -.274$, $p < .01$. None of the remaining control correlations were found to be statistically significant. Finally, no significant correlations were found with quality improvement or any of the ethical measures (see Table 3).

TABLE 3
SPEARMAN RANK CORRELATION FOR JURAN'S TRILOGY QUALITY PLANNING, QUALITY CONTROL, AND QUALITY IMPROVEMENT, AND ETHICAL LEADERSHIP STYLES

Variables	QP QC QI	Duty	Utilitarian	Virtue	Caring	Egoism	Justice
Quality Planning (QP)	-						
Quality Control (QC)	-						
Quality Improvement (QI)	-						
Duty (QP)	0.239*	-					
Duty (QC)	0.243	-					
Duty (QI)	0.112	-					
Utilitarian (QP)	0.068	0.087	-				

Variables	QP QC QI	Duty	Utilitarian	Virtue	Caring	Egoism	Justice
Utilitarian (QC)	0.089	0.087	-				
Utilitarian (QI)	-0.062	0.087	-				
Virtue (QP)	-0.206*	-0.475**	-0.171	-			
Virtue (QC)	-0.024	-0.475**	-0.171	-			
Virtue (QI)	-0.011	-0.475**	-0.171	-			
Caring (QP)	-0.12	-0.229*	-0.237*	0.149	-		
Caring (QC)	-0.069	-0.229*	-0.237*	0.149	-		
Caring (QI)	0.065	-0.229*	-0.237*	0.149	-		
Egoism (QP)	0.083	-0.073	-0.03	-0.056	0.089	-	
Egoism (QC)	0.024	-0.073	-0.03	-0.056	0.089	-	
Egoism (QI)	-0.046	-0.073	-0.03	-0.056	0.089	-	
Justice (QP)	-0.144	-0.610**	-0.253**	-0.108	-0.035	-0.054	-
Justice (QC)	-0.274*	-0.610**	-0.253**	-0.108	-0.035	-0.054	-
Justice (QI)	-0.126	-0.610**	-0.253**	-0.108	-0.035	-0.054	-

Note. *p<.05, **p<.01, ***p<.001; N = 91.

Relationship Between Leadership Characteristics and the Quality Planning Variable of the Juran Trilogy

A series of three ordinal logistic regression analyses were conducted with the outcomes of quality planning, quality control, and quality improvement, and with the predictors of leadership styles, leadership traits, and leadership ethics included in these analyses. Equation (1) shows the ordinal logistic regression model developed for the quality planning variable of the Juran Trilogy and the leadership characteristics. With the emphasis on the odds ratios, a one-unit increase in LTQ was associated with odds of being in the next higher category of quality planning, which was

$$Quality\ planning\ = ß_0 + ß_1(LTQ) + ß_2(MLQIA) + ß_3(MLQIB) + ß_4(MLQIM) + ß_5(MLQIS) + ß_6(MLQIC) + ß_7(MLQCR) + ß_8(MLQMBEA) + ß_9(ELSQD) + ß_{10}(ELSQU) + ß_{11}(ELSQV) + ß_{12}(ELSQC) + ß_{13}(ELSQE) + ß_{14}(ELSQJ) \quad (1)$$

increased by a factor of 25.029. Regarding MLQ: IA, a one-unit increase in this measure was associated with a reduction in the odds of being in the next higher category of quality planning by a factor of .353. A one-unit increase in MLQ: IM was associated with an increase of being in the next higher category of quality planning by a factor of 3.683. Concerning MLQ: MBEA, a one-unit increase in this measure was associated with an increase in being in the next higher category of quality planning by a factor of 2.320. Finally, leadership ethics was not found to be a statistically significant predictor of quality planning. Nonetheless, this ordinal logistic regression model was found to achieve statistical significance, with a pseudo R^2 of .2182 found. Table 4 presents the complete results of the ordinal logistic regression analysis conducted with the quality planning variable.

TABLE 4
ORDINAL LOGISTIC REGRESSION ANALYSIS OF QUALITY PLANNING ON LEADERSHIP MEASURES

Predictor	Odds Ratio	z (SE)	95% Confidence Interval	
			Lower	Upper
LTQ	25.029	3.61*** (22.314)	4.361	143.655
MLQ: IA	0.353	-2.01* (0.183)	0.128	0.973
MLQ: IB	0.632	-0.92 (0.317)	0.237	1.687
MLQ: IM	3.683	2.43* (1.979)	1.285	10.555
MLQ: IS	1.469	0.69 (0.821)	0.491	4.393
MLQ: IC	0.327	-1.95 (0.188)	0.106	1.007
MLQ: CR	0.898	-0.19 (0.501)	0.301	2.679
MLQ: MBEA	2.320	2.65** (0.738)	1.244	4.328
ELSQ: Duty Ethics	1.177	1.26 (0.152)	0.913	1.516
ELSQ: Utilitarian Ethics	0.999	0.00 (0.247)	0.615	1.623
ELSQ: Virtue Ethics	0.963	-0.23 (0.157)	0.699	1.325
ELSQ: Caring Ethics	0.872	-0.46 (0.259)	0.487	1.561
ELSQ: Egoism Ethics	1.524	0.68 (0.938)	0.456	5.092
ELSQ: Justice Ethics	1.000			

Note. LTQ= leadership trait questionnaire; MLQ_IA= idealized attributes; MLQ_IB= idealized behaviors; MLQ_IM= inspirational motivation; MLQ_IS= intellectual stimulation; MLQ_IC= individual consideration; MLQ_CR= contingent reward; MLQ_MBEA= management by exception (Active); *p<.05, **p<.01, ***p<.001; N = 91; LR $\chi^2(13) = 35.15$, $p < .001$; Pseudo $R^2 = .2182$.

This ordinal logistic regression model was found to achieve statistical significance. The results identified that idealized leadership traits may serve as predictors of good quality planning. Furthermore, MLQ: IA, MLQ: IM, and MLQ: MBEA styles also serve as predictors of good quality planning. Idealized leadership traits, MLQ: IM and MLQ: MBEA have a positive impact on quality planning. However, MLQ: IA style has a negative impact on good quality planning.

Relationship Between Leadership Characteristics and the Quality Control Variable of the Juran Trilogy

Equation (2) shows the ordinal logistic regression model developed for the quality control variable of the Juran Trilogy and the leadership characteristics.

$$Quality\ control = ß_0 + ß_1(LTQ) + ß_2\ (MLQIA) + ß_3(MLQIB) + ß_4(MLQIM) + ß_5(MLQIS) + ß_6(MLQIC) + ß_7(MLQCR) + ß_8(MLQMBEA) + ß_9(ELSQD) + ß_{10}(ELSQU) + ß_{11}(ELSQV) + ß_{12}(ELSQC) + ß_{13}(ELSQE) + ß_{14}(ELSQJ) \quad (2)$$

Regarding LTQ, a one-unit increase was associated with an increase in the odds of being in the next higher category of quality control by a factor of 9.798. A one-unit increase in MLQ: IC was associated with a decrease in the odds of being in the next higher category of quality control by a factor of .255. Finally, with respect to ELSQ: duty ethics, a one-unit increase in this measure was associated with odds of being in the next higher category of quality control that were increased by a factor of 1.335. This model was also found to achieve statistical significance, with a pseudo R^2 of .1893 found. Table 5 presents the complete results of the ordinal logistic regression conducted with the quality control variable.

TABLE 5
ORDINAL LOGISTIC REGRESSION ANALYSIS OF QUALITY CONTROL ON LEADERSHIP MEASURES

Predictor	Odds Ratio	z (SE)	95% Confidence Interval	
			Lower	Upper
LTQ	9.798	2.66** (8.394)	1.828	52.525
MLQ: IA	1.362	0.55 (0.769)	0.450	4.118
MLQ: IB	0.678	-0.74 (0.357)	0.241	1.905
MLQ: IM	2.474	1.63 (1.371)	0.835	7.329
MLQ: IS	1.417	0.57 (0.862)	0.430	4.671
MLQ: IC	0.255	-2.04* (0.171)	0.069	0.947
MLQ: CR	1.048	0.08 (0.622)	0.327	3.356
MLQ: MBEA	1.729	1.71 (0.553)	0.924	3.238
ELSQ: Duty Ethics	1.335	2.14* (0.181)	1.024	1.741
ELSQ: Utilitarian Ethics	1.290	0.98 (0.335)	0.775	2.147
ELSQ: Virtue Ethics	1.344	1.76 (0.225)	0.968	1.866
ELSQ: Caring Ethics	1.023	0.07 (0.320)	0.554	1.889
ELSQ: Egoism Ethics	1.561	0.69 (1.012)	0.438	5.562
ELSQ: Justice Ethics	1.000			

Note. LTQ= leadership trait questionnaire; MLQ_IA= idealized attributes; MLQ_IB= idealized behaviors; MLQ_IM= inspirational motivation; MLQ_IS= intellectual stimulation; MLQ_IC= individual consideration; MLQ_CR= contingent reward; MLQ_MBEA= management by exception (Active); *p<.05, **p<.01, ***p<.001; N = 91; LR $\chi 2(13) = 27.29$, $p < .05$; Pseudo R2 = .1893.

This ordinal logistic regression model was also found to achieve statistical significance. The results identified that idealized leadership traits may serve as predictors of good quality control. Furthermore, MLQ: IC style and ELSQ: duty ethics also serve as predictors of good quality control. Idealized traits and ELSQ: duty ethics were found to have a positive effect on good quality control. However, MLQ: IC has a negative effect on good quality control.

Relationship Between Leadership Characteristics and the Quality Improvement Variable of the Juran Trilogy

Equation (3) shows the ordinal logistic regression model developed for the quality improvement variable of the Juran Trilogy and the leadership characteristics.

$$Quality\ improvement = ß_0 + ß_1(LTQ) + ß_2(MLQIA) + ß_3(MLQIB) + ß_4(MLQIM) + ß_5(MLQIS) + ß_6(MLQIC) + ß_7(MLQCR) + ß_8(MLQMBEA) + ß_9(ELSQD) + ß_{10}(ELSQU) + ß_{11}(ELSQV) + ß_{12}(ELSQC) + ß_{13}(ELSQE) + ß_{14}(ELSQJ) \quad (3)$$

Regarding LTQ, a one-unit increase in this measure was associated with odds of being in the next higher category of quality improvement increased by a factor of 14.639. Regarding MLQ: IB, a one-unit increase was associated with odds of being in the next higher category of quality improvement reduced by a factor of .180. With respect to MLQ: IM, a one-unit increase in this measure was associated with odds of being in the next higher category of quality improvement increased by a factor of 3.392, while regarding MLQ: MBEA, a one-unit increase was associated with odds of being in the next higher category of quality improvement increased by a factor of 2.356. Finally, regarding ELSQ: Caring Ethics, a one-unit increase in this measure was associated with the odds of being in the next higher category of quality improvement increased by a factor of 1.943. This ordinal logistic regression model was also found to achieve statistical significance, with a pseudo R^2 of .2211 found. In addition, statistical significance was not found in relation to the Brant tests conducted, indicating that the assumption of parallel lines was not violated. Table 6 reports

the complete results of the final ordinal logistic regression conducted, which was conducted with the quality improvement variable.

TABLE 6
ORDINAL LOGISTIC REGRESSION ANALYSIS OF QUALITY IMPROVEMENT ON LEADERSHIP MEASURES

Predictor	Odds Ratio	z (SE)	95% Confidence Interval	
			Lower	Upper
LTQ	14.639	3.10** (12.653)	2.690	79.664
MLQ: IA	1.137	0.24 (0.619)	0.391	3.307
MLQ: IB	0.180	-3.13** (0.099)	0.061	0.527
MLQ: IM	3.392	2.27* (1.823)	1.183	9.724
MLQ: IS	1.495	0.76 (0.791)	0.530	4.215
MLQ: IC	1.915	1.11 (1.120)	0.609	6.026
MLQ: CR	1.178	0.28 (0.700)	0.368	3.774
MLQ: MBEA	2.356	2.86** (0.706)	1.310	4.238
ELSQ: Duty Ethics	1.005	0.04 (0.129)	0.781	1.292
ELSQ: Utilitarian Ethics	1.272	0.95 (0.324)	0.773	2.095
ELSQ: Virtue Ethics	1.128	0.73 (0.186)	0.815	1.559
ELSQ: Caring Ethics	1.943	2.01* (0.643)	1.015	3.716
ELSQ: Egoism Ethics	0.602	-0.99 (0.309)	0.220	1.644
ELSQ: Justice Ethics	1.000			

Note. LTQ= leadership trait questionnaire; MLQ_IA= idealized attributes; MLQ_IB= idealized behaviors; MLQ_IM= inspirational motivation; MLQ_IS= intellectual stimulation; MLQ_IC= individual consideration; MLQ_CR= contingent reward; MLQ_MBEA= management by exception (Active); *p<.05, **p<.01, ***p<.001; N = 91; LR $\chi 2(13) = 39.86$, $p < .001$; Pseudo R2 = .2211.

This ordinal logistic regression model was also found to achieve statistical significance. The results identified that idealized leadership traits are predictors of good quality improvement. Furthermore, MLQ: IB, MLQ: IM, MLQ: MBEA, and ELSQ: Caring Ethics also serve as predictors of good quality improvement, with MLQ: IB being the only measure with a negative effect on good quality improvement.

Leadership Preference

A series of nine additional ordinal logistic regression analyses were conducted in order to examine whether there is a preference for the transformational or transactional leadership styles over leadership traits. In addition, leadership ethics were examined to determine whether a preferential relationship existed. The pseudo R^2 values were compared within these sets of analyses to provide an indication of which leadership traits, styles, or ethics have the strongest impacts upon the three Juran Trilogy principles.

First, with regard to quality planning, the analysis conducted with LTQ produced a pseudo R^2 of .0774, while this was also .0774 in the analysis conducted with MLQ. Finally, a pseudo R^2 of .0540 was found in the analysis conducted with ELSQ. These results found that the impacts of LTQ and MLQ on quality planning were equally strong, with this effect reduced in the case of ELSQ. Next, in the analyses conducted with quality control, a pseudo R^2 of .0670 was found in the analysis conducted with LTQ, with a pseudo R^2 of .0943 found in the analysis conducted with MLQ. Finally, a pseudo R^2 of .0611 was found in the analysis conducted with ELSQ. These results indicate the strongest impact in the case of LTQ. Finally, three additional ordinal logistic regression analyses were conducted with quality improvement. A pseudo R^2 of .0823 was found in relation to LTQ, .1479 with regard to MLQ, and .0175 with regard to ELSQ. These results indicate the strongest impact with regard to MLQ.

DISCUSSION

The results of the analyses conducted for this study indicate significant associations between the Juran Trilogy (quality planning, quality control, and quality improvement) and leadership characteristics (styles, traits, and ethics). Further, the data analyses tell us IM and MBEA have positive effects on quality planning, and IM and MBEA have positive impacts upon quality improvement. Leadership traits were found to have a significant and positive impact on all three components of the Juran Trilogy. Finally, regarding leadership ethics, duty ethics had a significant and positive impact on quality control, with caring ethics found to have a significant and positive impact on quality improvement.

The findings demonstrate that the relationship between leadership styles and the Juran Trilogy is complex. The complexity of the relationship is due in large part to the three individual components of the Juran Trilogy principles and the different sub-styles that are components of the transformational leadership styles and transactional leadership styles. The findings revealed that there is a positive association between quality planning and transformational leadership styles, suggesting that transformational leaders are more inclined to engage in quality planning. The results also revealed a positive and moderate association between quality control and transformational leadership styles, and a positive and weak association between quality control and transactional leadership styles, suggesting that both transformational leaders and transactional leaders are inclined to engage in quality control. Furthermore, these results indicate a moderate, positive correlation with transformational leadership styles and positive and weak correlations with the remaining measures found to be significantly correlated with quality improvement.

Most literature that has explored leadership styles and quality management has done so from a TQM perspective. That is to say, the central focus of quality management takes the Juran Trilogy principles of quality planning, quality control, and quality improvement as a union in developing and implementing an organizational quality management system. Nonetheless, this study's findings are in alignment with McFadden et al. (2015) and Castle and Decker (2011) who found that the transformational leadership style positively influences improved quality and safety outcomes. As a result, the findings regarding quality control align with McFadden et al. (2015) and Laohavichien et al. (2011). These researchers found that different leadership styles complement one another and can influence leadership decisions because no leader consistently utilizes only one leadership style in their work. It is inconclusive which one specific leadership style may serve as a predictor of any aspects of TQM. In sum, the current study's findings further expand the understanding of the relationship between leadership styles and quality planning, quality control, and quality improvement.

In terms of leadership traits, the findings of this study revealed that there is a positive association between quality planning, quality control, and quality improvement. Additionally, within all three cases, the association between quality planning, quality control, and quality improvement and the leadership traits were found to be moderate, suggesting that leadership traits may be a significant influence in a leader engaging in all components of the Juran Trilogy. Most of the studies that have explored leadership traits and quality management were conducted from a TQM perspective and not on the individual quality components that are a part of the Juran Trilogy (Aij et al., 2015; Krumwiede & Lavelle, 2000; Yen et al., 2002).

In examining whether there was a positive association between quality and ethical leadership, the results indicated a positive association between quality planning and duty ethics and a negative association with virtue ethics. These findings suggest that quality planning is generally good when leaders believe that what they are doing is right. Additionally, the finding indicates that quality planning decreases when leaders believe they are doing what a good person would do. Further, the results revealed a positive association between quality control and duty ethics and a negative association with justice ethics. The findings suggest that quality control is generally good when leaders believe that what they are doing is right and that quality control decreases when leaders believe they are doing what is fair.

Furthermore, these results indicate no significant correlations found with quality improvement and any of the six ethical measures. The implication for the findings related to ethics is that organizations should consider that a leader's ethics may not align with their perception of people's ethics in terms of quality

planning and quality control. When leaders with responsibilities for organizational quality management consider what others in their position might do, there is likely to be a decline in quality planning and quality control. As such, organizations should consider encouraging their leaders to do what they think is right.

The study of the relationship between ethical leadership and the Juran Trilogy is timely and needed, given that most of the studies in this area of the literature (Groves & LaRocca, 2011; Toor & Ogunlana, 2009; Wang et al., 2015) generally focused on leadership characteristics (styles, traits, and personalities). There has only been one published study that sought to explore the relationship between ethics and TQM. Saini and Sengupta (2016) revealed that lapses in ethical judgment by upper managers had negative effects downstream on TQM implementation in organizations. However, the authors did not focus on the individual components of the Juran Trilogy. The current study contributes to the literature related to ethical leadership and the individual components of quality planning, quality control, and quality improvement.

The data collected through this research offered an opportunity to examine how leadership characteristics influenced each Juran Trilogy component. The findings revealed that idealized leadership traits may serve as predictors of good quality planning. An increase in the idealized leadership trait was associated with an increase in quality planning. This finding suggests that the more leaders rated themselves as having idealized personal characteristics of leadership (e.g., articulate, self-confident, and trustworthy), the more likely odds of quality planning were to increase. However, leaders with followers who hold shared goals and a mutual understanding of what is right and important are more likely to engage in good quality planning. Furthermore, leaders who closely monitor for deviances, mistakes, and errors are more likely to engage in good quality planning.

Idealized leadership traits may also serve as predictors of good quality control. An increase in the idealized leadership trait was associated with an increase in good quality control. This finding suggests that the more leaders rated themselves as having idealized personal characteristics of leadership (e.g., articulate, self-confident, and trustworthy), the more likely the odds of quality control were increased compared to leaders with lower self-reported ratings of personalized characteristics. Notably, the finding suggests that leaders who follow the rules and do what they think they are supposed to do when facing ethical dilemmas are more likely to engage in good quality control.

Finally, the data demonstrates that leadership traits may also serve as predictors of good quality improvement. Regarding the odds ratio, an increase in the idealized leadership trait was associated with an increase in good quality improvement. This finding suggests that the more leaders rated themselves as having idealized personal characteristics of leadership (e.g., articulate, self-confident, and trustworthy), the odds of quality improvement were more likely to increase than leaders with lower ratings of personalized characteristics of themselves. Additionally, the finding suggests that leaders who give attention to relationships when facing ethical dilemmas are more likely to engage in good quality improvement.

In general, there is a paucity of studies related to the significance of leadership characteristics as predictors of quality planning. The studies that have explored this phenomenon generally have not explicitly focused on quality planning on their own (Chang & Chen, 2013; Krumwiede & Lavelle, 2000; Toor & Ogunlana, 2009). Instead, these studies have focused on quality planning as part of TQM, and they did not explore specific leadership characteristics (leadership styles, leadership traits, and leadership ethics). Therefore, it was not possible to delineate the alignment of this current study's findings with some of the earlier studies. Only one of the previous studies, conducted by Krumwiede and Lavelle (2000), focused on the relationship between leadership characteristics and TQM.

The findings of the current study address many gaps in the literature regarding the significance of leadership characteristics as predictors of quality planning, quality control, and quality improvement. Krumwiede and Lavelle (2000) concluded that leaders with the trait of strong intuition (N) were favorable to TQM success and were more likely to be long-term planners. There was only one study that explored the relationship between leadership characteristics and quality control (Doeleman et al., 2012). While Doeleman et al. (2012) focused more on leadership styles rather than on leadership traits or leadership ethics, the authors' findings reveal that there is a strong correlation between transformational leadership styles and management control. However, Doeleman et al. did not specify whether the correlation between transformational leadership styles and management control was a positive or negative correlation.

Nonetheless, the findings of the current study align with Doeleman et al. regarding the significance of the transformational leadership style (i.e., MLQ: IC) as a predictor of quality control. There were no published studies related to leadership ethics and quality control.

In general, there are only a few published studies related to the relationship between leadership characteristics and quality improvement. These studies that have explored this type of relationship have not explicitly focused on quality improvement on its own (Kumar & Sharma, 2017, 2018). Therefore, it was not possible to specifically delineate the alignment of this study's findings with those of previous scholarship on the subject.

Implications

The study results support the leader's ability to select a leadership trait or leadership style that may be more effective for producing consumer goods, while making ethical managerial decisions affecting product quality decisions. Most importantly, the research allows leaders to determine if there is a preference between leadership styles and leadership traits having the most substantial impacts upon the three Juran Trilogy principles (i.e., quality planning, quality control, and quality improvement). Having knowledge of and understanding leadership characteristic focus data are key to a leader's business success, leadership structure, and effective managerial decisions.

The findings of this study revealed that the relationship between leadership styles and the Juran Trilogy is complex. Yet, one key implication of these findings is that they provide a unique opportunity to understand better which leadership styles are more closely aligned with the various components (i.e., quality planning, quality control, and quality improvement) of quality management. These findings could facilitate organizational leaders in developing and improving key areas to address TQM.

Further, the study also allows leaders to better understand whether leadership traits are more closely aligned with the various components (i.e., quality planning, quality control, and quality improvement) of quality management. The key implication of these findings is that organizations should consider the leadership traits of persons responsible for quality management. Leadership traits may prove to be beneficial to the quality management process.

The research allowed for the analysis of all three components of leadership characteristics' research variables, with the review of the last characteristic of leadership ethics. The leadership ethics variable review was to determine whether or not leadership ethics would affect the relationship between leadership styles, traits, and the various components (i.e., quality planning, quality control, and quality improvement) of quality management. The research does not show that ethics affects either of these relationships. Organizations may need to consider that a leader's ethics may not align with their perception of people's ethics in terms of quality planning and quality control. When leaders with responsibilities for organizational quality management consider what others in their position might do, there is likely to be a decline in quality planning and quality control. As such, organizations should consider encouraging their leaders to do what they think is right.

Limitations and Future Research Direction

The data analysis and findings were based on a correlational design in order to understand the relationship between the leadership characteristics (leadership styles, traits, and ethics) and the Juran Trilogy components (quality planning, quality control, and quality improvement). The findings suggest that there is a relationship between the variables in this study. However, the findings do not prove that the independent variables (leadership styles, traits, and ethics) caused a change in any of the dependent variables (quality planning, quality control, and quality improvement). Therefore, a limitation of this study was that it did not establish causation.

A second limitation is seen in the sample of the study. Not all leaders in this study were from the same industry. Additionally, data collection was limited to members of the following professional associations, the ASQ, SME, the IISE, and outside respondents that were also members of these types of associations. Furthermore, this set of leaders is not representative of all leaders from the same organization or from the same industry. As a result, these leaders may have different perspectives on quality planning, quality

control, and quality improvement. Generalizing the findings to all leaders who have an influence on quality leadership and product quality should be done only in consideration of these limitations.

Nonetheless, the level of statistical significance for some of the findings may prove to clarify leadership characteristics that influence TQM. It is important to acknowledge that although the study participants were informed that the findings would be presented anonymously, some participants could have provided socially desirable responses. People experience discomfort in expressing how they feel about certain topics and issues. Survey questions asking about sensitive topics related to ethics and matters of quality adherence often generate survey results that reflect distortion due to social desirability bias (Krumpal, 2013). A final limitation is that the study did not examine other factors that influence leadership styles, traits, and ethics that may have an impact on leadership decisions, such as job security, organizational stability, and profitability.

Future studies should address the effect of other factors—such as job security, organizational stability, and profitability—on leadership ethics, leadership styles, and leadership traits, as well as considering how they may impact leadership decisions. These other factors should include an assessment of a leader's preferences, strengths**,** weaknesses, and personality types to further assess how those factors may impact leadership characteristics and influence organizational quality and product quality. Future studies could utilize personality-type indicators such as the Myers–Briggs Type Indicator (MBTI). MBTI is a commonly used reliable self-report inventory assessment which helps to determine a person's Jungian type (Myers & Myers, 1995). Controlling for or exploring how these alternative leadership factors may influence leadership styles, leadership traits, and leadership ethics could produce a clearer picture of the relationships between the key study variables.

Existing scholarship examining the relationship between leadership characteristics and the Juran Trilogy is lacking, so more research is needed. The simplicity in how the Juran Trilogy is measured provides an efficient way of exploring the components of quality management. However, it has not been extensively assessed in terms of its reliability and validity for measuring quality management. Future study should continue to use the Juran Trilogy measure as a part of any research to assess the continued validity and reliability of the survey instrument.

CONCLUSION

This study examined the relationships between leadership styles, leadership traits, and leadership ethics on the Juran Trilogy principles. The objective was to gain insight into these leadership characteristics' ability to influence organizational quality decisions and product quality. This study offers organizations the ability to see how leadership characteristics may influence the quality of goods, as well as the safety of goods that consumers use. With a better understanding, organizations are better able to address consumer quality and safety concerns and maintain profitability.

Three primary research questions and three supplementary research questions were addressed in this study related to leadership styles, traits, and ethics. Significant differences existed between some aspects of leadership characteristics and the Juran Trilogy principles; there was limited influence by key demographic factors. These differences could help leaders develop and improve in key areas, better understand aspects of leadership styles, traits, and ethics, and examine the need to review ethical decisions and to do what they think is right. Companies and organizational leaders should be aware of these differences as their leadership characteristics could have a significant influence over the organizational quality and final product decisions.

Key recommendations resulting from this study may assist businesses in developing and growing organizational leaders who will more successfully influence and oversee organizational quality decisions that affect consumer goods. One key recommendation gleaned from the study's results is that organizations should pay close attention to the leadership traits and leadership styles of people who work in leadership positions related to quality management. Additionally, organizations should recognize that idealized leadership traits may serve as predictors of good quality planning, quality control, and quality improvement. Consequently, organizations that hire individuals with transactional leadership styles should develop these individual's transformational leadership characteristics.

For employees who have transactional leadership styles, organizations should offer an environment that fosters the development of their transformational leadership characteristics. A second recommendation based on the findings of the study is that organizations should try to reinforce ethical leadership in TQM by encouraging leaders to do what is right. Leaders who closely monitor for deviances, mistakes, and errors are more likely to engage in good quality planning, quality control, and quality improvement. Implementing these recommendations could result in organizational leaders who are more adept at improving key components of TQM and are more likely to advance ethical organizational strategies and product decisions with a sense of responsibility to the consumer and end user.

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