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Pepperdine University

Graduate School of Education and Psychology

ORGANIZATIONAL LEADERSHIP: A STUDY ON THE AFFECTS OF CERTIFICATION TO INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

A dissertation submitted in partial satisfaction

of the requirements for the degree of

Doctor of Education in Organizational Leadership

by

Jewel S. Cowart

March, 2015

Paul Sparks, Ph.D. - Dissertation Chairperson

This dissertation, written by

Jewel S. Cowart

under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

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DEDICATION

I would like to dedicate this work to all the research students at Pepperdine University, whose academic journey I admire. Also to the quality professionals and societies for business management, whose support of global values for a marketplace with quality assurance, I applaud you. More important, this paper is dedicated to family and friends. Thank you all.

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VITA

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-Teaching company principles of project/program management best practices for learning, training and development through specific models (e.g. 70-20-10).
-Providing program management guidance for project initiation, planning, executing, monitoring/control, for development and deployment of the functional excellence initiatives.
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ABSTRACT

Compliance to requirements of ISO is an important leadership problem for the International Aerospace Quality Group (IAQG) and the Aviation, Space and Defense (AS&D) companies. Furthermore, the IAQG seeks to understand the valuation of ISO/AS9100 requirements (2009), audit practices, management functions, business performance, customer satisfaction, and potential future concepts for the standard to assure quality. Since the release of the AS9100C total certification growth surpassed 1,100,000 organizations in 2010 with ISO 9001 series adoption and implementation governing business operations (ASQ, 2012b; ISO, 2011; Bernardo, Llach, & Marimon, 2011). Historians such as Crosby, Juran, Deming, and others established the foundation for quality assurance. Several researchers explored the issues which complicate overall benefits of ISO certification (Iwaro & Mwasha, 2012; Karthi et al., 2012; Sampaio et al., 2009). This study examined the effects on AS&D industries from ISO compliance to identify the implications (of ever-changing requirements) through an online survey of 15,000 practitioners. The research illuminated how ISO affects AS&D industries with current and future requirements for certification. The data showed that 75% of survey respondents report implementation of the AS9100C requirements still has benefits that outweigh the cost. Findings suggest that AS&D industries perceive significant value in the AS9100C document as part of the overall ISO 9000 series. In general, the comments from the survey can provide insight into the affects of ISO certification. The study concludes by recommending continued research to learn of further impacts from ISO certification within AS&D industries to improve the AS9100 document requirements for quality management systems.

Chapter 1: Introduction

Background

In 1946, the International Organization for Standardization (ISO) began helping to promote international manufacturing trade, and communication standards. Following standardized processes a company helps ensure consistent quality products and ensures that the product is produced the same way, every time. According to the U.S. Environmental Protection Agency (EPA), ISO is an international standard for consistency designed to help facilitate a quality management systems for worldwide exchange of goods and services (EPA, 2012).

The United States of America adopted the Federal Acquisition Regulations, a regulatory scheme for the codification and publication of uniform policies and procedures for acquisition by executive agencies (FAR, 2012). Prepared, issued, and maintained jointly, pursuant to the OFPP Reauthorization Act, under the statutory authorities granted to the Secretary of Defense, the Administrator of General Services, and the Administrator, National Aeronautics and Space Administration, the FAR covers several statutory authorities.

Chiefly, FAR Part 46 Quality Assurance prescribed the scope of compliance to statutory, contractual, and regulatory requirements, policies, and procedures. In 2009, to ensure alignment with the FAR policy and aerospace uniformity, the regulatory organizations expanded the scope of the ISO standard to include Aviation, Space and Defense industries. The expansion added emphasis for product and process improvement with risk management, critical items, and project management.

Consequently, the new section for project management accumulation stressed importance for the initiating, planning, executing, monitoring or controlling, and closing of a project. This requirement defined in the latest edition of ISO/AS9100C standard as follows:

> 7.1.1 Project management - As appropriate to the organization and the product, the organization shall plan and manage product realization in a structured and controlled manner to meet requirements at acceptable risk, within resource and schedule constraints. (SAE, 2009, p. 15)

These functions frame the process to ensure resources are utilized appropriately to result in the successful completion of goals and objectives. Additionally, the International Aerospace Quality Group (IAQG) has the charter to implement quality initiatives. The idea was to make significant improvements in quality and reductions in cost by establishing and maintaining dynamic co-operation based on trust between international companies.

The IAQG is an organization that supports FAR policy and ISO association by guiding AS&D industries with implementation and certification to the standards for continuous improvement. The objectives of the IAQG are:

> To establish commonality of AS&D quality systems, as documented and as applied; to establish and implement a process of continual improvement to bring initiatives to life (e.g., Industry expectations, lean manufacturing, performance metrics); to establish methods to share best practices in the AS&D industry; and to coordinate initiatives and activities with regulatory/government agencies and other industry stakeholders. (IAQG, 2012, p. 1)

Through collaborative initiatives the AS&D industries can obtain ISO standard resources that allow each individual to take ownership and improve quality of their products and services.

Statement of the Problem

In 2009, the IAGQ announced a mandate for certification to the new Revision C standard for ISO compliance. Numerous AS&D industries anxiously organized for the deadline to obtain certification to ISO/AS9100 Revision C compliance by July 2012. Additionally, leaders of the IAQG contemplated the affects at AS&D industries that assimilating or implementing quality tools with ISO assessment audits.

The operation of implementing ISO/AS9100 Revision C included compliance with several requirements designed to drive value creation and to continuous improved quality. The priority for leadership rapport should always be to "ensure that quality objectives, including those needed to meet requirements for products, are established at relevant functions and levels within the organization" (SAE, 2013, p. 12). Likewise these quality objectives should be measurable and consistent with the quality, cost, schedule, and relationships for customer satisfaction.

Executives of the IAQG leadership team initiated plans to understand how the implementation and certification to ISO/AS9100 Revision C would affect the AS&D industries. Unfortunately, with federal budget cuts by the U.S. Department of Defense, the AS&D industries may become overwhelmed with potential issues inherited from applying, maintaining, and renewing their ISO certification. Consequently, IAQG requirements manager, Buddy Cressionnie, organized a team to understand the needs of AS&D industries for ISO implementation and compliance.

During one of the organizational reviews, the IAQG team brainstormed ideas for engagement of their leadership with a purpose of achieving business objectives and goals. This process was designed to identify the best practices of quality management systems for use by AS&D industries. It is important to note a quality management system should be developed not to impose rules on an organization, but to help the organization achieve its quality objectives (Radice, 1995, p. 32).

Furthermore, when a business is at risk of not reaching goals the leadership should seek the advice of consultants to help mitigate risks or the negative effects. For instance, in a survey conducted by the American Society for Quality (ASQ) results revealed that almost all respondents believe quality helps the bottom line and fewer leaders view it as a management tool (Weiler, 2004). Time and again, a problem can arise when leaders fail to value ISO certification as a tool for management of their business processes for improvement.

Moreover, since AS9100C was based on ISO 9001:2008 changes, it was affected by revision activity of the International Organization for Standardization (ISO) Technical Committee (TC) 176 (Cressionnie, 2013). The IAQG evaluated quality assurance issues and concluded their own survey for understanding current needs with standards to ensure current relevance (Cressionnie, 2013) and revisions by the year 2016.

Equally important, survey results from the ISO/TC 176 (2011) showed that customer satisfaction was the primary reason for maintaining certification to the standard. Sixty-four percent of respondents believe ISO will be "okay, but with enhancements and 27% are fine with the requirements, whereas 5% considered the standard to be no longer relevant" (ISO/TC 176, 2012, p. 6). Overall, the Technical Committee plans support the AS9100C quality management systems requirements for the aviation, space and defense ISO certification.

Consequently without ISO certification the function and operations of an AS&D industry might be subject to difficult business situations. Therefore, IAQG deploys support materials, press release presentations about changes to the ISO standard, their frequently asked questions with clarifications, and reference articles on the website at www.iaqg.org (Cressionnie, 2011). In summary, the problem stated is often the AS&D industries disconnect with quality management system in relation to leadership roles for basic functions of management.

The issues relate to desires of the IAQG to understand the affects from ISO implementation and the AS&D industries need to maintain certification. AS&D industries might not improve the quality of processes, products, and services without the adoption of ISO standards. Consequently a defined quality management system can help business uncover a problem and find a solution.

More importantly, ISO helps employees work cooperatively with peers, suppliers, and customers for awareness and understanding as a team. The decision to maintain ISO/AS9100 certification to the ISO standards can eliminate the possibility of rework, defects, and delays in the products and services. Finally, the organization's leadership should understand they are accountable for resource allocation to meet customer requirements.

The negative effects of the U. S. Department of Defense budget cuts may reduce the operational funds available to the AS&D industries to provide necessary resources in support of ISO/AS9100 implementation, training, and certification. Thus the AS9100C quality management systems requirement for AS&D industries needs to provide effective tools to help ensure product and process integration. Through successful audits, the AS&Ds have maintained certification to the ISO 9001/AS9100 standards to date.

Typically, an IAQG or third-party organization comparable to the National Quality Assurance (NQA) team conducts ISO audits. The goal was to monitor and verify that a registered company continues to meet ISO 9001/AS9100 requirements while exposing any potential non-compliances. The primary ISO standard, AS9100C includes all IAQG sanctioned standards including AS9100C, EN9100 and JISQ 9100.

Certification to the ISO/AS9100C standard provides AS&D industries with favorable recognition in the international marketplace and a competitive edge in the industry. AS&D employees are usually recognized for their role in ensuring continuous process improvement and sustained compliance to the required standards. Therefore a desire of the study was to bring awareness to the affects of ISO certification and how leaders from the AS&D industries help to produce high-quality solutions to fuel the growth of future business.

An opportunity exists to examine if the adoption of the ISO standard has or has not improved the quality of the AS&D industry products. Furthermore, the study can display how AS&D industries have taken personal responsibility, accountability, and the capability to control processes, products, and services. Alternatively, this project can reveal how the AS&D industries and the IAQG support business industries.

Ultimately the IAQG will have the information necessary to understand and improve the quality management system resources provided to AS&D industries. In actuality the "leadership persuasion to a point of view is good for the organization but involves tough choices about teams and individuals" (Baldoni, 2005, p. 37). The AS&D industries should realize that continued success depends on their relationship with the IAQG for quality of their product.

The Desired State

The desired condition was to extend the results summarized from the previous IAQG survey to identify the impact from AS9100C implementation and certification, to assess the quality management system value, and to support future revision of the standards in cooperation with the ISO association. Also important was the observation of what might happen if the AS&D industries did not maintain ISO certification. Furthermore, the IAQG (Cressionnie, 2011), sought to understand the valuation of ISO/AS9100 requirements audit practices, management functions, business performance, customer satisfaction, and potential future concepts for the standard to assure quality.

Purpose of the Study

The purpose of this study was to determine whether organizational leaders of the AS&D industries value the ISO certification, which may become too expensive to maintain due to federal budget cuts. This study includes information on the ISO 9000 series, in particular, the ISO/AS9100C standard. The primary focus area in the study included three divisions within Americas, Europe, and Asia-Pacific sectors.

The primary objectives of Revision C within the ISO/AS9100 series are

1. to help improve the supplier performance and customer satisfaction;
2. to be the foundation of requirements applicable to all segments,;
3. to be recognized by industry authorities and regulators,;
4. to be applicable to well over 10,000 companies in 35 countries;
5. to allow a common interpretation of the standard; and
6. to take into account the new industry requirements. (Cressionnie, personal communication, 2012)

The researcher used existing data collected by the IAQG from quality professionals that support the AS&D industries with the requirements of ISO.

Information collected assisted the IAQG as well with the task of improving the requirements for quality processes, products, and services according to customer's expectations. This type of study can also assist quality auditors to provide internal control and process evaluations, consulting, and recommendations to improve the effectiveness and efficiency of internal control (Cangemi & Singleton, 2008). Similarly, survey results can help with understanding perceptions of leaders in the companies who manage quality systems.

Research Questions

According to organizational leaders, customer satisfaction is linked the quality assurance of products and services provided to customers (Cressionnie, 2009). Thus to help the AS&D and IAQG to establish commonality of quality standards and requirements for suppliers, questions for studying the effects of ISO certification were formulated.

This study will address the following research questions:

1. What are the perceived benefits/affects from certification to the International Organization for Standardization (ISO) among organizational leaders of the aviation, space and defense industry?
2. What are leadership challenges inherent in compliance to ISO revision changes?

This observational study will gather both quantitative and qualitative data to answer research questions.

Importance and Significance of Topic

The importance of the topic is international, driven by the AS standards in America, EN standards in Europe, and JIS Q standards in Asia-Pacific. However, the researcher will

segment survey results to narrow the investigation of the dissertation specifically to the AS Standard Certification. Although the survey was for all ISO 9000 series, the study evaluation of results from data collection based on responses to question about Revision C.

The results from this study may justify additional assets from ISO to maintain the livelihood of the resources provided by the IAQG to AS&D industries and the cost of the quality management system for the continuous improvement process (Dale, 2003). The IAQG was working from a limited budget and a potential solution to this problem could be to join other organizations such as the National Quality Assurance organization (NQA). This organization has additional resources that the IAQG may be capable of leveraging to achieve a higher success rate for communicating the importance of ISO compliance.

Alternatively, the IAQG leadership team might seek to outsource some of their functions. The IAQG may use the findings from the study toward generating a new campaign with the help of the NQA to provide tips for solving quality management system issues. All these items and more may be illuminated by the survey and may help to understand the need for ISO compliance.

Key Definitions

The following are definitions for understanding the background, statement of the problem, purpose, importance, limitations, assumptions, and the research questions of the study.

AS9100: An international quality management standard for the aerospace industry published by the Society of Automotive Engineers in the Americas and the European Association of Aerospace Industries in Europe, and shortly thereafter by standards organizations in Japan and Asia (ASQ, n.d.). The AS9100 standard is a cooperative effort of

the ISO association and the International Aerospace Quality Group (IAQG) chartered to control, develop and implement common requirements and guidelines for use by the aviation, space and defense industry (ASQ, n.d.).

AS&D industry: The Aviation, Space, and Defense organizations (i.e. Lockheed Martin, Raytheon, etc.) comprised of several individuals worldwide.

ASQ: American Society for Quality is a professional, not-for profit association that develops, promotes and applies quality related information and technology for the private sector, government and academia (ASQ, n.d.).

Assessment: A systematic process of collecting and analyzing data to determine the current, historical, or projected status of an organization (ASQ, n.d.).

Continuous quality improvement (CQI): A philosophy and attitude for analyzing capabilities and processes and improving them repeatedly to achieve the objective of customer satisfaction (ASQ, n.d.).

IAQG: The International Aerospace Quality Group (IAQG) is a cooperative global organization that brings aviation, space and defense industries in the Americas, Europe and Asia/Pacific together to deliver more value at all levels of the supply chain (IAQG, n.d.).

ISO 9000 series standards: A set of international standards on quality management and quality assurance developed to help companies effectively document the quality system elements to be implemented to maintain an efficient quality system (ASQ, n.d.).

NQA: the National Quality Assurance organization provides companies and government organizations certification resources for management system registration, process and product compliance services and support (ASQ, n.d.).

Nonconformance: a condition of any article, material or service in which one or more characteristics do not conform to requirements specified in the contract, drawings, specifications, or other approved product description (includes failures, discrepancies, defects, anomalies, and malfunctions (IAQG, n.d.).

Perception: The perceived value created to the degree for which requirements are fulfilled; the act or faculty of apprehending by means of the senses or of the mind; cognition; understanding (Perception, n.d.).

Project management: The application of knowledge, skills, tools, and techniques for project activities to meet the project requirements (PMBOK, 2012). *Quality Assurance*: part of quality management focused on providing confidence that quality requirements will be fulfilled (IAQG, n.d.).

Quality management system (QMS): A formalized system that documents the structure, responsibilities and procedures required to achieve effective quality management (ASQ, n.d.). The IAQG (2012) states that the quality management system is a set of interrelated elements established with policies and objectives to direct and control an organization with regards to quality.

Reviews: activity undertaken to determine the suitability, adequacy and effectiveness of the subject matter to achieve established objectives (IAQG, n.d.).

Scorecard: A "*scorecard*" is a graphical representation of information, often in bar and pie charts, which shows how well a certain business process is proceeding (Bersin, 2012).

Standard: a document, established by consensus and approved by a recognized body, that provides rules, guidelines or characteristics for activities or their results, aimed at the

achievement of the optimum degree of order for common and repeated use, in a given context that is based on consolidated results of science, technology and experience (IAQG, n.d.).

TQM: Total quality management is a management approach to quality improvement originating from quality theorist Philip B. Crosby, W. Edwards Deming, Armand V. Feigenbaum, Kaoru Ishikawa and Joseph M. Juran (ASQ, 2012c).

Key Assumptions

Several assumptions were considered for this study. First, the researcher assumptions are based on the information from analysis and research into the budgetary issues within the United States Department of Defense specifically to the AS&D industry contracts. The assumption was that the AS&Ds were in need of continuous improvement to maintain current and future contracts with the Department of Defense. This assumption was made because without the continuous improvement and ISO certification the AS&D industries were in jeopardy of loss or worse canceled business contracts.

Second, equally important were the potential responses from the AS&D industries' perceptions of the ISO and their wiliness to express this openly and honestly on the survey. Therefore several questions assumed effect to drawn measures of valuation from the AS&D industries. The final assumption was that the AS&D leaders were not eager to measure the progress of their labor from certification to ISO requirements but to maintain certification to the previous released standards in AS9100.

Limitations of the Study

The external validity of this observational study was limited by the population sample from survey participants and geographical locations. Due to the size of the population it was thought unachievable for the researcher to expect responses from all AS&D industries.

Important to note that this study focused on the Americas but included data collected from Europe and Asia-Pacific sectors.

As stated previously this study was be limited to literature available on the ISO/AS9100C (ISO, 2009) which was the most recent standard publication and included the AS9110 and AS9120 requirements. Other limitations for concern with this study related to methods of sampling the population.

Creswell (2009) suggested using a *pretest or post-test* with stakeholder guidance. Furthermore, a pilot test of the electronic survey was conducted by the IAQG leadership team. Feedback from the test improved the questionnaire prior to the official push with Survey Monkey to the AS&D members.

Summary

The chapter provided an overview of ISO past, present and future with a statement of the problem, key definitions, purpose of the study, and the research questions. The next chapter offers an overview of the literature reviewed for the purpose of this study to identify the affects from implementing ISO standards. Moreover, the ensuing section defined steps for assessing the value of maintaining certification as perceived by the AS&D industries.

Chapter 2: Literature Review

The purpose of this chapter was to provide a summary of the literature reviewed for understanding the importance of AS9100C quality management system for International Organization for Standardization (ISO) compliance. Literature reviewed for this study encompassed ISO certification in relation to quandary with the perception of quality assurance for customer satisfaction within the aviation, space and defense (AS&D) industries. The research strategy focused primarily on the International Aerospace Quality Group (IAQG), organizational theories on ISO, history of quality assurance and ISO, current affects of ISO certification, viewpoints of ISO, the basic functions of management, change management, organizational learning methods, project management philosophy, Andragogy, and a summary.

Nature of the Study

The nature of the study was to understand effects of ISO certification for the benefit of AS&D industries. Kotter and Cohen (2002) suggested that the effectiveness of an organization is dependent on the ability of leadership to embrace change for the benefit of all stakeholders. Through deductive reasoning the researcher expected the nature of this study to identify/create a structure to support research by way of a theoretical framework. Relevant information for this study was composed of scientific theories for leadership, quality assurance management, and findings from research and trends on the valuation of ISO.

Blanchard, Zigarmi and Zigarmi (1985) theory on situational leadership provided a concept to measure the perceived usefulness of ISO in association with the IAQG leadership team and AS&D leadership perception levels. The model for situational leadership characterized four leadership styles - participating, delegating, telling, and selling. "A role of the leader is to adjust his or her style to the maturity or the readiness levels of others" (Blanchard, 2009, p. 21).

According to Blanchard, Hersey (1996) and Johnson (2000), the situational leader adapts their style to be supportive and directive consenting to the maturity levels of individuals. For instance, if a leader's desire is more ordinance with an individual they would utilize style (S1) mapped to maturity level (M1). The four main leadership styles are:

- S1 – Telling (directing).
- S2 – Selling (coaching).
- S3 – Participating (supporting).
- S4 – Delegating.

The four maturity levels are:

- M1 – Low maturity.
- M2 – Medium maturity (skills are limited).
- M3 – Medium maturity (higher skills).
- M4 – High maturity.

Furthermore, the leader needs to assess an individual's readiness level and ability to perform a task thus appreciating others and their ways of interacting in the organization. Another leaders concept for this study comes from Edgar H. Schein's theory on organizational psychology. Leaders responsible for change within an organization must take time to transform the reality of the day to the desired state.

Schein (2004) suggested that the transformational learning involves conditions which the change leader must implement:

1. A compelling positive vision;
2. Formal training. Involvement of the learner;
3. Informal training of relevant family groups and teams;

4. Practice fields, coaches, and feedback;
5. Positive role models;
6. Support groups in which learning problems can be discussed;
7. A reward and discipline system and organizational structures that is consistent with the new way of thinking and working. (p. 332)

In general, the leader is responsible for assigning the day-to-day tasks to the team and lower level managers. He or she should be able to work with little supervision and seek feedback from their peers. Ultimately, the leader's ability to influence and persuade movement toward a specific business outcome produces a situation in which everyone wins.

Effective influence focuses on improving and supporting relationships while accomplishing the goals of the organization. Spending time holding critical conversations with members asking questions are necessary to move organizations from non-performance to action often through small steps for change. The researcher integrated participant ideas on quality management from the survey to John Kotter's Eight-Step Change Management theory for understanding.

By following the "*eight-steps*", the researcher can analyze the organization as a whole system (e.g. internal and external) to understand the affect of ISO certification according to the leaders. West (2011) advised, in the *Quality Press*, the need to engage organizations by considering workforce alignment. The process involves four parts

1. Sharing information;
2. Changing expectations;
3. Managing boundaries; and
4. Providing a supportive environment. (p. 58)

The actions should help to emphasize strategic planning with quality performance goals to achieve results that are valued by customers.

Organizational Theories on ISO

The IAQG initiated revision of the 9100 family of standards to stay aligned with changes to the ISO 9001, to drive supplier improvements and broaden the scope of the internationally harmonized standards from *aerospace* to *aviation, space and defense* (Cressionnie, 2007, p. 66). Since the release of the AS9100C total certification growth surpassed 1,100,000 organizations in 2010 with ISO 9001 series adoption and implementation governing business operations (ASQ, 2012b; Bernardo, Llach, & Marimon, 2011; ISO, 2011). Overall, much has changed for the management of quality assurance and the role of leadership in organizations.

According to Crosby (1999), cited by Patten (2010), the requirement for "quality management is needed because nothing is simple anymore, if indeed it ever was" (p. 146). An opportunity for nonconformance (Fotopoulos et al., 2010; Fotopoulos et al., 2011) to product design and development is part of manufacturing operational process. The impact of certification to ISO/AS9100C requirements for quality management systems is worthy of investigation.

Surprisingly, many forms of literature from books, journals, and articles were published on the subject, yet barely one hundred papers are written on the impacts of ISO certification (Karthi, Devadasan, Murugesh, Sivarama & Sreenivasac, 2012, p. 240). India, Greece, Netherlands, China, Portugal, Spain, Canada, U.S. and other countries across the world adopted ISO requirements for increased quality. Furthermore, these countries conducted academic research and published findings on the impacts of ISO certification.

Finally, the literature on the impact of ISO was published worldwide with feedback captured in an international knowledge database. Karthi, Devadasan, Murugesh, Sreenivasac and Sivarama (2012) noted that "during the past three decades, ISO 9001 certifications have facilitated contemporary organizations to systematically achieve continual quality improvement" (p. 237). The subject of their study demonstrated a relationship between ISO/AS9100C requirements and the AS&D industries when measuring the affects (Karthi et al., 2012). Overall, researchers' case studies based on global views of ISO certification are helping to summarize steps for self-guidance from the perspectives of organizational leaders.

In 2006, several researchers explored the effects of ISO 9001 on productive efficiency of firms to learn the positive or negative elements. Tzelepis, Tsekouras, Skuras and Dimara (2006) suggested that (a) ISO 9001 operates as a factor affecting technical inefficiency with non-neutral effects on capital and labor; (b) combined effect of ISO 9001 with capital increases the level of technical inefficiency reflecting adjustment costs incurred when ISO 9001 is adopted; and (c) combined effect of ISO 9001 with labor decreases the level of technical inefficiency reflecting the positive result of ISO 9001 on reducing inefficiency (p. 114). This study determined that ISO 9001 is a managerial factor reducing productive inefficiency.

These researchers identified the history, impacts, performance, benefits, risks, social responsibility, and opponents of ISO for quality. Several researchers noted that most "organizations have long recognized the need to assess the quality of products and services, but only in the past few years have a substantial number of organizations pursued the measurement of enterprise-wide quality" (ASQ, 2012c, p. 1). Keywords used to search for literature included ISO 9000, ISO 9001, AS9100, TQM, quality control, quality management systems, and process

management. Searches contained combinations of the words such as impact and ISO, affect and ISO, AS9100C and effect.

In general, the relationship between organizational leadership and quality management practices are synonymous in that they are not mutually exclusive. Leaders have a responsibility to ensure the business strategies, objectives, and goals are achieved to "improve performance, enhance product realization planning and mitigate risks" (Cressionnie, 2011, p. 64). In the case of AS&D industry leadership, the goal was to attain ISO certification for quality control.

Overview of Topic and Problem

To facilitate certification, the IAQG provided a standard set of requirements in the AS9100C document for business operations and tools to develop a quality management system. The quality management system requirements should be viewed as a viable instrument for competing in the global environment geographically (Simon & Douglas, 2013). Equally important to the process of management were decision-making tools providing guidance to leaders for the benefit of the AS&D strategic objectives and goals.

AS&D leaders were challenged to manage change while improving their products for customer satisfaction. In parallel, the IAQG leadership team suggested that AS&D industries avoid audit findings against their Quality Management Systems since this situation may require an increased capacity for ISO audits performed and can potentially become a risk of noncompliance with contracts (Cressionnie, 2007). In general, management issues in relation to quality assurance were driven by universal root causes from the employees' system of values and the inherent ability to learn in a constant organizational environment of change.

Historical Overview of Quality Assurance

Total quality management. The history of ISO was global. The father of Total Quality Management (TQM), Feigenbaum believed the concept of quality control was a management responsibility that the U.S. eventually adopted with mandatory training for employees in the common workplace (ASQ, 2012a). TQM's philosophy involved all employee participation and was significant for improving quality to achieve total customer satisfaction.

Additionally, the IAQG asserted that "Total quality management is a approach that tries to achieve and sustain long-term organizational success by encouraging employee feedback and participation, satisfying customer needs and expectations, respecting societal values and beliefs, and obeying governmental statutes and regulations" (IAQG, 2012, p. 1). Unfortunately, a management concern (Crosby, 1984) was that the quality control is not constantly taught in leadership schools (p. 85). Total quality management education with leadership development can present opportunities for continuous improvement.

A critical task for leadership in the United States during the TQM era was to estimate the cost of quality for assuring motivation toward continuous improvement with linkage to performance goals of employees. Crosby (1984) said "The management commitment to quality should be made the first item on the agenda of the leadership meetings before finance and be discussed in specific terms" (p. 101). Effective meetings with an agenda can offer a forum to review management concerns with quality and principles for improvements.

Quality gurus. Throughout time the advent of quality principles from gurus Juran and Deming guided organizations with focus on improving processes used by people (Quality Progress Staff, 2010). Deming (1986, 1994) similar to Crosby, argued that the people see themselves as components of the organization, to work collectively, to improve quality of

products, and to achieve goals. Walton (1988) wrote the book *The Deming Management Method*, outlining 14 points for managers based on Demings' philosophy that revolutionized Japan and became guidelines for all (p. 34-36). The 14 points are:

1. Create constancy of purpose to achieve quality.
2. Adopt the quality way of thinking.
3. Stop depending on inspection to achieve quality.
4. End the practice of awarding business to suppliers on price alone instead minimize cost by working closely with only one or two vendors.
5. Constantly improve every process involved in planning, production, and service.
6. Institute on-job training for all employees.
7. Adopt and institute leadership.
8. Drive out fear from the work environment.
9. Break down barriers between the workers and the management.
10. Eliminate slogans, exhortations, and targets.
11. Eliminate quantity-quotas and targets for the workforce and management.
12. Remove barriers that rob people of their pride in workmanship, and eliminate the annual rating or merit system.
13. Institute a vigorous program of education and self-improvement for everyone.
14. Put everyone in the organization to work to accomplish the transformation. (p. 34-36)

Overall, researchers concurred with the principles of the quality gurus. Their belief in quality management systems were based on legacy implementation, thus the choice of ISO adoption was generally supported with different quality tools or guidebooks of knowledge for organizational leaders. One historical view on ISO valuation is derived from the premise of

quality circles which stipulates that all work must include corrective and preventive action to resolve problems from the customer engagement point of cost-effective operation (QP Staff, 2010).

Kaoru Ishikawa suggested that "all employees must be involved on quality improvement teams to enhance the capability of individual workers to improve work processes" (Quality Progress Staff, 2010, p. 5) and that 95% of a company's problems could be solved by a select number of quality tools (as cited in ASQ Quality Progress, 2009, p. 19). Crosby, Deming, Feigenbaum, Juran, and Ishikawa established a foundation for quality assurance. Ultimately, the value for each individual increased with the participation of all employees and opportunities for collective learning and knowledge sharing that organization can offer.

In Zeng, Tian, and Shi's study summarized findings reporting the areas of ISO application within construction e-commerce (as cited in Karthi, Devadasana, Murugeshb, Sivarama & Sreenivasac, 2012). The researchers noted that original ISO 9000 standards contained over twenty clauses based on the ISO 9001:1994 document as compared to the current eight listed in the AS9100C document (Zeng et al., 2005). Many years of survey feedback and debate, drove the IAGQ to assemble and produce Revision B and finally C of the AS9100 requirements within the Society of Automotive Engineers aerospace standard (SAE, 2009).

The revision of the AS9100C document by the International Aerospace Quality Group (IAQG) corresponded with the ISO 9001:2008 standard thereby updating the aerospace requirements of organizations which manufacture and supply products to the aviation, space and defense industries. Similarly, a routine revision by the ISO technical committee in charge of quality management and quality assurance standards keeps the requirements at the forefront of good practice (Robinson, 2012b).

International organization for standardization. The International Organization for Standardization (ISO, 2012c) operates in Geneva, Switzerland, with approximately 100 of the world's industrial nations. This consortium includes the American National Standards Institute (ANSI) representing the United States, the British Standards Institute (BSI) and the Canadian Standards Association (CSA). Established in 1946, the non-government ISO started operations with the World Trade Organization to represent several thousands of countries and committees around the world.

The scope of these standards offered guidelines for a quality management design (ISO 9000 Series) to help ensure consistency with product and service development per requirements for customer satisfaction. Collectively, members of the ISO committee, National Aeronautics and Space Administration (NASA), Department of Defense (DoD), and Federal Aviation Administration (FAA) continuously brainstormed ways to reduce the amount of requirements in the industry. In 1980, ISO formed Technical Committee (TC) 176 to develop international standards for quality management and quality assurance.

The ISO/TC 176 began surveying companies for the feedback on the usefulness of the standards as they related to continuous improvement and customer satisfaction. By the 1990s, the AS9000 series was launched assisting the IAQG and AS&D industries to ensure ISO compliance. Kotter and Cohen (2002) suggested that the effectiveness of an organization is dependent on the ability of leadership to embrace change through collaborative learning for the benefit of all stakeholders.

The International Organization for Standardization (2012b) described benefits as follows:

> To ensure that products and services are safe, reliable and of good quality; to provide business strategic tools that reduce costs by minimizing waste and errors and increasing

productivity; and to help companies to access new markets, level the playing field for developing countries and facilitate free and fair global trade. (p. 1)

Overall, the standard can facilitate sharing of quality best practices across the organization as well as enable partnering for continuous improvements worldwide.

U.S. military standards. The United States Military published the MIL-Q-9858, in 1959, to provide guidance for AS&D industries with quality assurance management. Likewise, MIL- I-45208 was a specification that establishes requirements for industry subcontractors' inspection systems. The process entails requirements for inspection and test that are necessary to substantiate product conformance to drawings, specifications and contract requirements and to all inspection and tests required by the contract (Military Standard, 2012).

Aerospace standards. In 1995, leaders in the Aerospace Standards segment of ISO implemented a series of requirements for commonality with quality management systems. The primary focus of the research for the study was within the Society of Automotive Engineers Aerospace Standard (SAE AS). Aerospace Standard (AS) is segmented into three series numbered 9100, 9110, and 9120. The ISO/TC 176 organization released the quality assurance 9000 series standards.

AS9100C is the international recognized quality management system standard for the Aviation, Space and Defense industry. In this paper the subject discussed was the AS&D industries goal of ensuring consistent quality design and development of products. Managed by the IAQG, revision of the AS9100C quality management system is based on the ISO 9001. In the past, committees from ISO, NASA, DoD, and FAA legislative bodies have consolidated the enormous quantity of standardize requirements.

Important to note was that many of the businesses upgrade from the SAE AS9100B

standard to SAE AS 9100C Quality Management Systems (requirements for AS&D industries) in 2012. And the IAQG audit team and third-party assessors from organization like National Quality Association conducted audits of the AS&D industries' quality management systems for compliance to the requirements of AS9100C. Bottom line, a desire of the AS&D industries was to earn certification to the standard and to avoid non-compliance to the requirements mandated by the U.S. government.

U.S. Government mandate for ISO compliance. The U.S. Department of Defense is the regulatory government body of leaders that mandates the use of international requirements for standardization. The objective was to review the industry of businesses that delivery products and services to understand what was working and what was not for the safety of customers. This goal was accomplished by helping ensure that quality objectives, including those needed to meet requirements for product, and to establish relevant functions and levels within the organization. ISO compliance helped to strengthen existing program roles and with verification (ASQ, 2012a) whether products and services conform to specific requirements.

Moreover, the quality objectives measurable and consistent with industry policy aligned with leadership responsibility to monitor business activities and other information relating to customer perception of quality requirements. For instance, if audit findings were found against a Quality Management Systems, the situation may require an increased capacity for ISO audits performed (e.g., incurring additional costly audits) and the potential risk of noncompliance with government contracts (Cressionnie, 2007). The ultimate goal was to avoid audit findings from assessments of the business operation.

According to Deming (1994), organizational leaders should have a vision and focus on quality products and services to meet their commitments. The adoption of an internationally

recognized standard of operations was important to the uniformity of an organization, the quality management system, and leadership development for the effectiveness of industry operations. Thus, ISO helped facilitate the exchange of goods and services worldwide.

The term 9100-series standards comprised the following quality management system standards: 9100, 9110, and 9120; based on ISO9001:2008 and developed by the IAQG then published by various national standards bodies (IAQG, 2012). The National Quality Assurance organization offered key steps in implementing ISO 9001 stating:

> When implementing ISO there are a number of requirements which can seem somewhat overwhelming. A few of them may be new to the organization, including internal audits and management review, but a lot of what's required by ISO can be seen as "business as usual", or can it be. (NQA, 2013)

Ultimately, to help ensure compliance with the government mandate, the proceeding stakeholders worked collectively to provide guidance and assistance to all.

Aviation, space, and defense. In 1954, the IAQG began serving the AS&D industries. A division of the IAQG, the AS&D industries were from the manufacturing, service, and government sectors. The IAQG council consisted of Americas (AAQG), Europe (EAQG) and Asia (APAQG) sectors.

Organizational leaders assigned to these sectors were entrusted by stakeholders to help maintain ISO certification with change management in their environments. Some of the organizational members were from Bombardier Aerospace, BAE Systems, Embraer, General Electric, Honeywell, Korean Aerospace Industries, UTC (Pratt & Whitney), Goodrich, Gulfstream, Parker Aerospace, Rockwell Collins, Rolls-Royce, Vought Aircraft,

certification/registration bodies, defense industry and authorities, space industry, regulatory authorities and trade associations (see Appendix B).

Their professional expertise typically included Executive, Quality Director/Manager, Manufacturing Director/Manager, Quality Engineer Professional, Quality Administrator, and Quality Auditor. Members represent the sectors (e.g. Americas, Europe, and Asia-Pacific) with expert feedback that was provided to the International Aerospace Quality Group to help determine changes to the ISO standard. The Americas (AAQG) sector are comprised of liaisons currently employed by the AS&D and individuals with expertise from major companies who carry out the design, development, manufacture, and support of equipment at systems level. Also some individuals maintain an active role in the AAQG or Representatives of Government Departments and Agencies participating in meetings and projects. Meanwhile, the Asia-Pacific and European sectors are comprised of individuals similar to the AAQG.

The IAQG. The IAQG was a cooperative global organization of companies providing international oversight to Aviation, Space or Defense industries. The International Aerospace Quality Group website was located at http://www.iaqg.sae.org/iaqg/. IAQG was responsible for the development and maintenance of the 9100 standard with the AS&D industries collectively to facilitate the quality assurance of products and services.

The purpose of the IAQG (2012) was to establish and maintain a dynamic cooperation based upon trust between international aerospace companies on initiatives to make significant improvement in quality and reductions in cost throughout the value stream. In other words, the objectives were to (a) identify common quality standards and requirements; (b) institute processes for continuous improvement; (c) organize methods to share results; and (d) implementation plans that bring the ISO initiative to life. In this paper the subject to discuss was

the IAQG survey results from research to understand AS&D leadership perception of ISO certification valuation.

Lastly, important to note was that the IAQG announced plans to use the survey feedback to update the AS9100C document. Cressionnie (2013) argued that:

- The AS9100 is based on ISO 9001 and is affected by the International Organization for Standardization (ISO) Technical Committee (TC) 176's revision activity;
- The TC 176 plans to publish a revised ISO 9001 in 2015;
- The next revision of the AS9100 series (Rev E) is scheduled for publication in early 2016, shortly after the ISO 9001 revision is released. (p. 47)

He concluded by stating that "this date will depend on (a) the ISO 9001 publication and completion of all integration and coordination activities with other IAQG standards; (b) the IAQG goal for this revision is to release all related AS9100 series standards together with deployment-support materials and training at the same time; and (c) this has never been done before and is quite a challenge for an international quality organization comprised of voluntary resources" (Cressionnie, 2013, p. 47).

Viewpoints of ISO

Empirical researchers from the past to the present revealed many challenges on the value of ISO certification for product quality assurance and improved organizational performance. For instance, Srivastav (2009) cited that ISO 9000 certification does not lead to improved business performance and there is reluctant support by organizations because they do not always understand the cost benefits of certification (Karthi et al., 2012). According to the ISO, there were many values obtained with certification. They are listed as follows:

- Cost savings - International Standards help optimize operations and therefore improve the bottom line;
- Enhanced customer satisfaction - International Standards help improve quality, enhance customer satisfaction and increase sales;
- Access to new markets - International Standards help prevent trade barriers and open up global markets;
- Increased market share - International Standards help increase productivity and competitive advantage;
- Environmental benefits - International Standards help reduce negative impacts on the environment. (ISO, 2012b)

Conversely, several researchers have analyzed different elements of ISO to help understand the relationships which were sometimes complimentary. In Magd and Curry's study ISO 9000 and total quality management were complimentary to each other (as cited in Nair & Prajogo, 2009). Furthermore, motives of ISO certification were linked to implementation in a "dynamic way where the system is continually improved rather than maintained at the minimum level of compliance to the standard" (Nair & Prajogo, 2009, p. 4556). Thus this section of the paper summarized the conceptual framework of multiple viewpoints on the topic of ISO certification.

Customer satisfaction and competitive advantage. Researchers declared that "empowerment, contingent reward, charisma, intellectual stimulation and active management-by-exception support ISO9000-2000 implementation" (Jabnoun & Al-Ghasyah, 2005, p. 21). Several studies designated that customer satisfaction or competitive advantages were obtained from the impacts of ISO certification.

Llach, Marimon, and Bernardo examined ISO 9001 diffusion analysis to activity sectors and determined that implementation occurs in all types and size of organizations (as cited in Karthi et al., 2012, p. 248). Karthi et al., (2012) summarized from these researchers the impacts of "superior self-esteem plus motivation" and "increased profitability" with ISO certification (p. 249). The analysis isolated the effects of ISO 9001 to individual driving factors of valuation.

Fotopoulos and Psomas summarized the (a) "augmented market value of equity"; (b) "higher customer satisfaction and loyalty"; (c) "reduced number of non-conformances and reworks"; and (d) "competitive advantage" as the impacts from ISO certification (as cited in Karthi et al., 2013, p. 249). Karthi et al., (2012) concluded ISO 9001 certification was appreciated in the literature for producing valuable results in the "organisational arena" and that deficiencies found in previous standards have been overcome with effective clarifications (p. 249). The literature review was in the context of global views on integrating Six Sigma and ISO 9001 certification to achieve continuous quality improvement.

Furthermore, Psomas, Pantouvakis and Kafetzopoulos (2013) completed a study with over 100 certified companies to find that "product/service quality and operational performance of the service companies were directly and significantly influenced by ISO 9001 effectiveness" (p. 149). The researchers learned that the effectiveness was indirect through significant correlation with operational performance of the ISO certified companies. This study was consistent with previous research findings on financial performance in relation to operational performance.

Yaya, Marimon, and Casadesus (2011) concluded, from the research using an online survey among 428 customers within the banking services in Spain, that positive impact on customer satisfaction, significantly influences e-loyalty. Researchers suggested that "mediating and moderating role of satisfaction on the relationship between service quality and loyalty was

confirmed" though "ISO 9001 certification does not seem to influence customers' perceptions of e-service quality" (p. 1194). The word *e-loyalty* referred to electronic loyalty among banking customers who participated in the quality survey.

Similarly, Hernandez reported that the quality survey and audit process was a driver for compliance to ISO 9001 standards (as cited in Karthi, 2012, p. 252). Karthi et al., (2012) observed that few research papers existed on the implementation of ISO 9001 (p. 254) with survey and audit practices. The finding was pragmatic and addressed the IAQG process which required the use of audit activities to verify adoption of the ISO standards for certification.

In their study, Nair and Prajogo (2009) presented the performance impacts of *internationalization* of ISO 9000 suggesting:

- Internalisation of ISO 9000 standards is positively associated with operational performance, and operational performance, in turn, is positively associated with business performance.
- Internalisation of ISO 9000 standards is associated with both functionalist and institutionalist motives in low performing firms, whereas only functionalist driver influence the internalisation of ISO 9000 standards in high performing firms. (p. 4545)

Internalisation was the correct spelling for this research paper and the meaning is equal to the word "*internationalization*".

Sampaio, Saraiva, & Rodrigues (2009a) analyzed the economical impact of the quality management system implementation and certification of six companies' performance. Research by the author concluded the "majority of ISO 9001 certified companies were not able to support the fact that quality management system implementation does have a positive impact over

companies' economic-financial performance" (p. 16). Findings were that ISO 9001 certification motivations (internal or external) can influence the derived benefits.

On the other hand, the researchers concluded the "majority of ISO 9001 certified companies were not able to support with facts that quality management system implementation does have a positive impact over companies' economic-financial performance" (p. 16). Lastly, Arumugam, Ooi, and Fong observed competitive advantages with TQM practices and quality management performance (as cited in Karthi, 2012, p. 249). Karthi et al., (2012) reported that the researchers' investigation of the relationship using data from ISO 9001:2000 firms in Malaysia uncovered similar value results from the aforementioned studies.

Rusjan and Alic declared that "some studies have concluded that there was definitely a significant relationship between the implementation of a quality-management system and a company's performance (as cited in Yaya et al., 2011, p. 1198). Detailed findings from this study were not available for review of literature. In addition to the above impacts from ISO, a few researchers have reported the profitability of ISO certification.

Profitability. Piskar and Dolinsek (2006) published findings from research of 212 Slovenian companies supporting positive understanding and use of ISO 9001 standard as an important tool for managing companies (p. 1333). Karthi et al., (2012) and Heras-Saizarbitoria (2011) aligned with the findings of this paper with multiple factors which can improve profitability with the implementation of ISO. Furthermore, Dick, Heras, and Casadesus argued (as cited in Heras-Saizarbitoria, 2011) and (Karthi et al., (2012) for the same reasons, as previously discussed, that the tenants of improved performance was an aggregate of continuous adoption, learning and adaptation of the upcoming practices and systems.

Orthaber (2010) explained that the "ISO 9001 quality management system (QMS) has been around since 1987 and was generally acknowledged to produce some fairly significant benefits, including improved profitability, higher sales and better employee morale" (p. 41). The author prescribed secrets to successfully implementing an ISO 9001 QMS (a) understanding the scope of the project; (b) having the right attitude; (c) developing an implementation plan; (d) understanding how to write and organize the administrative procedures; and (e) having a good adviser (p. 46).

Lastly, Stauffer and Owens (2012), in *Quality Press*, declared the results from research clearly demonstrate high ROI can be achieved via quality management systems (p. 29) and the model built on the study's predictions accurately estimates quality's contributions to the current economy and potential contributions from further implementation. All researchers mention aforesaid and concluded with recommendations for continued research on the profitability of ISO certification. Consequently, several viewpoints on the misunderstandings were presented in the next section as well.

Misunderstandings. ISO/AS9100C quality management system requirements were useful when understood by organizations contemplating quality control of business products. Orthaber (2010) suggested that businesses were unsure how to implement the quality management system and viewed the process of implementation costly because they do not understand the methods. Leaders of the IAQG were responsible for guiding the aviation, space and defense industry to understand the steps with to implement a QMS.

In a survey conducted by the ASQ, the researchers found almost all CEOs and other top executives believed quality helped their bottom line but fewer viewed a management tool or its practitioners as professionals (Weiler, 2004, p. 53-54). Less than 60% of the executives

representing manufacturing, service, healthcare and education were familiar with the ISO 9000 series and only 28% used the quality tools (Weiler, 2004).

Lastly, as summarized above, a few researchers reported that there were no continuous improvements (Fotopoulos & Psomas, 2009) with adoption but rather only promotion of the ISO organization. Furthermore, the ISO certification standard may create a burden of documentation for organizations (Karthi, 2012, p. 250). In addition to the above misunderstandings, several researchers have reported the disadvantages of ISO certification.

Disadvantages of ISO. Similar to the above mentioned studies, Karthi et al., (2012) summarized papers with findings from research to disclose the disadvantages of ISO as:

- The standard-based quality management system necessitate a high level of documentation and administration, cost and time, and is a non-changeable system. (Pfeifer et al., 2004);

- There exists a possibility that the competitors will copy the procedures and formats of each other rather than use the general requirements of the standard. (Gotzamani et al., 2007);

- If the ISO 9001 standard-based quality management system is viewed just as a documentation system, it may not improve the product quality or market share. (Poksinska et al., 2006);

- The internal audits conducted as a part of ISO 9001 certification cannot audit everything thus results in weak validity of the audit findings (Balague, 2009) hence the availability of ideal internal auditors is also very rare in the ISO 9001-certified organizations; and

- The ISO 9001-certified companies make use of only the standard tools and techniques because advanced elements are not very challenging in terms of information, experience and skills are scarcely used by the ISO 9001-certified companies. (Fotopoulos & Psomas, 2009)

A few researchers completed studies and reported findings with a lack of benefits from ISO certification.

No benefits. Poksinska, Eklund and Dahlgaard criticized the value of ISO certification based on research with findings to suggest "if the ISO 9001 standard-based quality management system was viewed just as a documentation system, it may not improve the product quality or market share" (as cited in Karthi et al., 2012, p. 250). Accordingly, Dick, Heras, and Casadesus (2008) concluded in a research paper that within the maintenance and testing manufacturing arena, doubts of ISO 9001 certification as a single system would yield better performance, even after certifications (p. 250). Over time, the benefit of ISO certification can fluctuate, thus training and learning with quality tools is encouraged to help facilitate continuous improvements.

Sampaio, Saraiva, and Rodrigues (2009a) summarized that the impacts of ISO 9001 certification were inconclusive because overall no consistent evidence could be found in the literature concerning real impacts. They recommended additional research in order to analyze

1. What is the real ISO 9001 certification impact over business financial performance;
2. Determine if *quality organizations* are indeed more profitable and competitive than the others;
3. Establish if companies that become certified base on internal motivations have different results, also from perspective, as compared to the ones that become certified based mostly on external motivations. (p. 17)

In general, these findings supported the need for more literature on the impacts of ISO certification and to grow the body of knowledge.

Quality tools. Historian, Kaoru Ishikawa believed that 95% of a company's problems could be solved by a select number of quality tools (as cited in Gordon, 2010a, p. 19). The *Quality Progress* (2012) published the basic seven tools of quality as a sequel to the original (Ishikawa, 2009) to help organizations innovate, communicate and plan for major and complex projects (p. 19). Furthermore, the January 2012 edition, the ASQ published an article (Darabi, 2012) on the Chemonics approach for quality and social responsibility. Chemonics developed a global QMS in accordance with ISO 9001 requirements to fit the organizational culture for continual improvements of lives of clients, staff, and beneficiaries around the world.

The above tenets to ISO were summarized for understanding with the collections of quality tools from Japanese Scientists and Engineers (JUSE) referred to as (a) affinity diagrams, (b) arrow diagrams, (c) matrix data analysis, (d) matrix diagrams, (e) process decision program charts, (f) relations diagrams and (g) tree diagrams (p. 19). Alternatively, Fotopoulos and Psomas (2009) assessed the advanced tools for quality and cautioned there usage for change.

Tigani (2012) says that "many organizations strive to improve performance by implementing various management systems without their employees even being aware those management systems exist, succeeding in obtaining the required approvals for an ISO 9001 certification without effective implementation (p. 38). However, organizations may obtain "good documentation and continual improvement tools with a standards-based approach to establishing a QMS" (p. 40). Equally, AS&D leaders can manage organizations through quality management systems and tools for certification to ISO standards.

Current Findings on the Affects of ISO

Worldwide there were less than 200 research papers written on the ISO 9000 series (Karthi et al., 2012; Sampaio et al., 2010) and initial research details on the impacts of certification (Castka et al, 2008; Llach et al., 2011; Srivastav, 2009; Su et al, 2008) focused on the cost benefit analysis of adopting the standards for guidance with manufacturing. Two less frequently mentioned researchers (Barrett, 2009; Castka & Balzarova, 2012) disclosed the social responsibility of ISO with organizational development and quality assurance fundamentals. In the end, all researchers exposed different impacts with ISO certification thus this section of the paper covered studies on several viewpoints.

The American Society for Quality published the findings from research based on a quantitative survey by Iwaro and Mwasha (2012) with results affirming why ISO 9001 certification was important to an organization. Thus organizations can improve workmanship performance when compared to the non-ISO organizations (p. 11). ISO certification through education of the quality management system standards can help to improve the performance of an organization.

Modern researchers have examined the role of managers and leaders in implementing and understanding the value of ISO certification. Similarly, additional researchers studied internalization of ISO 9001 (Heras-Saizarbitoria, 2011; Nair & Prajogo, 2009), quality and the FDA (Perez, 2012), intellectual capital management based on ISO 9001(Kim, Kumar, & Kumar, 2009) and integration of several ISO management systems for potential benefits (Simon & Douglas, 2013). Overall, organizational leaders shared the responsibility of improving organizational performance by helping employees though learning development opportunities.

Kim et al., (2009) concluded that (a) a framework of Intellectual Capital Management Based on ISO 9001 Quality Management System helped organizations to identify customers' needs as well as to evaluate customers' perception about the organizations' efforts (p. 172).

Castka and Balzarova (2012) advocated that social responsibility can drive organizations to adopt ISO standards for improved performance. Their research offered economic drivers as rules with organizational management theories elevated in ways to maintained stakeholder involvement with high quality outcomes. Fundamentally, ISO helped to create a management culture that encourages total participation in an on-going quality process.

Holme and Watts offered a definition that is fairly representative, as well as descriptive:

> Corporate social responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the work force and their families as well as the local community and society at large. (as cited in Barrett, 2009, p. 24)

Zuckerman argued for change to realign the views of ISO certification from social responsibility instead of a status quo practice in the global marketplace (as cited in Castka & Balzarova, 2012, p. 239). Thus many factors of change in quality expectations continuously drove the evolution of quality management systems (Zuckerman, 2002, p. 15). Research by the author supported the topic of this paper.

Overall 1 million organizations were certified to the ISO 9001 standard (ISO, 2013) and the demand continued to growth (Karthi et al., 2012; Sampaio et al., 2010). According to the International Organization for Standardization "certification to ISO 9001 for quality management decreased slightly by 1%; experts put this down to the revision of the standards, for planned publication in 2015, and also to continue improvement in verification of the survey data received

from multiple sources" (Frost, 2012, p. 2). Nonetheless, research studies illustrated a problem with adoption because some organizations failed to obtain ISO certification.

Boiral (2006), Han et al., (2007), Morris (2006) published findings from studies on the impacts of ISO certification. However, the summaries were not shared in this paper due to the date of the reports. Similarly, Palmes (2006) stated that twenty years of observation showed organizations cannot achieve ISO certification without identifying a management representative to navigate the ISO 9001 highway. Management issues were more complex with the QMS requirements woven into the developmental process of organizational functions and current management roles involved understanding the subject of maintaining ISO certification.

Lastly, the APQC (2012d) stated that "quality leaders continued to have numerous questions about the best way to structure an enterprise quality function and the best methods to influence the culture so work aligned with organizational goals" (p. 8). Research by the APQC of both domestic and international based companies identified 8 imperatives for enterprise quality function best practices (2012d, p. 8-9). Imperatives from the APQC included

- Align Enterprise Quality with Strategic Goals and Initiatives;
- Establish Structures and Resources to Get the Desired Results;
- Create Supporting Policies, Procedures, and Tools – Not Mandates;
- Select, Define, and Standardize Quality Measures Across the Enterprise;
- Allow Business Unit Leaders to Establish the Performance Targets for Enterprise Quality Measures;
- Report Quality Measures at Least Quarterly;
- Design Quality Measures to Focus on Value-Added Quality Activities and Core Strategic Objectives;

- Use Measures to Promote a Culture of Quality. (p. 58-60)

More importantly, over time, the use of these best practices can help the AS&D industries with the measurement (valuation) of enterprise quality improvements.

Impacts of ISO Certification

Scholarly explorations (Sampaio et al., 2009, 2010) supported the relationships between quantitative research and ISO 9001 certification which identified significant variables that influenced the evolution of continuous improvement. Moreover, the results of these studies can help the certification bodies that operate in global countries learn about ISO 9001 different trends, and thus predict how the quality management systems may develop in the future.

Srivastav (2009) studied the impact of ISO 9000 implementation on Indian public sector manufacturing industry culture, organizational climate, and role stress and coping strategy. The researcher found that (a) ISO 9000 implementation enhances the culture of collaboration; (b) transforms the climate from dysfunctional to functional (by strengthening achievement and extension, and weakening control); (c) levels the role stress, reducing it when it is high, increasing it when it is low; strengthens confrontation and problem solving through teamwork; (d) and weakens problem-avoidance (p. 438).

Findings in the study were consistent with research completed by studies throughout the domestic and international arena.

Equally important are the impacts of ISO 9001 effectiveness on the performance of service companies. Fotopoulos and Psomas reported that top management commitment and involvement were essential for the effective implementation of ISO 9001-based quality management system (as cited in Karthi, 2012, p. 250). This paper demonstrated the impacts of ISO dependent on the implementation process and buy-in of stakeholders.

The *International Journal of Management* published the research from Tang and Lee (2009) which suggested that the effect of organizational factors on managerial satisfaction with ISO 9001 Quality standard certification was attributed to the efforts of management. For instance, the research suggested that to fully realize the benefits of quality standards such as ISO 9001, to improve collaboration with the certification process, those responsible should encourage employees in the participating firms to commit themselves directly to the ISO 9001 principles" (Tang & Lee, 2009, p. 107). Bell and Omachonu (2011) examined the implementation process of certifying a quality management system to ISO 9000 including development of business performance measures for effectiveness. The researchers discovered that "emphasis on implementing the documentation systems were found to be linked to business performance as measured by the return on assets financial measure" (p. 1). Certification best practices were identified with new methods for studying ISO implementation process with financial and survey data.

Levine and Toffel (2010) at the Harvard Business School described the research study findings on how the ISO 9001 standard for quality management systems affects employees and employers. The researchers studied manufacturing firms in California to report that (a) ISO adopters had higher growth rates for sales, employment, payroll, and average annual earnings and (b) injury rates declined slightly for ISO 9001 adopters, although total injury costs did not (p. 1). In summary, the researchers discovered new results which indicate that ISO 9001 appears to deliver value for many organizational stakeholders.

Echoing Iwaro and Mwasha (2012), ISO certification can improve organization workmanship performance in comparison to non-ISO certified organizations (p. 63). Research by the authors summarized the effects of ISO certification on organization workmanship

performance learning that ISO 9001 certified organizations performed better (p. 53). Given the emphasis on organization workmanship and shift in management styles, an explanation of the basic functions of management is presented.

The Basic Functions of Management

According to Cressionnie (2011) the "IAQG expectation was that some level of project planning, risk management, configuration management and controlling work transfers occur in every AS&D organization" (p. 62). Ultimately, the leader was held accountable for ensuring that all objectives were met in a timely manner within an allocated budget (Lee, 2010). Project leaders were responsible for initiating, planning, executing (directing), controlling, and the closing of several tasks, events, plus other activities within a program to satisfy the expectations of a particular customer.

The PMI (2013) required that leaders be knowledgeable of both leadership and project management including business management aspects (i.e. quality and technical). For this purpose, to implement a QMS, organizational leaders should understand the basic functions of management for leadership effectiveness. Research by Fayol (as cited in Mena & Chen, 2011, p. 3) proposed a theory of management for organization governance with five basic functions of (a) planning; (b) organizing; (c) directing; (d) coordinating; and (e) controlling.

Planning. To implement ISO standardization businesses create a plan and present this arrangement (i.e. quality management system) to management who in turn can flow the plan down to the organization. Another term for a business operation, the quality management system (ASQ, 2012) ensured work, tasks and skills were adequately defined, controlled, and managed to prevent defects, and provide a consistent quality of product and service. Likewise, strategic

planning, annual operating goals, and individual performance goals were the tools used to manage an organization.

The quality management plan should be developed to help the organization achieve its quality objectives and avoid nonconformance, not to impose rules on an organization (Radice, 1995). Leaders can assist employees with performance goals by identifying strengths, areas for performance improvement as well as development planning. In this paper the subject to spotlight was the planning effort in relation to the ISO certification process.

Deming (1993) professed that organizational leaders should understand quality principles for reducing defects, improving the process for better quality products, and the benefit of organizations. Eugene Barker (personal communication, 2002), a Fellow of the American Society for Quality, a member of the Registrar Accreditation Board of directors and an IAQG founding member said the purpose of ISO is to assist management with the operation of a business (personal communication). Essentially, ISO standard requirements were designed to support business organizational strategies, objectives, and goals for continuous improvement as well as the development of the workforce.

During his tenure, Barker (personal communication, 2002) led teams that wrote the AS9000 standards as well as hosted the Quality Congress session titled "Globalization and Commonization of Industry Quality Standards," summarizing views on the requirements for a new standard. ISO can encourage employees to look at quality through the eyes of the universal customer. Overall, the initial planning can make all the difference in how the ISO standard requirements were organized for on-going effectiveness.

Organizing. The AS&D industries implemented the Air Force standards called military (MIL) specifications to provide guidance for business operations and organizational

management. With government contracting projects and programs evolved to empower organizations and to build partnerships between business, its suppliers, and employees who share common requirements and work to achieve these goals together. The organizations used ISO standards as a guide to integrate quality assurance and quality improvement goals into overall performance and management.

Directing. Providing direction to the organization facilitates an effective and efficient program. Moreover, strategic management tools such as the balanced scorecard helped to align the objectives and measure performance of all people in the organization from top to bottom (Kaplan & Norton, 1996, p. 199). In this paper the subject to highlight was need for direction by leadership in relation to the ISO certification process.

Kaplan and Norton (1996) developed the scoreboard measurement tool and shared it with the *Harvard Business Review*. The authors described how to use the scorecard as a strategic management tool and suggested that the balanced scorecard helped top executive management allocate the organization's resources in accordance with the organization's strategic goals.

Coordinating. ISO compliance helped to strengthen existing organizational roles to verify mission assurance for continuous improvement (Hoyle, 2006). Furthermore, the "organizations must share not only their objectives, but also the information, measures and data needed to recognize opportunities and carry out improvement projects" (West, 2011, p. 58). Consequently, leaders of the organization helped to ensure that quality objectives, including those needed to meet requirements for product, are established at relevant functions and levels.

Controlling and closing. Miner (2006) stated "(A) control is the process of checking the realities of operations against plans and taking steps to correct deviations; and (c) it assumes the existence of up-to-date plans and the use of sanctions to achieve compatibility with them in a

timely manner" (p. 118). More important, Fayol explained that "the control systems may create duality of management if not devised correctly and monitored" (as cited in Miner, 2006, p. 118). In this paper the subject to highlight was the need for control in relation to the ISO certification process.

In summary, leadership effectiveness begins with an approach to preparing for the role of management using tools to communicate, to listen for feedback, and to align processes, people, and culture to the values of the business. Leadership lessons were to commit to the strategic objectives and goals of the organization. Thus it was naturally right to explain change management and ISO certification in the next section.

Organizational Theories for Change Management

When a business leader was at the inauguration of change, the goal was to support a more powerful method, one based on helping people to see the truth and act with more urgency (Kotter & Cohen, p. 23). Several theoretical perspectives on leadership and change management (Kotter, 1999; Senge, 2006; Welch, 2005) documented mechanisms, guidelines, and steps for help. An important concept of leadership and change management related to the awareness of one's self and to be able to draw out the best of the people who work in the organization.

Jack Welch. Before the implementation of ISO 9001-based quality management system the willingness to change has to be analyzed (Karthi et al., 2012; Psomas et al., 2011, p. 251). The former CEO of General Electric, Jack Welch (2005) offered his advice on development models for leaders, as 4E characteristics:

1. The 4E leader has energy – A great leader has a big motor and is always on the go, displaying limitless energy. If life had a speed limit, this leader would constantly get tickets for hyper-charged "drive." Even at warp speed, this leader embraces change.

2. The 4E leader energizes – A great leader not only has energy, he or she can transmit energy to others. These leaders "spark others" to action, inspire people to respond to their "vision" and share the credit if that's what it takes to get going.
3. The 4E leader has edge – As a "strong competitor," the leader tests the margins, makes "difficult decisions" and doesn't hesitate to hire or fire.
4. The 4E leader executes – A leader "delivers results" and is a "consistent performer". (Krames, 2005, p. 23)

Furthermore, these 4E characteristics embody 12 essential traits:

1. Character/Integrity – "The strongest leaders are the ones you can trust".

2. Competence/Acumen – "Excellent leaders understand business and demonstrate an instinctive intelligence about what to do".

3. Think global – "The best leaders know about the worldwide marketplace".

4. Customercentric – "These leaders understand that business begins with customers".

5. Welcome change and disdain bureaucracy – "Leaders embrace positive changes and foster flat hierarchies".

6. Strong communicators – Possessing "empathy" puts you in a better position to motivate people.

7. Build effective teams – "Leaders enlist the best people so they can build good teams".

8. Focus on achieving the objectives – "Pursue goals that best serve the organization".

9. Great energy and spark others – "Leaders demonstrate vision and motivate others".

10. Infectious enthusiasm – This is a "force multiplier" for the organization.

11. Achieve and deliver – "Leaders meet or exceed their objectives".

12. Love what they do – "Leaders relish plunging into the job every day". (Krames, 2005, pp. 16-17)

All 12 traits can help guide business decisions and daily actions of leaders wanting to improve the organization goals and objectives. Furthermore, "leadership persuasion is good for the organization but involves tough choices about teams and individuals" (Baldoni, 2005, p. 37). With or without these 4Es and 12 traits, persuasion dictated that the leaders were able to engage within an organization.

Goleman (2006) stated motivation and inspiration energized people, not by pushing them in the right direction as control mechanisms but by satisfying basic human needs for achievement, a sense of belonging, a feeling of control over one's life, and the ability to live up to one's ideals (pp. 193-197). Additionally the leader offered a forum for engagement that works with stakeholders and experts to provide appropriate information with reflection for change (PMBOK, 2012a, p. 403). Last, leaders can take steps to evaluate the effectiveness of a town hall that was designed to champion the outcomes.

Peter Senge. The values of leadership sometimes evolved from the minds of individuals who reached different levels of consciousness in the minds of teammate at unusual places. The alignment of individual energy was common direction for a shared vision enhancing wisdom of teams. Senge's (2006) described his vision of this phenomenon and many others who witnessed the 11 world basketball championships of the Boston Celtics.

With help from National Basketball Association basketball player Bill Russell the discussion on the fourth discipline affirmed "a process of aligning and developing the capacity of a team to create the results its members truly desire" (Senge, 2006, p. 218). Moreover, team members (although specialist in their own right) did not have to sacrifice their interest but used

their powers to function as a group. Problems occurred when low levels of alignment existed before leadership assumed control of the team.

Senge (2010) cautioned several critical dimensions of team learning (a) need to think insightfully about complex issues; (b) need for innovative; coordinated action; and (c) the role of team members on other teams. Organizations need to master the practices of discussion and learn how to deal creatively with the forces opposing this practice. Finally, the overall goal was to practice the discipline of the organization learning process while seeking to avoid groupthink for organizational effectiveness.

As organizations go through the process of change, the leader should watch for signs of discomfort and ambiguity. "Collaboration was vital to sustain what we called profound or really deep change, because without it, organizations were just overwhelmed by the forces of the status quo" (Senge, 2010, p. 25). Leaders faced their own challenges during and after significant change as individuals become doubtful and were unsure of responsibilities.

John Kotter. Change management started with leaders who can engage employees to achieve success with organizational transformations. The eight step model (Kotter, 1999) was carefully designed for managing change in face of very high *resistance to change*. The subject of this paper covered the inputs, process and results associated with large corporations and change management to include (a) create a sense of urgency; (b) develop a guiding team; (c) create change vision with a strategy; (d) communicate the vision for understanding; (e) empower others to act; (f) produce short-term wins; and (g) create a new culture.

As the rate of change increased with time, so did the willingness and ability to keep developing become central to career success for individuals and to economic success for organizations (Kotter, 1996, p. 178). Research by the author uncovered *eight steps* to help

ensure change in an organization. More importantly, leaders can prepare the organizations by being adaptable, passionate, confident, tolerant in times of ambiguity and optimistic.

Therefore, to avoid uncertainty in the future and to synergize the organization, leaders can review the 8-steps for change management. By using the guidelines and introduction of the change management, leaders can help to ensure that significant change was accomplished for the benefit of preventing costly delays and to integrate cultural differences for performance. At length, the use of right approaches along with these steps to a specific change management situation helped complete the transition.

Organizational Learning Methods

ISO is a tool, a guide, a model for quality assurance in design, development, production, installation, and servicing. Many researchers from the literature review have studied theories of change management in cultures frozen by their own values and policies that stifle flexibility to adapt when others evolved. The success of leadership and ISO certification initiatives depended on the implementation approach to organize structures for the business environment and scope of a project.

Organizational leaders need to know their audience and determine the best leadership personality style to gain effective results. Senge (2006) cited Chris Argyris' *Ladder of Inference* and suggested that by knowing ourselves and receiving feedback can help others understand and improve communication. Moreover, these leaders should speak of their values, model their ethical standards, emphasize the company mission, speak enthusiastically, and adhere to the company values.

Project Management for ISO Compliance

Equally important was the project management method for professional qualifications registered against the ISO/AS9100C standards for quality management systems. The Project Management Professional (PMP) credential was accredited by the American National Standards Institute (ANSI) aligned with the International Organization for Standardization (2013). Thus, the characteristics of project management for the specific purpose of the study and the research topic were presented.

According to the experts, poor project management means low performing organizations risk 14 times more money than high performing organizations (PMI ©, 2013). Research from 800 project management leaders showed organizations that completed 80% or more projects verses 60% or less on time, on budget and within goals are considered high performers (PMI ©, 2013). From an organizational point of view, the subject of project management was a worthy subject to address.

In 2008, the Project Management Institute (PMI) (2008a) published *A Guide to the Project Management Body of Knowledge-PMBOK® 4th* with guiding principles as follows: (a) project integration management; (b) project scope management; (c) project time management; (d) project cost management; (e) project quality management; (f) project human resource management; (g) project communications management; (h) project risk management; (i) and project procurement management. In 2013, the PMI published the latest principles prescribing techniques for managing tasks to achieve strategic goals and objectives.

PMI © defined processes and instruments which can help to assist the AS&D industries manage projects to improve the quality of products. Accordingly, the IAQG (2011) reported that the 7.1.1 clause pertains to how a company plans and manages efforts to meet requirements (p.

62). Furthermore, the project management approach was utilized to solicit input and manage revisions to the AS9100 document.

APQC (2010) made a parallel case for integrating quality management, such as that required by the ISO 9001 standards for certification, to attain successful project management. The way to implement quality improvements with this framework was with project management best practices (a) using collaborative tools to facilitate project delivery, communication, and accountability; (b) by refining project management processes to improve future results; (c) conducting frequent, thorough reviews; (d) appointing full-time project managers to help drive success; and (e) maintaining consistency in project management delivery (p. 1-2).

Kerzner and Belack (2010) defined that "projects are most often unique endeavors that have not been attempted before or again, but have specific start and end dates, are difficult to estimate, and create challenges for functional managers" (p. 298). Consequently, support from executives and stakeholders of complex projects within ISO requirements can make the difference between good and bad performance.

Similarly, InfoSys conducted a qualitative study with survey distribution, by structured questionnaire, to Malcolm Baldrige deployment senior leaders for change management to determine the solutions for the challenges they faced. Likewise, Tiwari and Nandiwada (2010) a Fortune *500* company, learned how to improve change management by increasing the focus on survey results and effective project execution not leadership speeches or overexcited commitments. Overall, the company aligned leadership commitments with ISO change initiatives, to drive the execution of tasks, to achieve results.

Similar to the functions of management, the PMBOK® delineated five process groups to manage projects by (a) initiating; (b) planning; (c) executing; (d) monitoring and controlling; and

(e) closing (Kerner, 2009; PMI, 2013a, p. 61). The Project Management Institute (PMI) © explained how the risks of undervaluing project management were the high cost of low performance (2013f, p. 1). In the next section paper the five processes of project management were defined for understanding the importance in relation to ISO certification.

Initiating. The first of the five processes of project management, the practice of initiating sets the foundation for the entire project. The PMBOK® Guide (2009) defined *initiating* as the process that facilitates the formal authorization to start a new project or a project phase. In this paper the spotlight on this part of the process was project initiation with ISO requirements from the AS9100C quality management system.

Planning. The second type of the five processes for project management is planning. According to the PMBOK® Guide (2009), the process entailed refinement of original plans and a course of action to attain clear objectives and scope that the project was undertaken to address. In this paper the subject to discuss was the planning of a detailed project for all objectives (e.g. resources and metrics) setup during the initiating process.

Executing. The third type of the five processes for project management is executing. According to the PMBOK® Guide (2009), *executing* consisted of directing, managing, performing, and accomplishing the project work, providing the deliverables, and providing work performance information. During this process, the project manager directed the resources to carry out the plan and the schedule, ensuring all activities are effectively managed and resourced.

Monitoring and controlling. Monitoring and controlling is the fourth of the five processes of project management. The PMBOK® Guide (2009) defined this process as measuring and monitoring progress to identify variance from the project management plan so that corrective action can be taken when necessary to meet project objectives. To monitor and

control, the project manager monitored performance, resources, and budget, supports team members, manages change and removes roadblocks in preparation for completion and closure.

Closing. The final process, closing, occurred after all deliverables have been produced. According to the PMBOK® Guide (2009), closing included the processes used to terminate all activities of a project or a project phase, hand-off the completed product to others, or close a canceled project. During this process, the project manager performed a post-project review or audit to evaluate overall project performance.

In summary, all five processes are important to the management of projects in relation to ISO certification for customer satisfaction. AS&D industries using the project management process for ISO compliance may increase the performance and organizational development for enhanced customer satisfaction. Consequently, the Malcolm Knowles theory of Andragogy is covered in the next section of this paper.

Andragogy

Andragogy is based on the theoretic debate about the adult learners need to maintain responsibility for their decisions, lives, and more varied experiences. The six principles are:

- learner's needs to know;
- self-concept of the learner both autonomous and self-directing;
- prior experience of the learner including resource and mental models;
- readiness to learn;
- life related and development task;
- orientation to learning both problem centered and contextual; and
- motivation to learn though intrinsic value and personal payoff. (Knowles, Holton, & Swanson, 2005, p. 4)

Accordingly, the subject of this paper involved contextual literature review in the areas of research and practice for development of the adult learner.

The process of learning required a deeper understanding of the business and the willingness to address hard issues (Lencioni, 2002). Organizational leaders may be tempted to implement a new system to make a situation for ISO compliance better. However, leaders cannot assume everyone involved in the process for change understands the reason.

Summary

The synthesis of research comprehensive of results exemplified positive support of certification to the standards plus some benefits of certification to the ISO were competition or customer driven (ISO/TC, 2009). Literature was reviewed that related to the history of quality assurance management, basics of functional management, change management theory, overview of Andragogy, and the stages of organizational development. The chapter concluded with tenet organizational learning methods and project management principles.

Chapter 3 is an introduction to the problem and continued with the purpose statement and restatement of the research questions. The research design for the study established definitions on the subject and quantitative approach. In this paper subjects on the population unit of measure, survey tool development, implications, and sampling procedures of the study presented viewpoints on the topic of organizational development. Lastly, Chapter 3 included the proposed instrumentation and data collection plan, analytical techniques, and overview of validity and reliability.

Chapter 3: Method

Introduction

This chapter described how the research study was conducted and how the survey answers were used to measure the relationship between ISO and affect on Aviation, Space and Defense (AS&D) industries to obtain statistical results from a selected sample. The quantitative survey questions addressed the relationship of ISO to variables within a variety of the AS&D industries using an online survey tool. And the International Aerospace Quality Group (IAQG) conducted the survey for understanding the dilemma.

The value of ISO compliance is a dilemma worthy of investigation to understand the perception from the AS&D industry leaders. These leaders are organized in a hierarchical structure within the IAQG membership (see Appendix B). The problem was that in 2013, the U.S. federal government budget cuts affected the AS&D industries and these businesses become overwhelmed with potential issues inherited from applying, maintaining, and renewing their ISO certification.

The IAQG suggested that typically if there were audit findings against a Quality Management Systems, this situation may require an increased capacity for ISO audits performed (e.g., incurring additional costly audits) and can potentially become a risk of noncompliance with government contracts (Cressionnie, 2007). The purpose of this study was to identify the affects from implementing ISO standards and assess the value from maintaining certification. Chapter 3 outlined the research questions, research methodology, reliability of sample, instrumentation & data collection, and analytics.

Restatement of Research Questions

1. What are the perceived benefits/affects from certification to the International

Organization for Standardization (ISO) among organizational leaders of the aviation, space and defense industry?

2. What are leadership challenges inherent in compliance to ISO revision changes?

Research questions were designed to explore the perceptions of the AS&D industry success with ISO certification and to validate usefulness. One significant point was that ISO doctrines are in the status of revision. These ISO revision activities must align the AS&D industries with their suppliers and stakeholder for the expected benefits and results. Likewise, a challenge existed for all parties to manage the cost of quality with ample resources. Second, more important was that the ISO requirements should contribute to organizational leadership business goals and objectives for continuous quality improvements.

Finally, because ISO applied to all organizations producing aviation, space, and defense products or services the leaders of the industries are responsible for the implementation and health of quality management systems. These research questions were used to measure related characteristics of the topic including dependent and independent variables from AS&D industry leaders. Hence, end-product organizations faced the task of ensuring quality, and integrating product and services throughout the world and at all levels within the supply chain. For the purpose of this study these research questions need to be answered.

Description of Research Methodology

The research design for the study was based on the observational approach. A mixed method of research was selected for the objectives to statistically measure the data captured from the survey of AS&D industries (Creswell, 2009). The mixed method (see Appendix D) was the best way for collecting large amounts of data from the AS&D industries.

The electronic survey is the right tool for this study because the goal was to reach as many AS&D industries as possible for a sufficient response. Divided into three parts, the survey was designed to capture samples from different types of leaders within the aviation, space and defense. Likewise, the survey questions were grouped into several ISO 9000 series classifications to help with understanding the nature of the affects from certification.

The unit of measure was the group identified as the AS&D industries geographically located in the United States, Asia-Pacific, and Europe. Some of these companies include the Bombardier, Embraer, General Electric, Honeywell, Lockheed Martin, Northrop Grumman, Textron (Bell & Cessna), UTC (Pratt & Whitney), Goodrich, Gulfstream, Parker Aerospace, Rockwell Collins, Rolls-Royce, Vought Aircraft companies. Furthermore, the AS&D industries are segmented into 3 areas.

The Americas (AAQG) sector are comprised of liaisons currently employed by the AS&D and individuals with expertise from major companies who carry out the design, development, manufacture, and support of equipment at systems level. Also some individuals maintain an active role, or were Representatives of Government Departments and Agencies participating in meetings and projects. Meanwhile, the Asia-Pacific Aerospace Quality Group (APAQG) and European Aerospace Quality Group (EAQG) sectors were comprised of individuals connected with the whole IAQG. AS&Ds are the appropriate population for the study of ISO compliance because professional expertise includes Executive, Quality Director/Manager, Manufacturing Director, Manufacturing Manager, Quality Engineer Professional, Quality Administrator, and Quality Auditor.

Reliability of Sample and Instrumentation

Scholarly explorations (Sampaio et al., 2010) with data gathered can uncover relationships between quantitative research and ISO 9001 certification with variables that influence ISO 9001 certification evolution. Moreover, the results of the study can help certification bodies that operate in global countries learn about ISO 9001 trends, and thus predict how the quality management systems certification market will develop in the future.

More importantly, the results from the evaluation may help the International Aerospace Quality Group align and set future priorities with quality management systems investments. As far as return on investment is concerned, this product may help to validate the Quality Management System as a value added tool. The researcher expects the study to be of some value to all stakeholders by enforcing the need for ISO compliance as well as process improvement that helps organizations maintain their reputation of high quality.

Data collection. Data collected by the IAQG was reported and analyzed by the researcher. Through a statistical process of data reduction, the researcher used the information to perform descriptive statistics for understanding. Quantitative data collected by IAQG was exported by the researcher from the web-based system to a Microsoft Excel spreadsheet for reporting numbers using statistical information to describe trends, compare groups, or relate variables.

To evaluate potential relationships among variables the researcher ran several regression examinations (Creswell, 2009). The researcher used descriptive statistics to describe the basic features of the data in a study and to provide simple summaries about the sample and the measures. The results were used to infer the relationship between leadership valuation and ISO certification requirements as they apply to all AS&D industries. The researcher completed the

Item and Factor Analysis separately for each dimension within the questionnaire to evaluate possible correlations of variables.

For instance, the independent variable *value* was measured with a Likert-type Scale. For most of the survey questions that range was from Extremely Valuable, Fairly Valuable, Valuable, Somewhat Valuable, and No Value. Furthermore, multiple regression analysis was conducted with the dependent variable and independent variables to evaluate relationships among the AS&D industries (Creswell, 2009).

Data Analysis. Data collected from the IAQG survey was shared with the researcher who completed the following steps:

- Export IAQG data collection from Survey Monkey to Microsoft Excel
- Import collection to SPSS or SAS
- Execute/generate multiple custom data analysis for reports

By using analytical tools, the researcher expected to answer the research questions by understanding the AS&D industries. Furthermore, the data analysis may help to define the IAQG vision and business goals specific objectives for the organization (Northouse, 2007).

Validity and reliability. The IAQG conducted the survey and gathered data from individuals within the AS&D industries. The IAQG completed a pilot test of the questionnaire with the Pacific Northwest Aerospace Alliance, International Aerospace Quality Group Requirements Team, and Americas 9100 Team panel of experts for review and comment. The results from the pilot required the revision of survey questions for understanding by the IAQG. Overall, there was a possibility for language translation issues with the survey questions.

By end of the first quarter in 2013, the results from the survey and questionnaire were made available. The researcher measured the level at which objectives were accomplished. This

survey feedback may support ISO standard revision activities and auditing scheme to validate previous revision goals (Cressionnie, personal communication, 2012).

Limitations

The external validity of this observational study was limited by the population sample of participants at the Aviation, Space, and Defense industry geographical locations. Therefore, of the three sectors: Americas, Europe, and Asia-Pacific was analyzed for the scope of the study. A benefit to this research approach is to understand the effects of ISO certification in the global marketplace.

Summary

Chapter 3 included the methodology for an observational process chosen by the researcher with reintroduction to the problem and the purpose of the study. Steps for conducting the study are outlined according to the IRB policy and guidelines and process for analytical techniques. Theoretical elements and statistical results of this chapter were to be used for the development of Chapter 4.

Chapter 4: Results

Introduction

The purpose of this observational study was to identify the impact of implementing ISO standards and assess the value from maintaining certification within the aviation, space and defense (AS&D) industries. Existing literature identified that certification to the ISO standards is required for all International Aerospace Quality Group (IAQG) members. The value of ISO compliance was an issue worthy of investigation in order to understand the perspective of the AS&D industry leaders. For data gathering a new survey was created and conducted by the IAQG (2012) to investigate the relationship between ISO certification and the leadership.

Results from data analysis via standard formats for statistically review of information from the AS&D industry leaders were detailed in this section of the paper. An analysis of findings from the AS&D industries illuminated the effects of implementing ISO standards according to the IAQG. The study outcomes, descriptive statistics of the sample, findings and response rate, and a summary follow.

Demographics and Response Rate

Aviation, Space and Defense (AS&D) industries responded to the IAQG survey questions distributed on the Internet using Survey Monkey. These AS&D industries included 15,000 individuals geographically located in America, Europe, and Asia-Pacific. However, only 559 survey participants responded to the request (3.7% response rate). Overall, there was a possibility of language translation issues with the questions that impacted the results.

Individuals in the Americas sector, which resulted in a 65% return rate, completed 364 surveys. The individuals in the Europe sector responded to the survey at a 22% return rate by completing 124 surveys. Individuals in the Asia-Pacific sector responded to the survey at a 13%

return rate by completing 71 surveys. The survey responses were used to measure the relationship of geographical influences to ISO compliance. Overall, the comparison of the three sectors substantiated what each sector had reported for the affects of ISO compliance within their organizations.

Question 1 asked "What is your sector or geographical area?" The responders provided their answers by selecting one of the available options, Americas, Europe, Asia-Pacific, or Other specifying the location. These groups are the IAQG and were identified as the primary location population for collecting responses in support of findings.

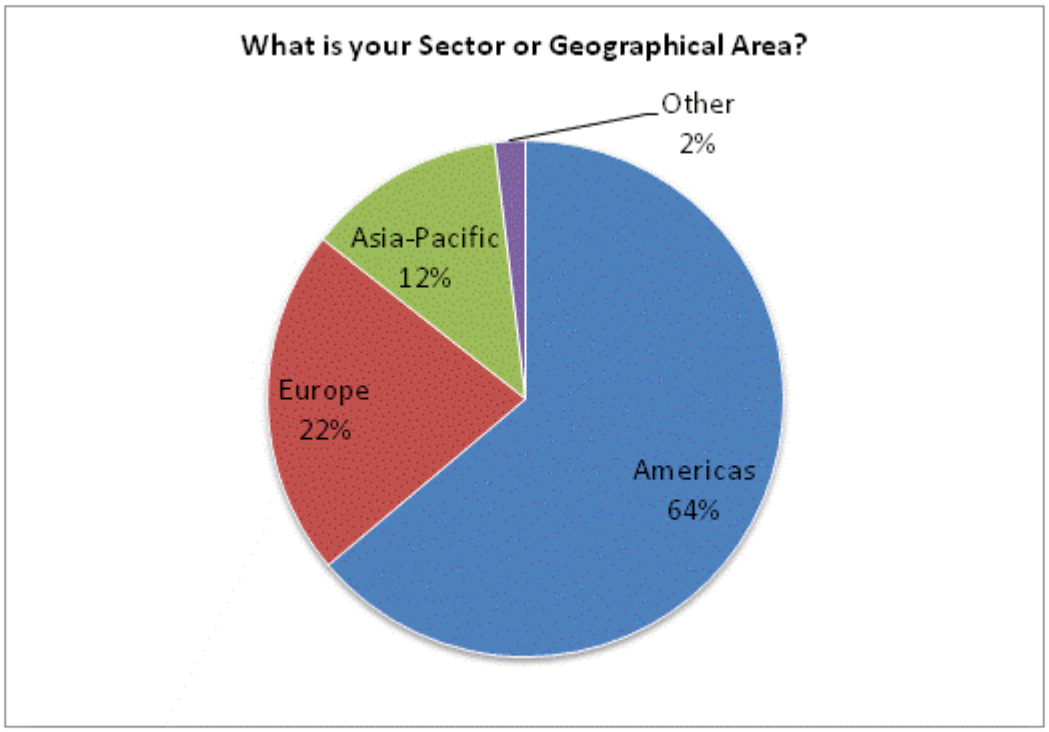

Figure 1. Question 1

The figure shows a total of 364 in *America*, 124 in *Europe*, and 71 in *Asia-Pacific*, and 11 in *Other*.

Question 2 asked responders to provide their answers by selecting available options, *Aviation*, *Space*, *Defense*, or *Other*. More than 52% of the responses were from the Aviation type of industry. Less than a third of the responses were only from the Defense industry at 27%. And the Space industry only encompassed 11% of the responses to the survey.

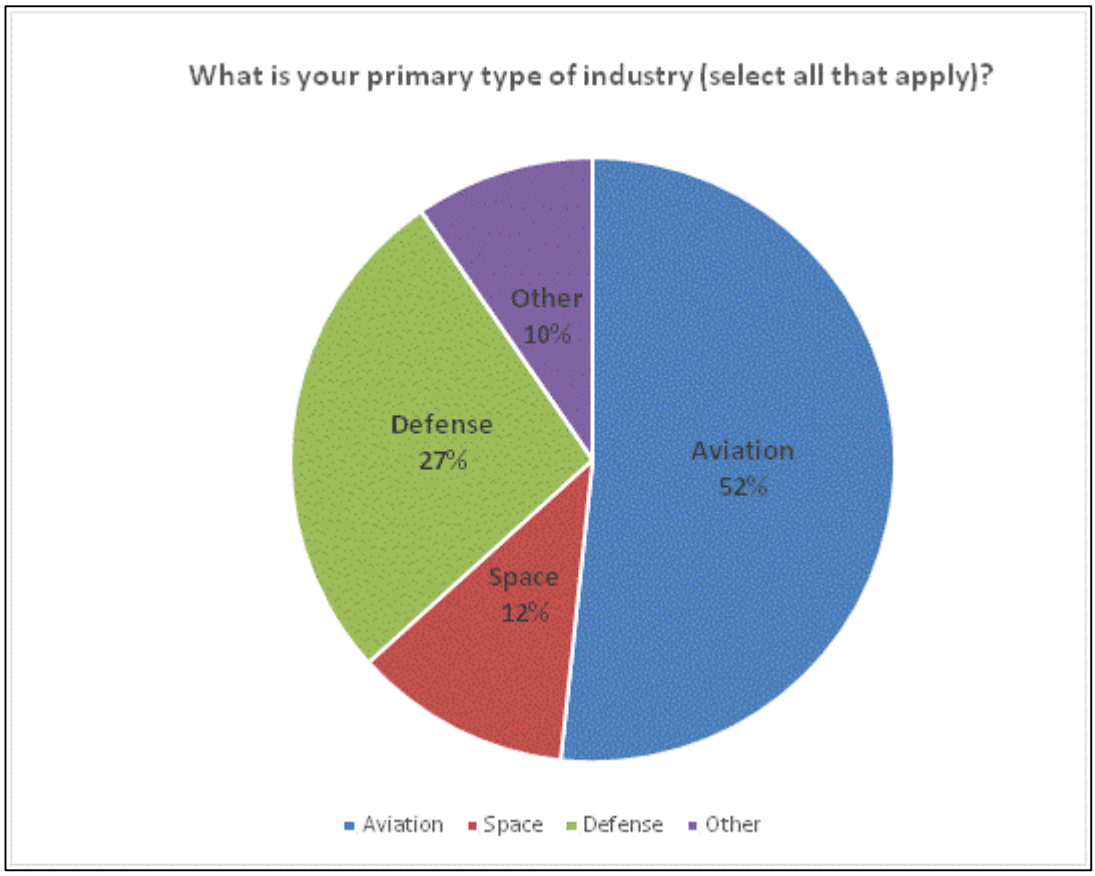

Figure 2. Question 2

The figure shows 441 respondents (52%) reported their primary type of industry as Aviation. 99 respondents (12%) reported their primary type of industry as Space. 231 respondents (27%) reported their primary type of industry as Defense. Collectively, 46 respondents reported all three (e.g. AS&D) as their primary type of industry. Finally, 82 respondents (10%) reported their primary type of industry as "Other". Thus the majority of the survey respondents are from the Aviation business.

Question 3 asked "What is the size of your organization?" Options available to respondents were a) Small <50 employees, b) Medium 50-500 employees, c) Large 501-5000 employees, and d) Extra Large> 5000 employees. The available range was revised to show 501 to 5000 employees as *large*.

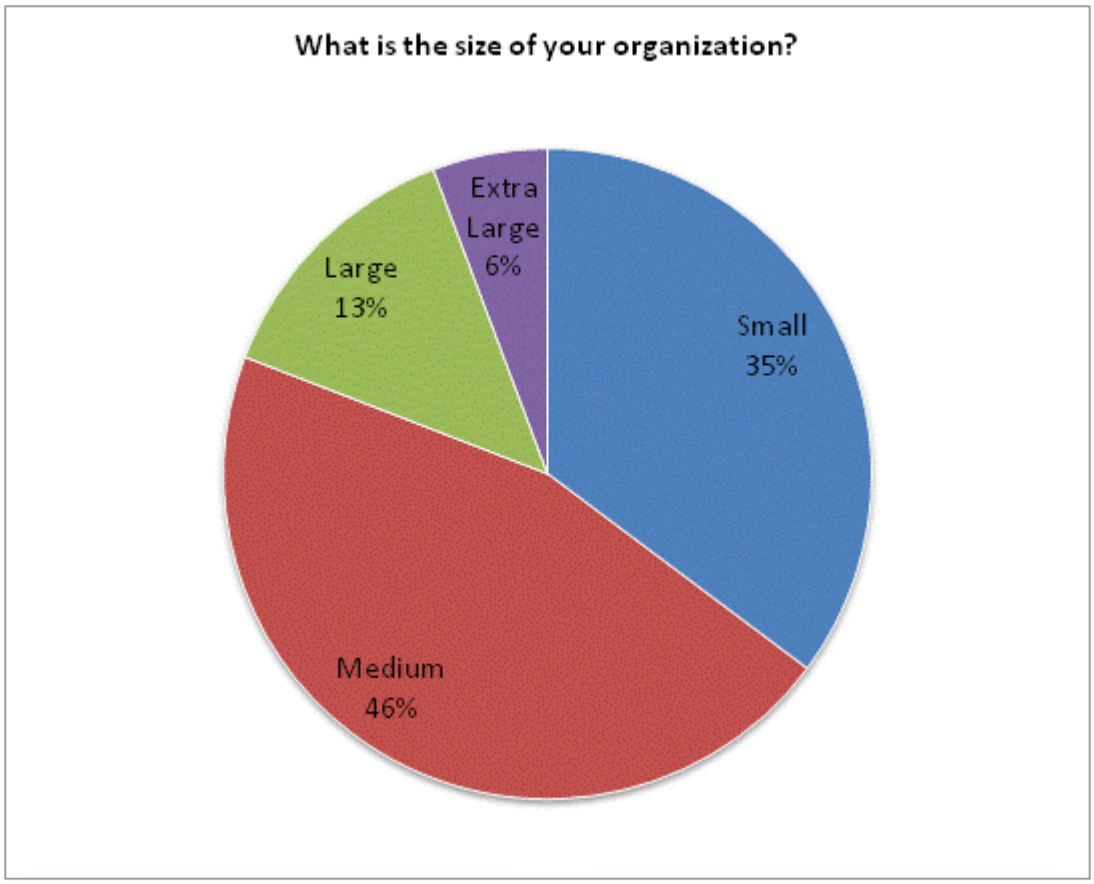

Figure 3. Question 3

The figure shows 197 respondents (35%) reported the size of your organization as *Small*. 255 respondents (46%) reported the size of your organization as *Medium*. 75 respondents (13%) reported the size of your organization as *Large*. Finally, 32 respondents (6%) reported the size of your organization as *Extra Large*. The highest representation is medium size consisting of 50-500 employees.

Question 4 was created to clearly list all types of AS 9100/9110/9120 Standard Certifications and to ask "How does your customer flow down standard certification requirement for your organization?" Additionally, Likert scale multiple choice options were added to measure respondent attitudes using answer choices that range from one extreme to another. For example, answer choices *mandatory*, *recommended*, and *no requirement* help to gauge the areas of concern or for improvements.

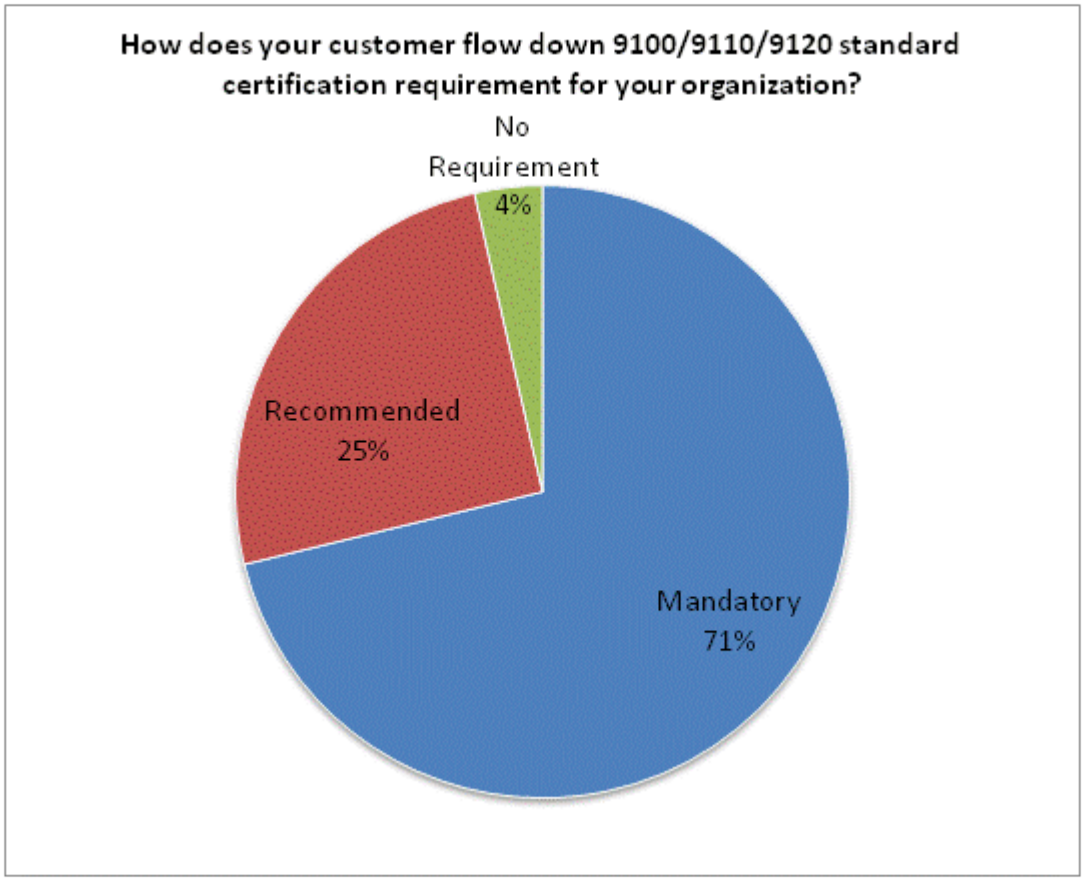

Figure 4. Question 4

The figure shows 398 respondents (71%) reported the standard certification requirement of the organization as *Mandatory*. 141 respondents (25%) reported standard certification requirement of the organization as *Recommended*. Finally, only 20 respondents (4%) reported the standard certification of the organization as *No Requirement*. The majority respondents have a mandatory requirement.

Question 5 asked "How valuable is certification to 9100/9110/9120 in the management of your organization?" Likert Scale options for responding to the question were unchanged from the original multiple choice of:

a) Extremely Valuable,

b) Fairly Valuable,

c) Valuable,

d) Somewhat Valuable, and

e) No Value.

Table 1
Certification in the Management of Your Organization

Responses	*N*	%
Extremely Valuable	283	51
Fairly Valuable	142	25
Valuable	82	15
Somewhat Valuable	44	8
No Value	8	1
Total (*N*)	559	100

The table shows answers that 283 respondents (51%) reported certification as *Extremely Valuable*. 142 respondents (25%) reported certification as *Fairly Valuable*. Eighty-two respondents (15%) reported certification as *Valuable*. Forty-four respondents (8%) reported certification as *Somewhat Valuable*. Finally, only 8 respondents (1%) reported certification as *No Value*. Collectively, certification to 9100/9110/9120 in the management of the AS&D organization is 99% valuable.

Question 6 asks "How valuable is receiving ISO 9001 certification as part of your 9100 series (9100, 9110 and 9120) certification?" Likert Scale options for responding to the question were unchanged from the original multiple choice of:

a) Extremely Valuable,

b) Fairly Valuable,

c) Valuable,

d) Somewhat Valuable, and

e) No Value.

Table 2
ISO 9001 Certification as Part of the 9100 Series

Responses	*N*	%
Extremely Valuable	226	40
Fairly Valuable	128	23
Valuable	92	17
Somewhat Valuable	68	12
No Value	45	8
Total (*N*)	559	100

The table shows answers that 226 respondents (40%) reported receiving ISO 9001 certification as part of your 9100 series as *Extremely Valuable*. One hundred twenty-eight respondents (23%) reported as *Fairly Valuable*. Ninety-two respondents (17%) reported as *Valuable*. Sixty-eight respondents (12%) reported as *Somewhat Valuable*. Finally, only 45 respondents (8%) reported as *No Value*. Overall, the value of 9100 series adds up to 92%.

Question 7 asked “How would you rate the overall clarity of the new requirements added to the 9100/9110/9120 series (see questions below for specifics)?” This approach allows respondents the opportunity to only select a) Yes, b) No, and c) N/A – (Not Applicable) for each category. The answers (See Appendix K) were 463 respondents (83%) reported *Yes*. Meanwhile 75 respondents (13%) reported *No* and only 21 respondents (4%) reported *N/A*. And there were some comments in this section, but most respondents complained about the poorly written question. Overall, the majority of respondents feel the new requirements are clear.

The categories presented included:

- Overall 9100 standards clarity
- Project Management – Clause 7.1.1
- Risk Management - Clause 7.1.2
- Configuration Management – Clause 7.1.3
- Work Transfer – Clause 7.1.4
- Special Requirements/Critical Items
- Production Process Verification
- Customer Focus/Satisfaction – Product Conformity OnTime Delivery
- Process Effectiveness Focus

Overall, the respondents answered this questions with comments for each category with information on how the each clause might be revised to accommodate industries that were small, medium, large or extra-large in size. Furthermore, some respondents offered ideas for including more details for the clarity of the standards documentation in the future revisions.

Question 8 asked about the new ISO requirements published with Revision C.

Table 3
Benefits for My Organization that Outweigh the Cost

Responses	*N*	%
Yes	417	75
No	142	25
Total (*N*)	559	100

The table shows answers that 417 respondents (75%) reported *Yes* that implementing the 9100/9110/9120:2009 requirements has benefits for my organization that outweigh the cost. In contrast, 142 respondents (25%) reported *No* that implementing the 9100/9110/9120:2009 requirements does not have benefits that outweigh the cost. The researcher observed that the respondents to this question value the cost of ISO certification.

Question 9 was created to integrate the original Questions 13 and 14 to learn if respondents were aware of the *Deployment Support Materials* located on the IAQG website. Options for responding to the question were unchanged from the original multiple choice of a) Yes, b) No and an open-ended block for was integrated from for comments.

Table 4
Deployment Support Material Located on the IAQG Website is Helpful

Responses	*N*	%
Yes	275	49
No	32	5
Did Not Use	242	46
Total (*N*)	559	100

The table shows that 275 respondents (49%) reported *Yes* that deployed support material is helpful (See Appendix M). 32 respondents (5%) reported *No* that deployed support material is not helpful. Finally, 242 respondents (46%) reported that they *Did Not Use* deployed support material. While 75% thought the cost of ISO was beneficial, almost half the respondents reported they did not use the tools.

Question 10 asked the respondents to choose options to improve the *9100/9110/9120 requirements* but not the *AS/EN/JIS Q and ISO requirement*. The results from this question were not useful for the research and are not reported. Question 11 ask the respondents to *Rate the following future concepts for the revision of 9100/9110/9120 regarding value to your organization*. Likert Scale options were unchanged with options for respondents to select one of the following:

a) Extremely Valuable,

b) Fairly Valuable,

c) Valuable,

d) Limited (Somewhat) Valuable, and

e) No Value.

All 559 respondents (See Appendix O) answers received provided a picture of trends for revision of 9100/9110/9120 standard. Ratings for *Addition of operator self-verification requirements* were 402, 86, 68, and 3. Ratings for *Addition of human factors similar to 9110 in the analysis of corrective and preventive action* were 364, 115, 74, and 6. Ratings for *Strengthen Customer Requirements Management in the Product Realization Lifecycle* were 380, 106, 71, and 2.

Ratings for *Strengthen Subtier Supplier Management Processes (i.e. Design Change Control, parts Substitution, Change Notification)* were 352, 124, 83, and 0. Ratings for *Addition of Escape Prevention - The idea of prevention is associated with stopping a future issue from occurring* were 403, 97, 56, and 3. Lastly, ratings for *Additional focus on project management* were 323, 132, 96, and 8. Overall, each category of the question received more than responses for the revision of 9100/9110/9120 future concepts.

Question 12 was designed with open-ended layouts allow respondents another chance to explain their observations from the affects of ISO certification within their organization.

Table 5
Overall Comments

Responses	*N*	%
Overall comments:		
Response count	153	27
Skipped question	406	73
Total (*N*)	559	100

In summary, 406 respondents did not answer the question and 153 respondent submitted detail comments for understanding the research problem. Half complained about the survey and some wrote about challenges with requirements. Several respondents complained about the format of the survey questions. All comments were reviewed for comparison or contrast of respondents input to the benefit of ISO certification. Appendix P shows the *wordle* image created from a web toy for generating clusters of most frequent responses to Question 12. The word *requirements* turned out to be the most frequently report comment by survey respondents.

Data Analysis

The results from the survey were analyzed using the Chi-square test of ordinal data based on the Likert scales (i.e. according to the rating) to determine the most frequent data value trend. Mann-Whitney Test was not utilized to analyze the data from the survey because the data is not from independent samples (Colman & Pulford, p. 72). Chi-square test was used because of the multivariate data within the study and need to assess their statistical significance of independent variables on a dependent variable. Overall, the greater the level of deviation between actual and expected responses, the higher the Chi-square statistic and, thus, the less well the results fit the hypothesis (Colman & Pulford, p. 47). The frequency of responses reveals a relationship with the geographical sector/area of *Americas* which was the most selected choice where the type of industry was Aviation, verses Space and Defense.

The most noteworthy results were calculated with the correlation coefficient to measure variables for the extent to which two vary or move together. Chi-Square and Pearman's Rank Correlation Coefficient tests offer results from data analysis. Benefits of ISO and helpfulness of the IAQG website were compared by geographical location and industries (e.g. Aviation, Space, and Defense).

In summary, the Chi-Square results were *not* significant ($p < 0.05$). However the Pearson's Rank Correlation Coefficients were strongly positive from the comparison of the geographical areas and industry. This means different locations are inclined to experience ISO benefits from deployed support material provided by the IAQG website (See Appendix Q).

Summary

Chapter 4 presented the data gathered from surveys ($N = 559$). The methodology outlined in chapter 3 was applied to the data and the results were shown in frequency tables. The results

from AS&D industries that represented leadership and quality organizations throughout the world (*Americas,* 364, *Europe*=124, *Asia-Pacific*=71, *Other* = 11) were described and compared for each of the variables, and any significant differences and trends were identified. The problem statement presented in chapter 1, which noted the need to research ISO compliance and its affect organizations, was addressed by providing evidence from the IAQG.

The data collected from the study revealed approximately 75% of respondents implementing the 9100/9110/9120:2009 requirements have benefits for the organization that outweigh the cost (Appendix L). Alternatively, the negative outcomes, 25% from respondents *No* responses disclose that the costs do not outweigh the benefits. Understanding the overall comments associated with the question may provide insight into the relationship of costs and how it can affect the organization. Chapter 5 interpreted the data and provided conclusions drawn from the data, the significance to IAQG (2000) survey, and the contribution to the field of leadership, and the limitations of study were presented.

Chapter 5: Conclusions/Recommendations

Introduction

The purpose of this observational study was to identify the affects from compliance to International Organization for Standardization (ISO) requirements and assess the value of maintaining certification. The primary problem statement identified was the implications of implementing ISO standards with ever-changing requirements. The study provided a background on the ISO organization, the Federal Acquisition Regulation (FAR), the International Aerospace Quality Group (IAQG), the Aviation Space and Defense (AS&D), a statement of the problem, the issue, the opportunity, the desired state, research questions, assumptions, limitations, and nature of the study.

The literature reviewed included organizational theories on ISO, historical overview of quality assurance, viewpoints of ISO, synopsis of quality tools, principles of project management, past and current affects of ISO certification, impacts of ISO, the basic functions of management, organizational theories for change management, and Andragogy definition as framework to guiding the study. The focus area of the study was the Americas, European and Asia-Pacific sectors for understanding the global impacts to all three sectors. Chapter 3 provided the methodology approach utilized to conduct the study, IRB approval, and reasoning for mixed method research with the results from data analysis, tables and several graphs presented in Chapter 4.

A mixed method of research was selected for the study to statistically measure the data captured from the survey of Aviation, Space, and Defense (AS&D) industry (Creswell, 2009).

The following are the dissertation research questions

1. What are the perceived benefits/affects from certification to the International

Organization for Standardization (ISO) among organizational leaders of the aviation, space and defense industry?

2. What are leadership challenges inherent in compliance to ISO revision changes?

Summary of Key Findings

The key findings of this study revealed answers to questions in regards to affects of ISO compliance from Aviation, Space, and Defense (AS&D) industry businesses. Furthermore, research questions were designed to explore the perceptions of the AS&D industry success with ISO certification and to validate usefulness. More importantly, the value of the AS9100 series of standards was exemplified by its sustained growth since being first launched in 2004 with nearly 16,000 certified sites worldwide (Cressionnie, 2013, p. 47).

The data in this study found almost 75% of respondents reported that implementing the 9100/9110/9120:2009 requirements has benefits for the organization that outweigh the cost. The score is consistent with the finding of Bashir and Al-Rawahi (2011) concluding that the benefits of implementing ISO 9000 outweighed the cost of implementation. More importantly, the respondents rated the future concepts "extremely valuable" for the revision of 9100/9110/9120. This finding was significant because industries can view ISO certification as an end of the audit process for quality compliance (as cited in Srivastav, 2010).

The sector and size of an organization does matter in the case of obtaining ISO certification. Results from this study showed the medium size identified by 46% of respondents. Magd and Curry (as cited in Bashir & Al-Rawahi, 2011) reported that large manufacturing organizations were significantly more likely to seek certification to improve the quality system than medium size organizations.

Current literature defined ISO as a competitive advantage and reported non-compliance in financial impacts such as loss business, government fines, and other economic failures. Initial research (Karthi et al., 2012) on affects of ISO certification focused on the cost benefit analysis of industries and business adopting the standards for guidance with manufacturing. Interestingly enough, there were new studies on the corporate social responsibility of ISO protract theoretical perspectives from organizational development and theory of change management (Castka & Balzarova, 2008).

Overall, findings from this study provided a new understanding of ISO compliance affects and the leading drivers for continuous improvement. Based on a 2012 stakeholder survey, 82% of AS9100 stakeholders viewed receiving ISO 9001 certification as a valuable part of AS9100 series certification (Cressionnie, 2013, p. 47). Whether small, medium, or large companies implemented quality objectives for ISO compliance which sometimes lead to advancements or discontent with goals for continuous improvement.

Conclusion One

Need for a simpler ISO standard. A perceived benefit was the need for a simpler ISO standard with clear requirements for each specific business industries in a language that is easy to read and understand but modeled after the original mantra for quality assurance. This conclusion supports with Research Question #1. The purpose of the IAQG (2012) is to establish and maintain a dynamic co-operation based upon trust between international companies on initiatives to make significant improvements with benefits in quality and reductions in cost throughout the value stream. To manage change of the ISO requirements regulatory leaders must become *unfrozen* by their own values and policies that stifle flexibility to adapt when the companies they support ask for help.

This conclusion for a simpler standard was important because of the comments received from the survey respondents. Twenty-five respondents suggested the ISO/AS9100C document has too many requirements (too long) and was not clear (vague). More importantly, the ISO requirements should align with the original Federal Acquisition Regulations. Thus, the quality management system requirements should be written and viewed as a viable instrument for competing in the global environment geographically (Simon & Douglas, 2013).

Modern studies examined the role of leaders in implementing and understanding the value of ISO certification (ISO/TC 176, 2009). In some comments the failure to obtain certification to the ISO standards was not uncommon and this supports with Research Question #2 on leadership challenges. International Organization for Standardization states that "certification to ISO 9001 for quality management decreased slightly by 1%; experts put this down to the revision of the standards that will begin shortly, for planned publication in 2015" (Frost, 2012, p. 2).

Furthermore, a lack of quality leadership representation can lead to a breakdown in organization performance (Palmes, 2006). Surprisingly, most organizations were managing their compliance to the ISO requirements as much as before the changes to the standard were mandated. And in other organizations the adoption opened doors to new business ventures.

Lastly, the APQC (2012) offered eight imperatives based on their case study with the utilization of enterprise quality measurements to drive business value. The culture of quality promotion was a strategic objective emerging throughout the world. One objective of ISO compliance was to motivate employees to view their jobs from a quality-conscious perspective in regards to the cross-functional integration.

The implications of the study may affect the ISO 9000 series revisions at the International

Aerospace Quality Group. The IAQG suggested the findings may provide an input source for clarifications and FAQs of the standard (Cressionnie, personal communication, 2012). The study will attain, when finished, results to support the understanding of the problem to qualify the data analysis.

Conclusion Two

Benefits outweigh the costs of certification. A perceived benefit was the implementation of 9100/9110/9120:2009 requirements for the organization that outweighs the costs and maintaining quality certification to ISO was significance as part of the overall 9100 series. Furthermore, another conclusion from Survey Question #3 determined that respondents do not believe the size of the organization has anything to do with the ISO certification. This feeling supports with the Research Question #1 for the benefits of ISO certification. Llach, Marimon, and Bernardo examined ISO 9001 diffusion analysis to activity sectors and determined that implementation occurred in all types and size of organizations (as cited in Karthi et al., 2012, p. 248).

A comprehensive study conducted by the IAQG (2013), ISO/TC 176 (2009), and numerous researchers captured data that is helpful and valuable to the growing body of knowledge for valuation of the cost of quality. According to the experts, poor project management meant low performing organizations risk 14 times more money than high performing organizations (PMI ©, 2013). Overall, the valuation of ISO certification is dependent on the organization measurement and leadership ensures the business strategies, objectives, and goals are achieved.

Conclusion Three

Leaders play a key role in quality certification. Leadership challenges found in survey

are the AS&D presence is *extremely valuable* for maintaining quality by certification to the International Organization for Standardization. Several respondents felt leadership issues were not addressed by the new revision and that there needed to be a flow of information upward for quality management systems to be effective. This conclusion supports with Research Question #2. Leaders have a responsibility to ensure the business strategies, objectives, and goals are achieved to "improve performance, enhance product realization planning and mitigate risks" (Cressionnie, 2011, p. 64).

This study found that key effects of ISO certification support the original findings from the ISO/TC 176 (2009) survey results. According to the AS&D leaders, the importance of ISO certification is driven by customer satisfaction with quality product assurance and justifications for revisions to the standards. This finding is consistent with the Bashir & Al-Rawahi (2001) which states that "survey results showed the leading motivators for seeking ISO certification were improving company image, improving the efficiency of the quality management system, complying with customer requirements, improving product/service quality, and improving productivity" (p. 12).

Of the 551 responses respondents, approximately 99% answered that the management of their organization certification to 9100/9110/9120 was *valuable*. Unfortunately, there were no open ended comments to support this Survey Question #10. Overall, the majority of respondents felt certification to 9100/9110/9120 was important to the management of organizations. This feeling supports with Research Question #1 on the benefits of ISO certification.

Customer Focus/Satisfaction – Product Conformity and On Time Delivery Focus was rated with the highest clarity of new requirements added to the 9100/9110/9120 series by responses from America's. Aviation, Space and Defense industry leaders were challenged to

management change while improving their project and program management for customer satisfaction.

In contrast, several negative comments from respondents requested clarity of the new requirements forewarning the need to improve this part of the ISO guidelines. This comment supports with the Research Question #2 on the leadership challenges of ISO requirements for certification. Overall, the study provided themes to the affects of ISO certification and the impacts perceived by the AS&D industry. Themes included benefits, cost for AS&D verses supplier, simple requirements, leadership engagement, scalable ISO application, and training.

Conclusion Four

Project management and risk are undervalued. Respondents rated risk, configuration and project management, Clause 7.1.1, 7.1.2, 7.1.3 lower than the other sub-clauses of ISO 9000 series standards. This finding is in line with a quantitative findings as reported by the Project Management Institute (2013) that only 54% of organizations understand the value of project management principles (PMI ©, 2013).

Furthermore, the management of projects (Castka 2012; PMI ©, 2013b; Patanakul, 2009) was in line with past and current research supporting evidence to capitalize on training opportunities. Overall, both risk and project management requirements could be improved with integrated training on best practices. Regardless, the IAQG's goal for the next revision was to release all related AS9100 series standards together with training with deployment-support materials (Cressionnie, 2013, p. 47).

An opportunity for future research was to examine the business actions taken to grip with costly ISO certification practices for effective quality management systems. Additional research by the IAQG may provide more data into the relationship of compliance and the AS&D industry,

enabling leaders to continuously improve quality and balance the return on ISO. The quality management system requirements should be viewed as a viable instrument for competing in the global environment.

Recommendations for Future Research

The research from this study adds to the body of knowledge on ISO compliance with organization performance (Iwaro & Mwasha, 2012, p. 63), on the role of quality measurement in organizational change (Sampaio et al., 2009), on impacts to organizations (Srivastav, 2009) and overall quality management research (APQC, 2013). Any future studies that utilize this survey need to understand advantages and limitations of collaborative research studies. Future research should careful select survey questions and the appropriate response options.

For instance, Survey Question #7 (*How would you rate the overall clarity of the new requirements added to the 9100/9110/9120 series*) in this survey offered the participant a response of either *yes* or *no*. Despondently, several respondents complained that they had a difficult time answering the question and suggested using a scale of 1-10 similar to the Likert Scale approach. The study was limited to twelve questions after the IAQG piloted the original twenty-five questions intended for detailed responses from surveyed respondents.

The researcher recommends the IAQG use the results of this study to assist with revisions for the ISO requirements to support a quality management policy. Furthermore, additional research for understanding the benefit of ISO is necessary for development of requirements. Overall, having a knowledge of past quality management studies and AS&D industry achievements can help guide additional organizations with goals for humanizing business processes and improving customer satisfaction.

Lastly, two studies were suggested for follow-on research based the quantitative methods.

Research by Sampaio et al. (2009; 2010) identified the relationships between quantitative study and ISO 9001 certification with significant variables that influenced the evolution of continuous improvement. Lastly, research by Iwaro and Mwasha (2012) identified the relationships plus effects of ISO certification and workmanship performance.

Summary

Compliance to the ISO was an important leadership problem for the International Aerospace Quality Group (IAQG) and Aviation, Space and Defense (AS&D) industries. Researchers explored various cost and revision issues which complicate overall benefits of ISO certification (refs). This study examined the effects on AS&D industries from ISO compliance to identify the implications of ever-changing requirements through and online interview of 15,000 practitioners.

The research illuminated how ISO affect different sized companies throughout the world driven by current and future requirements for certification. The data showed that 75% of respondents reported implementation of the 9100/9110/9120:2009 requirements has benefits for the organization that outweigh the cost. And 51% of the respondents perceived *extreme value* with certification to 9100/9110/9120 in management of the organization.

In conclusion, the perceptions of the IAQG requirements teams were that maintained quality certification to the International Organization for Standardization was important. More important, the perception of AS&D leaders regarding quality by certification to the International Organization for Standardization is extremely important. Respondents overwhelmingly called for a simpler ISO standard with clear requirements for each specific business industries in a language that is easy to read and understand.

Compliance to requirements of ISO was an important leadership problem for the

International Aerospace Quality Group (IAQG) and the Aviation, Space and Defense (AS&D) industries. In general, understanding the comments associated with the survey questions may provide insight into the relationship of ISO certification and how it can affect an organization. This study examined the effects on AS&D from ISO compliance to identify the implications of ever-changing requirements through and online survey of 15,000 practitioners. The research illuminated how ISO affects different sized companies throughout the world driven by current and future requirements for certification. The research study concluded by recommending continued research to learn of further impacts of ISO certification on Aviation, Space and Defense industry to continuously improve the requirements for quality management

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APPENDIX A

Survey

1. What is your Sector or Geographical Area?
    a. Americas
    b. Europe
    c. Asia-Pacific
    d. Other (please specify)

2. What is your primary type of industry (select all that apply)?
    a. Aviation
    b. Space
    c. Defense
    d. Other
    If "other", please specify

3. What is the size of your organization
    a. Small <50 employees
    b. Medium 50-500 employees
    c. Large 501-5000 employees
    d. Extra Large> 5000 employees

4. How does your customer flow down 9100/9110/9120 standard certification requirement for your organization?
    a. Mandatory
    b. Recommended
    c. No Requirement

5. How valuable is certification to 9100/9110/9120 in the management of your organization?
    a. Extremely Valuable
    b. Fairly Valuable
    c. Valuable
    d. Somewhat Valuable
    e. No Value

6. How valuable is receiving ISO 9001 certification as part of your 9100 series (9100, 9110 and 9120) certification?
    a. Extremely Valuable
    b. Fairly Valuable

c. Valuable
d. Somewhat Valuable
e. No Value

7. How would you rate the overall clarity of the new requirements added to the 9100/9110/9120 series (see questions below for specifics)
    a. Yes
    b. No
    c. N/A - Not Applicable
    d. Comments
        – Overall 9100 standards clarity
        – Project Management – Clause 7.1.1
        – Risk Management - Clause 7.1.2
        – Configuration Management – Clause 7.1.3
        – Work Transfer – Clause 7.1.4
        – Special Requirements/Critical Items
        – Production Process Verification
        – Customer Focus/Satisfaction – Product Conformity OnTime Delivery focus
        – Process Effectiveness Focus

8. Implementing the 9100/9110/9120:2009 requirements has benefits for my organization that outweight the cost.
    a. Yes
    b. No
    c. Comments

9. The 9100/9110/9120 Deployment Support Material located on the IAQG website (http://www.iaqg.org/) is helpful.
    a. Yes
    b. No
    c. Comments

10. What recommendations would you make to improve 9100/9110/9120 requirement(s) in the next revision?

11. Rate the following future concepts for the revision of 9100/9110/9120 regarding value to your organization.

    a. Extremely Valuable
    b. Fairly Valuable
    c. Valuable

d. Limited Valuable
e. No Value

Rate the following 9100/9110/9120 Future Concepts:

- Additional requirement for prevention of counterfeit parts to product
- Additional focus on Risk Management
- Addition of Business Continuity Plans and Processes
- Addition of Environmental, Health, and Safety (personnel safety)
- Addition of Safety Management System principles (product safety)
- Addition of Aviation, Space, and Defense industry specific requirements in an appendix
- 9100/9110/9120 requirements contained in a single document with the Maintenance Repair and Overhaul (MRO) and distributor additions/deletions specified in an appendix
- Expansion of 9110 standard to include Space and Defense industries
- Strengthen Customer Requirements management in the Product Realization lifecycle
- Strengthen Subtier Supplier Management Processes including Design Change Control, Parts Substitution, Change Notification (Product & Process)

12. Overall comments:

APPENDIX B

IAQG Membership

ASIA-PACIFIC	**EUROPE**
• AIDC (Aerospace Industrial Development Corp.) • AVIC I • AVIC II • COMAC • DSO National Laboratories • Fuji Heavy Industries, Ltd. • Hawker de Havilland • IHI Co. Ltd. • Indonesian Aerospace • KAI (Korea Aerospace Industries) • Korean Air • Kawasaki Heavy Industries, Ltd. • MHI **AMERICAS** • ATK • Ball Aerospace • Boeing • Bombardier Aerospace • Embraer • GE Aviation • Goodrich Corporation • Gulfstream • Honeywell Engines and Systems • Lockheed Martin Corporation • Northrop Grumman • Parker Aerospace • Raytheon • Rockwell Collins • Rolls-Royce • Spirit Aerosystems • Textron • Triumph Group • UTC (United Technologies Corporation)	• Advanced Electronics Company (AEC) • Airbus • Airbus Military • Alenia Aermacchi • AgustaWestland • Astrium • Avio Aero • BAE Systems • Cassidian • Dassault Aviation • ELBIT Systems • Eurocopter • FACC • Fokker Aerospace • GE Aviation Systems • GKN Aerospace Engine Systems • HEGAN • Israel Aerospace Industries LTD • MBDA • Meggitt • Messier-Bugatti-Dowty • MTU Aero Engines • PFW • RAFAEL • Rolls-Royce • Russian Helicopters • Saab • SAFRAN • SAGEM • SNECMA • Sonaca • THALES • Turbomeca • UAC (United Aircraft Corporation) • Zodiac Aerospace

APPENDIX C

Qualitative, Quantitative, and Mixed Methods

Table 1.4 Qualitative, Quantitative, and Mixed Methods Approaches

Tend to or Typically . . .	Qualitative Approaches	Quantitative Approaches	Mixed Methods Approaches
• Use these philosophical assumptions	• Constructivist/ advocacy/ participatory knowledge claims	• Post-positivist knowledge claims	• Pragmatic knowledge claims
• Employ these strategies of inquiry	• Phenomenology, grounded theory, ethnography, case study, and narrative	• Surveys and experiments	• Sequential, concurrent, and transformative
• Employ these methods	• Open-ended questions, emerging approaches, text or image data	• Closed-ended questions, predetermined approaches, numeric data	• Both open- and closed-ended questions, both emerging and predetermined approaches, and both quantitative and qualitative data and analysis
• Use these practices of research as the researcher	• Positions him- or herself • Collects participant meanings • Focuses on a single concept or phenomenon • Brings personal values into the study • Studies the context or setting of participants • Validates the accuracy of findings • Makes interpretations of the data • Creates an agenda for change or reform • Collaborates with the participants	• Tests or verifies theories or explanations • Identifies variables to study • Relates variables in questions or hypotheses • Uses standards of validity and reliability • Observes and measures information numerically • Uses unbiased approaches • Employs statistical procedures	• Collects both quantitative and qualitative data • Develops a rationale for mixing • Integrates the data at different stages of inquiry • Presents visual pictures of the procedures in the study • Employs the practices of both qualitative and quantitative research

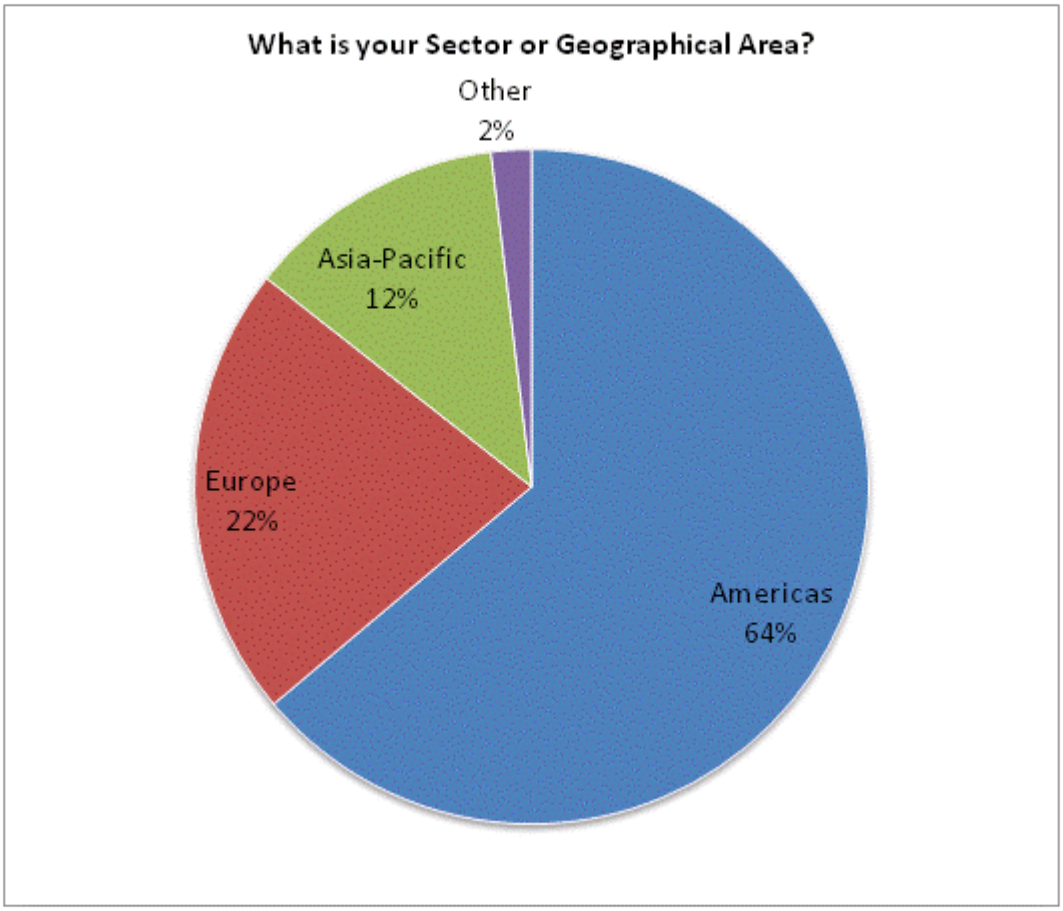
(Creswell, 2009, p. 17)

APPENDIX D

Conceptual Framework

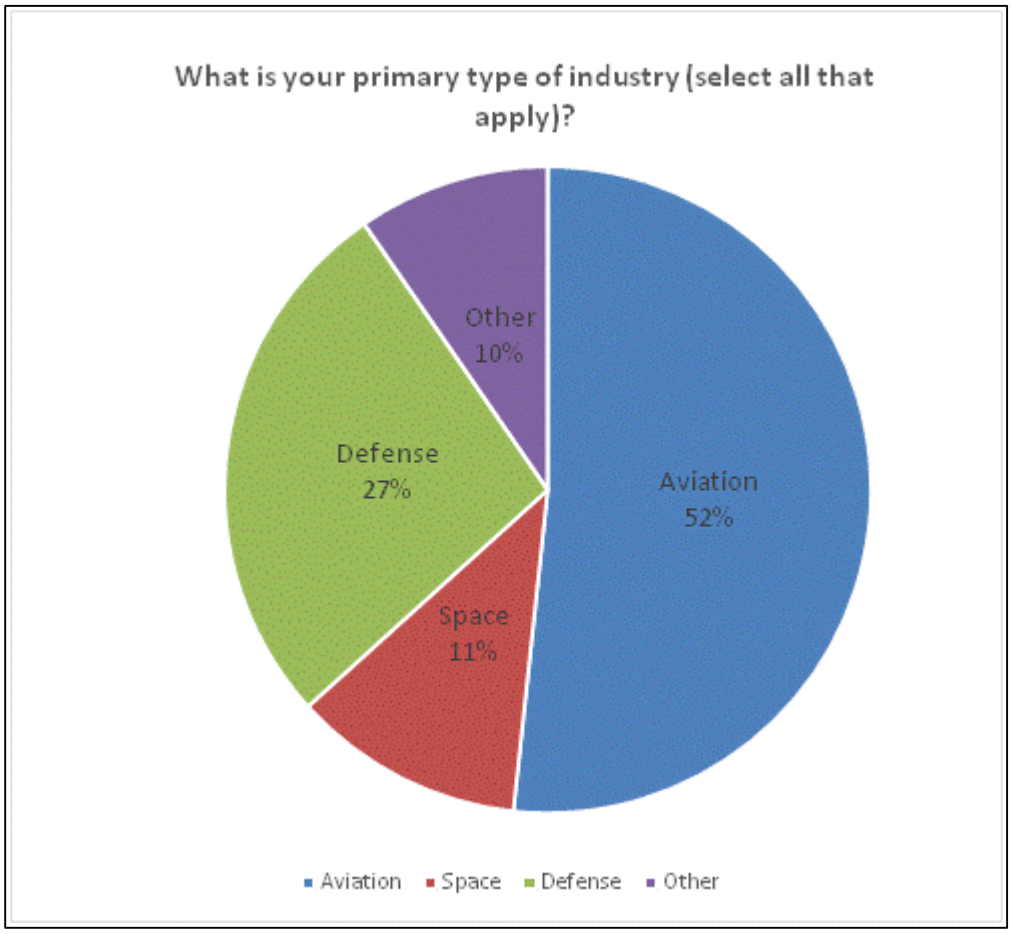
APPENDIX E

(Question 1)



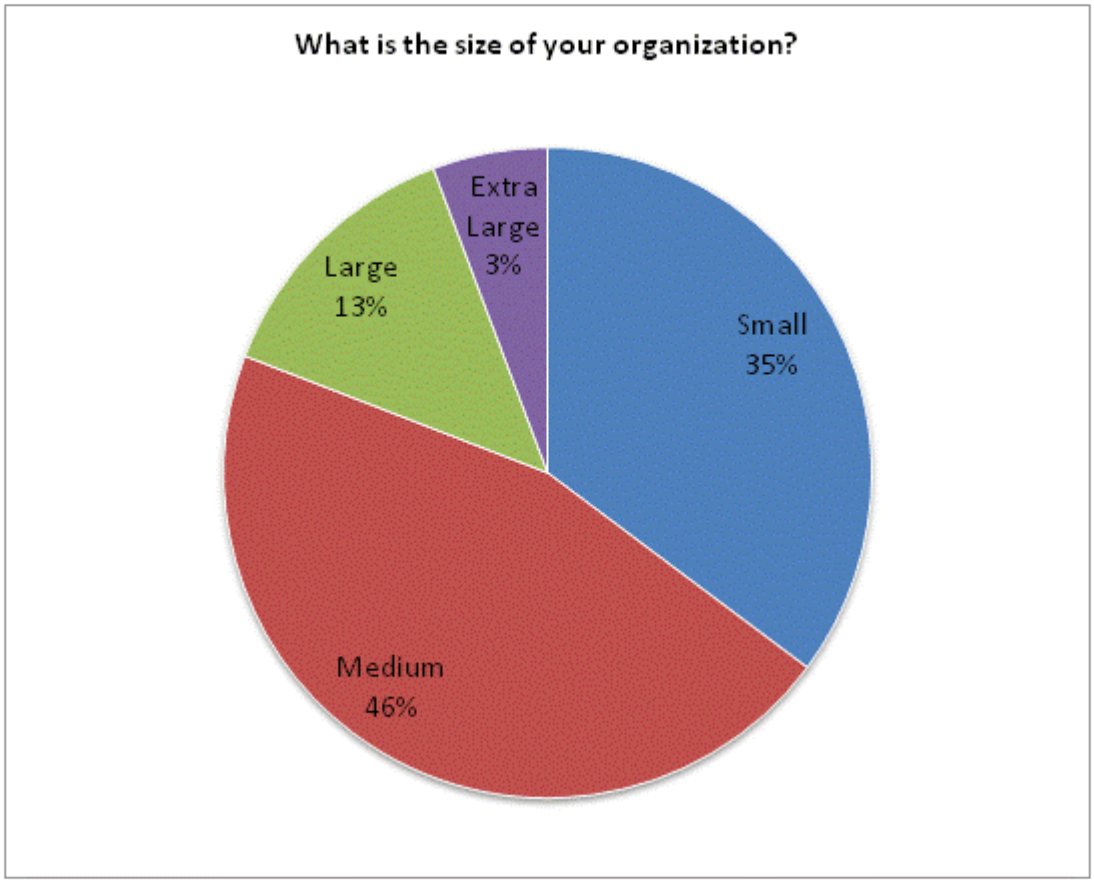
APPENDIX F

(Question 2)



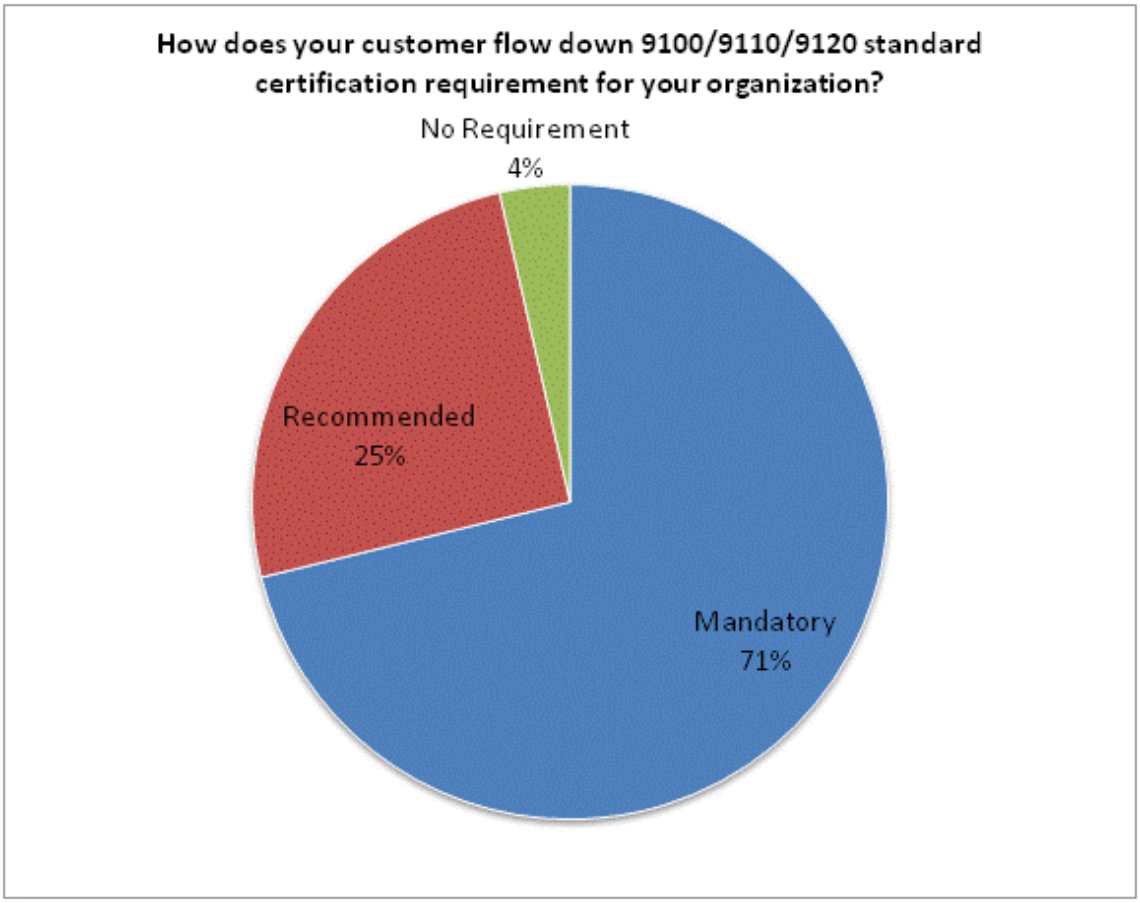
APPENDIX G

(Question 3)



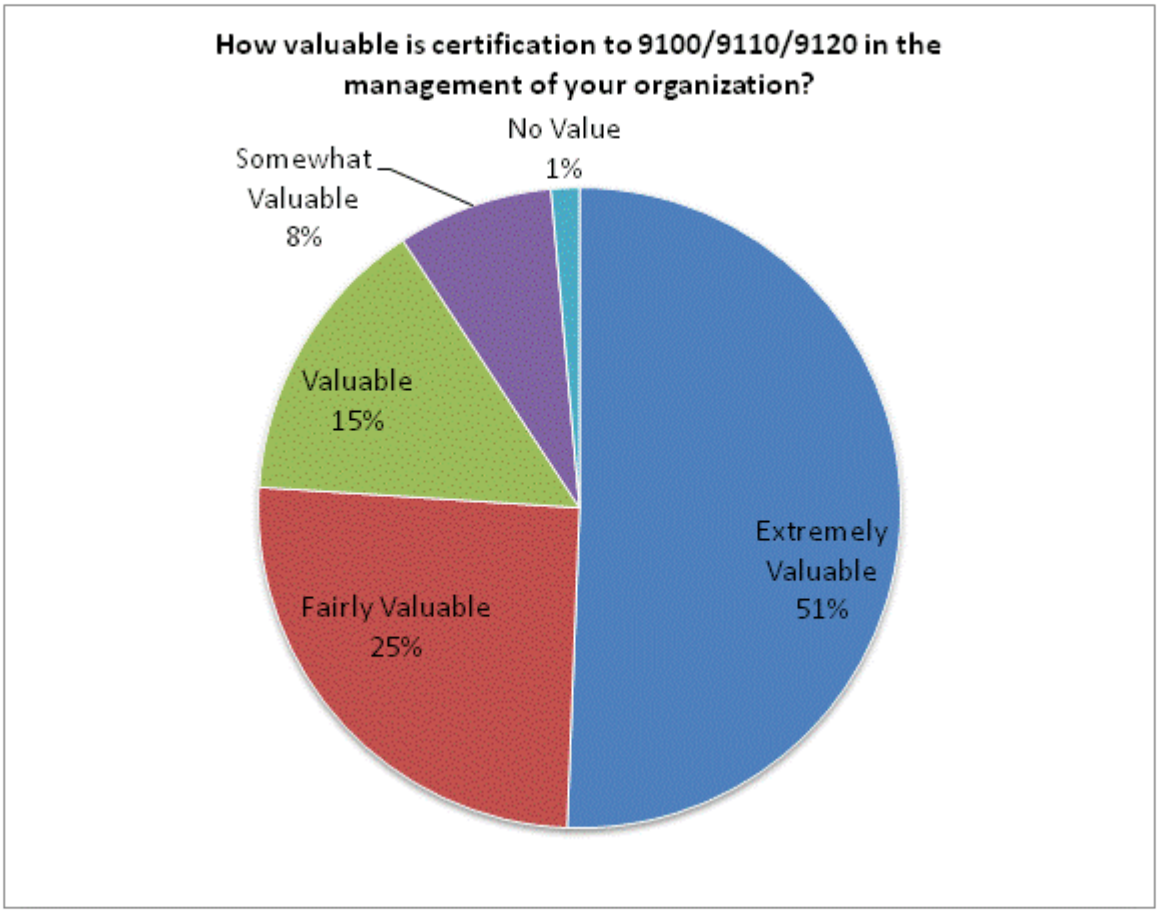
APPENDIX H

(Question 4)



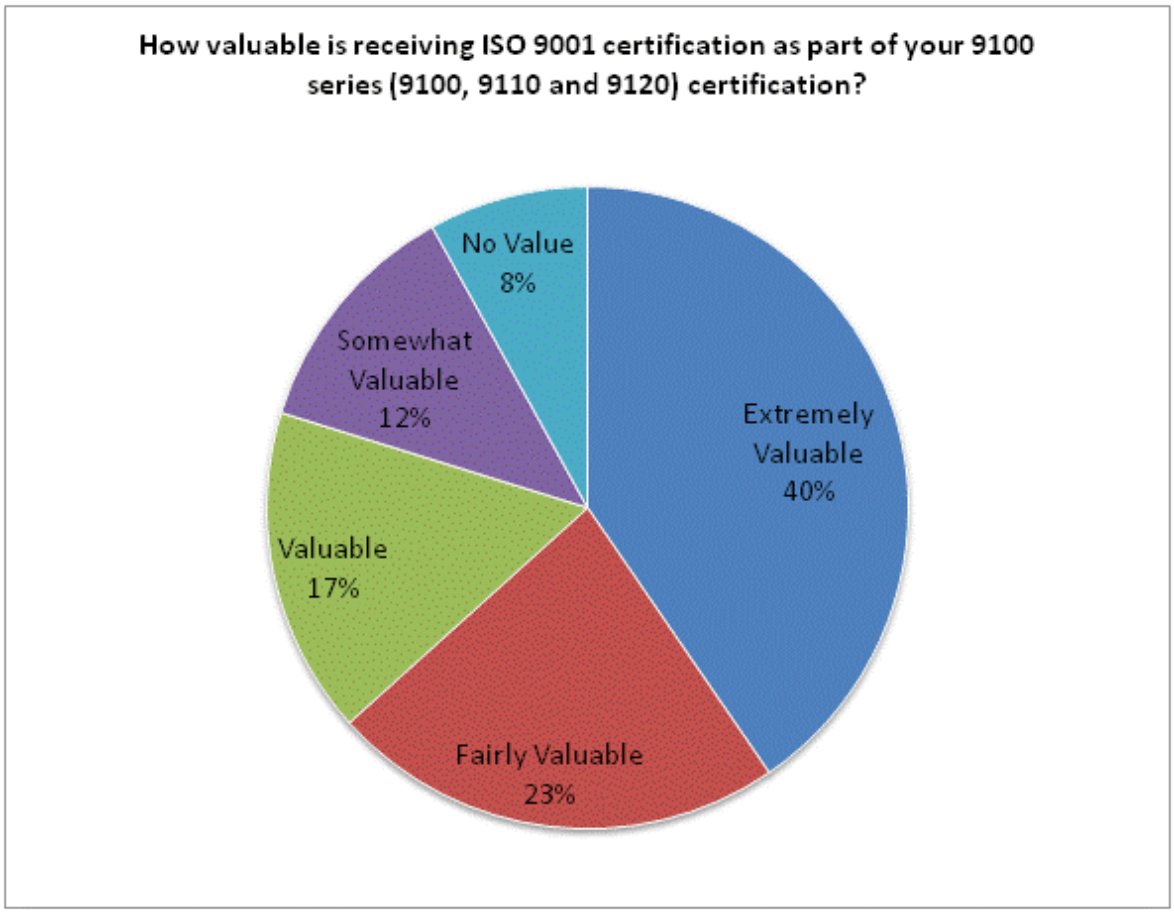
APPENDIX I

(Question 5)



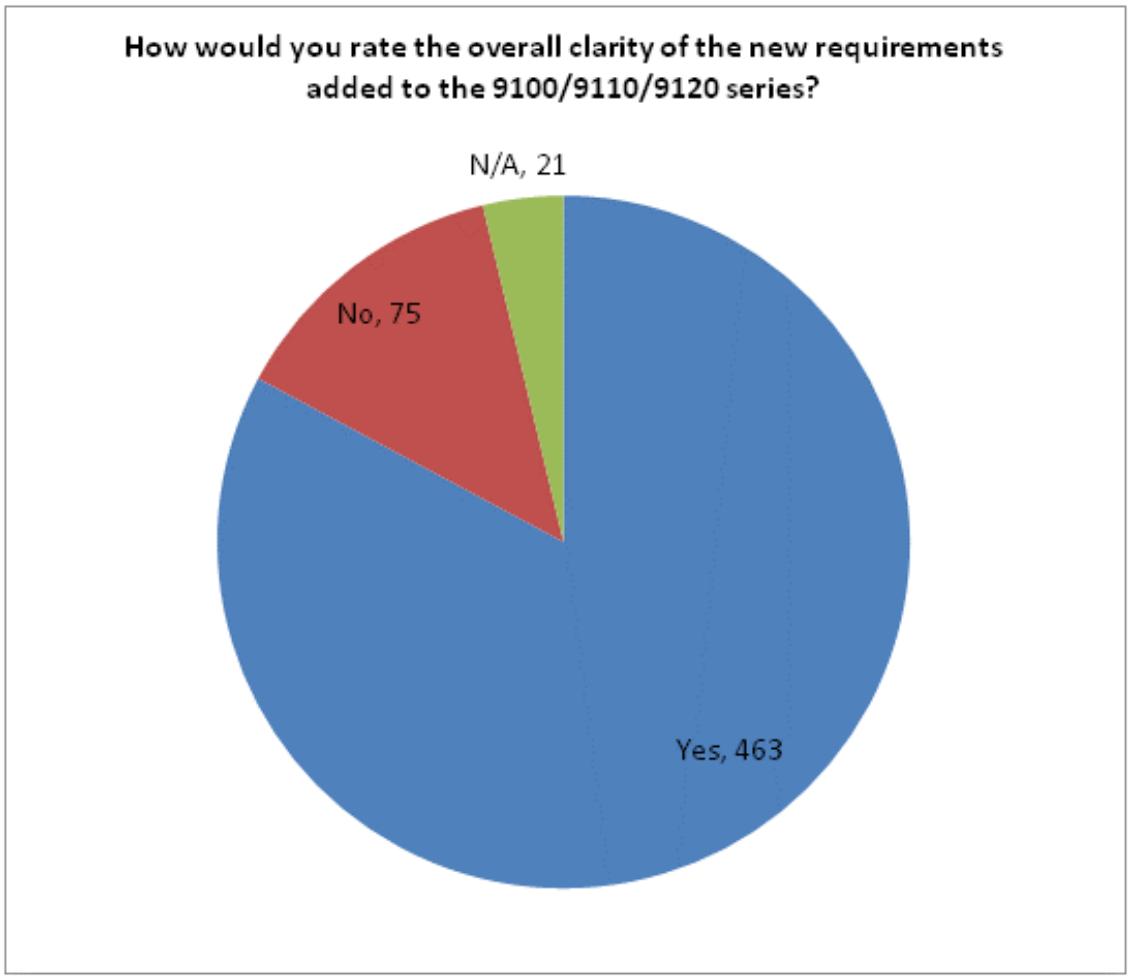
APPENDIX J

(Question 6)



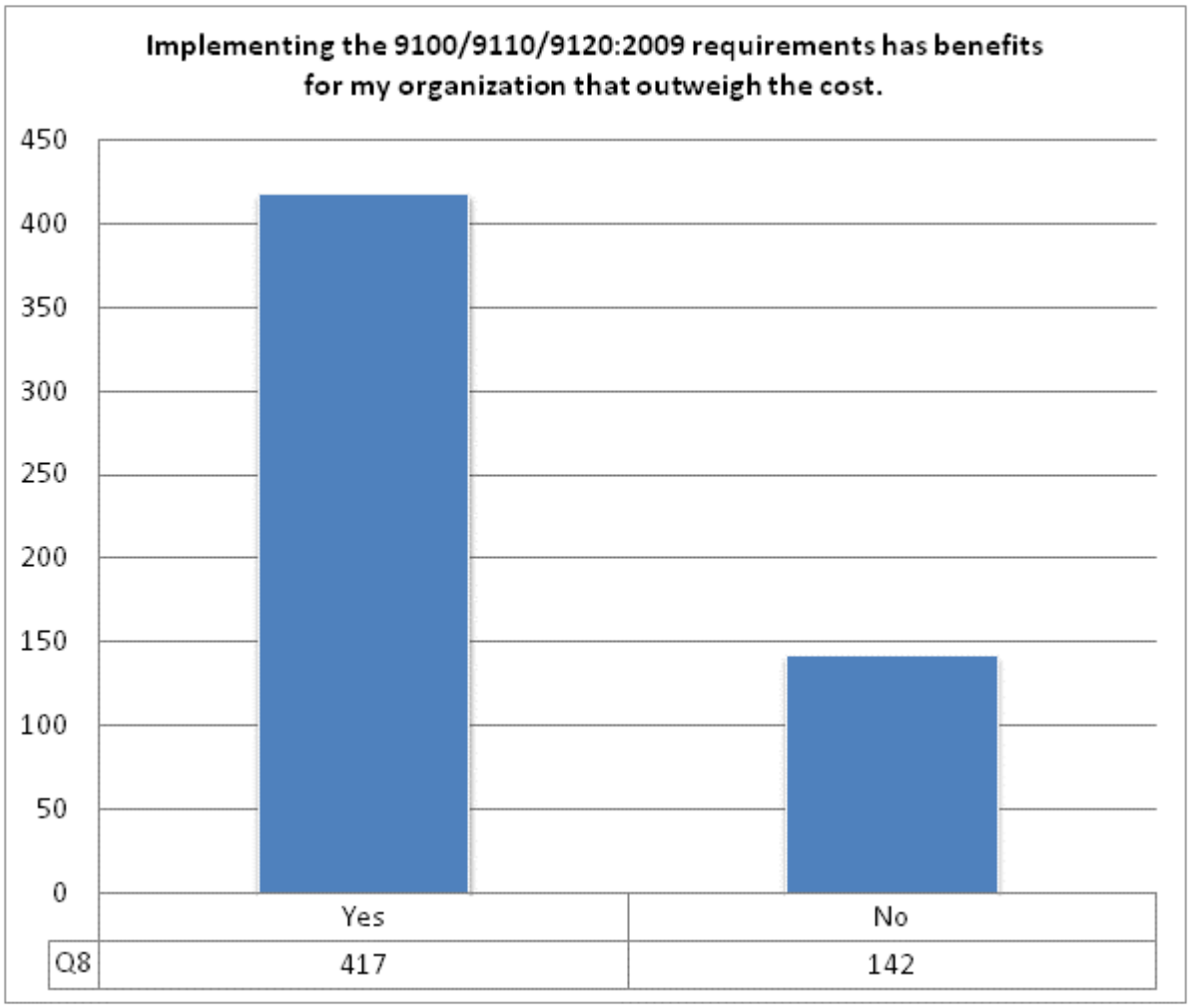
APPENDIX K

(Question 7)



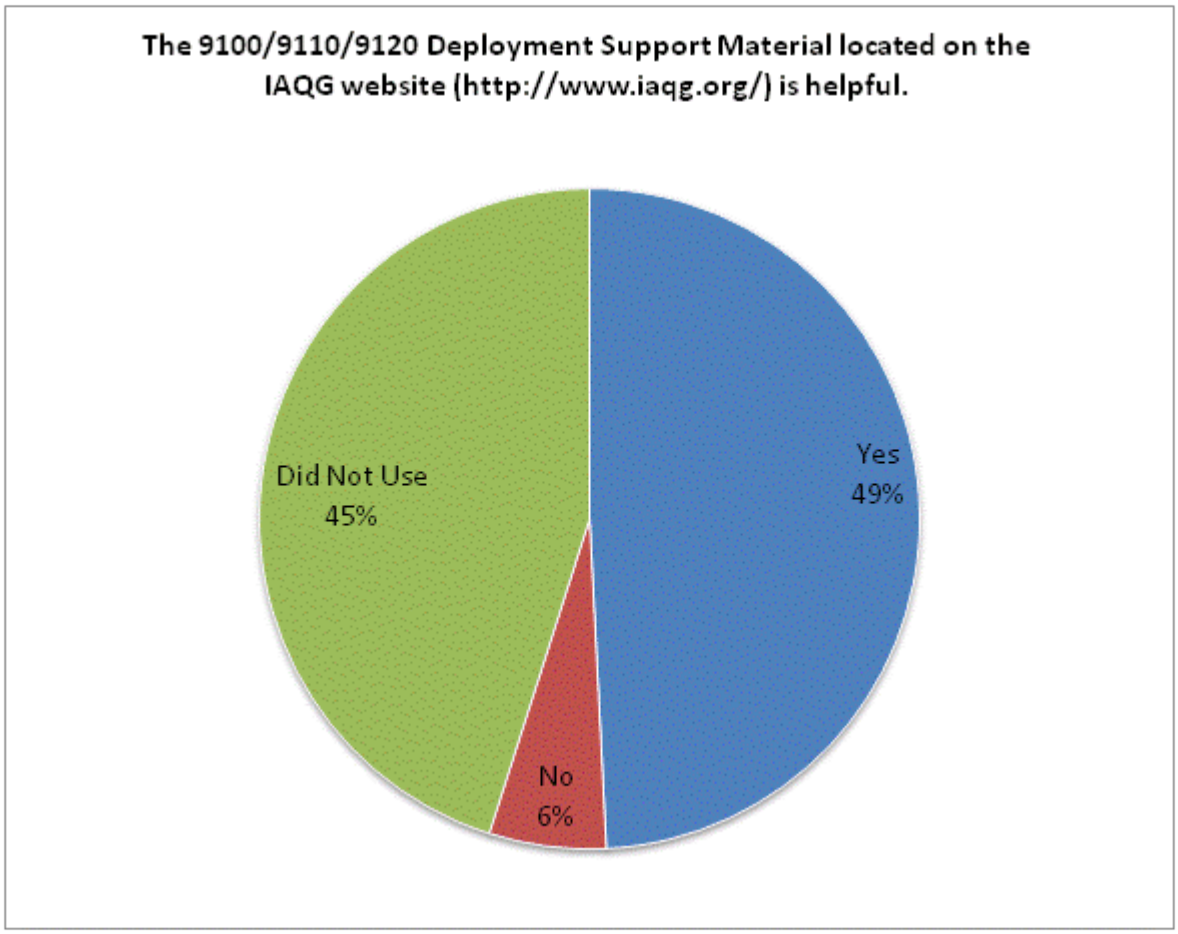
APPENDIX L

(Question 8)



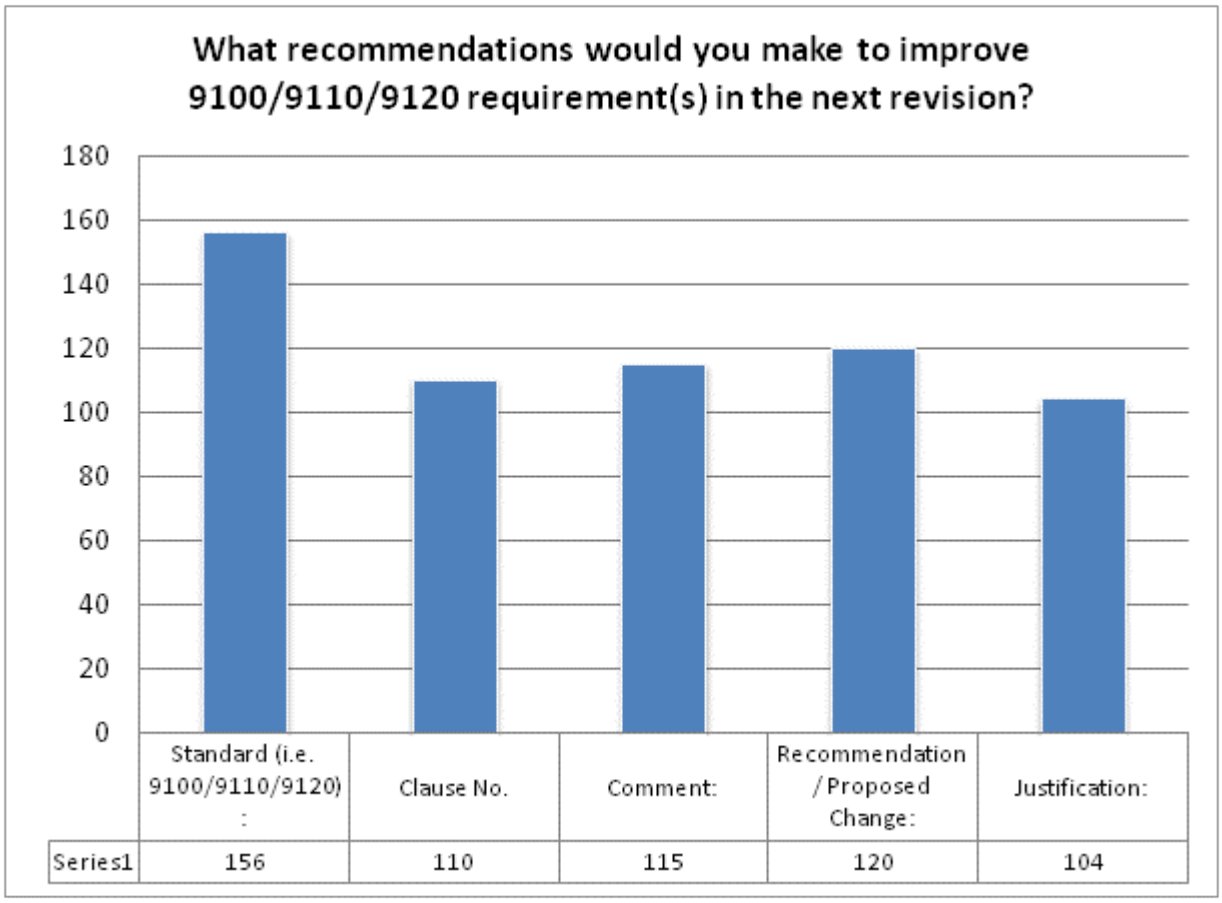
APPENDIX M

(Question 9)



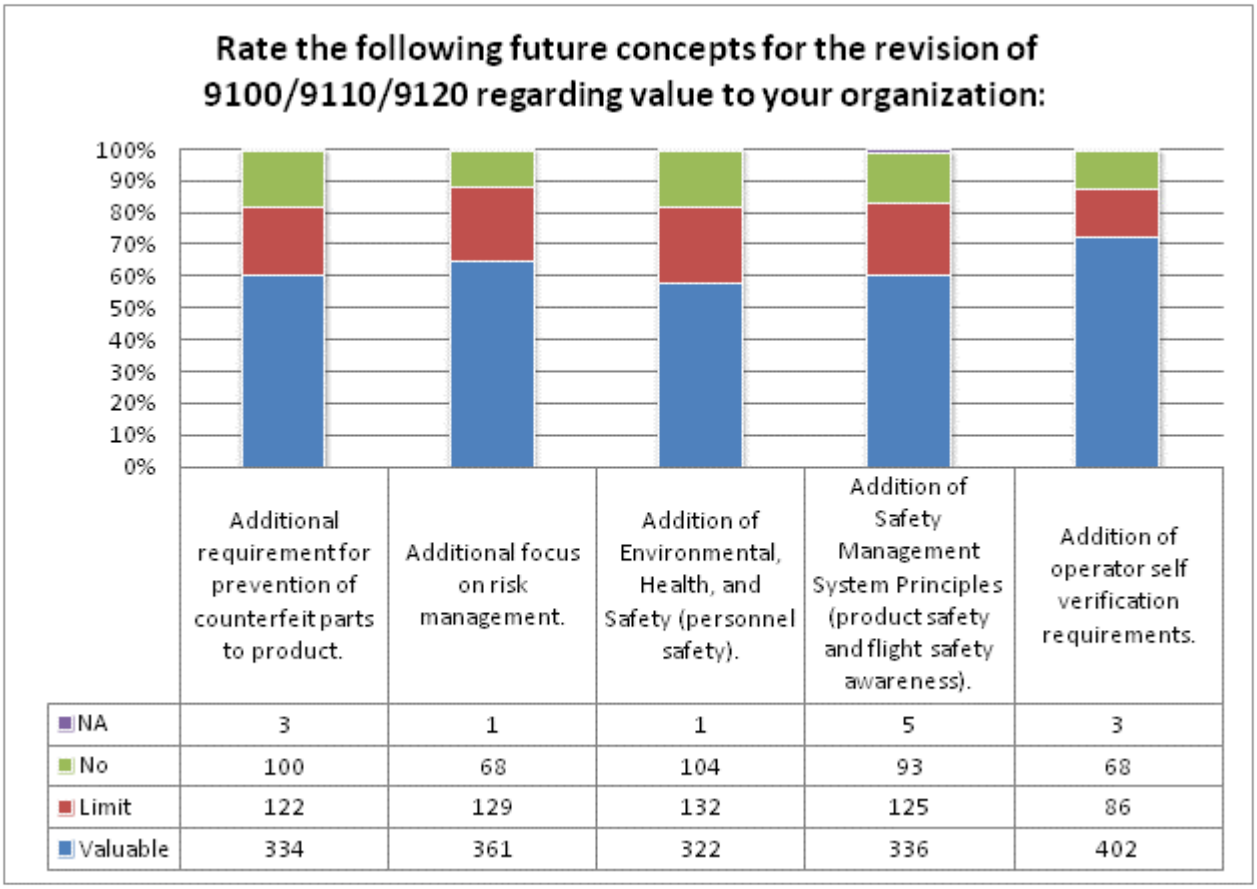
APPENDIX N

(Question 10)

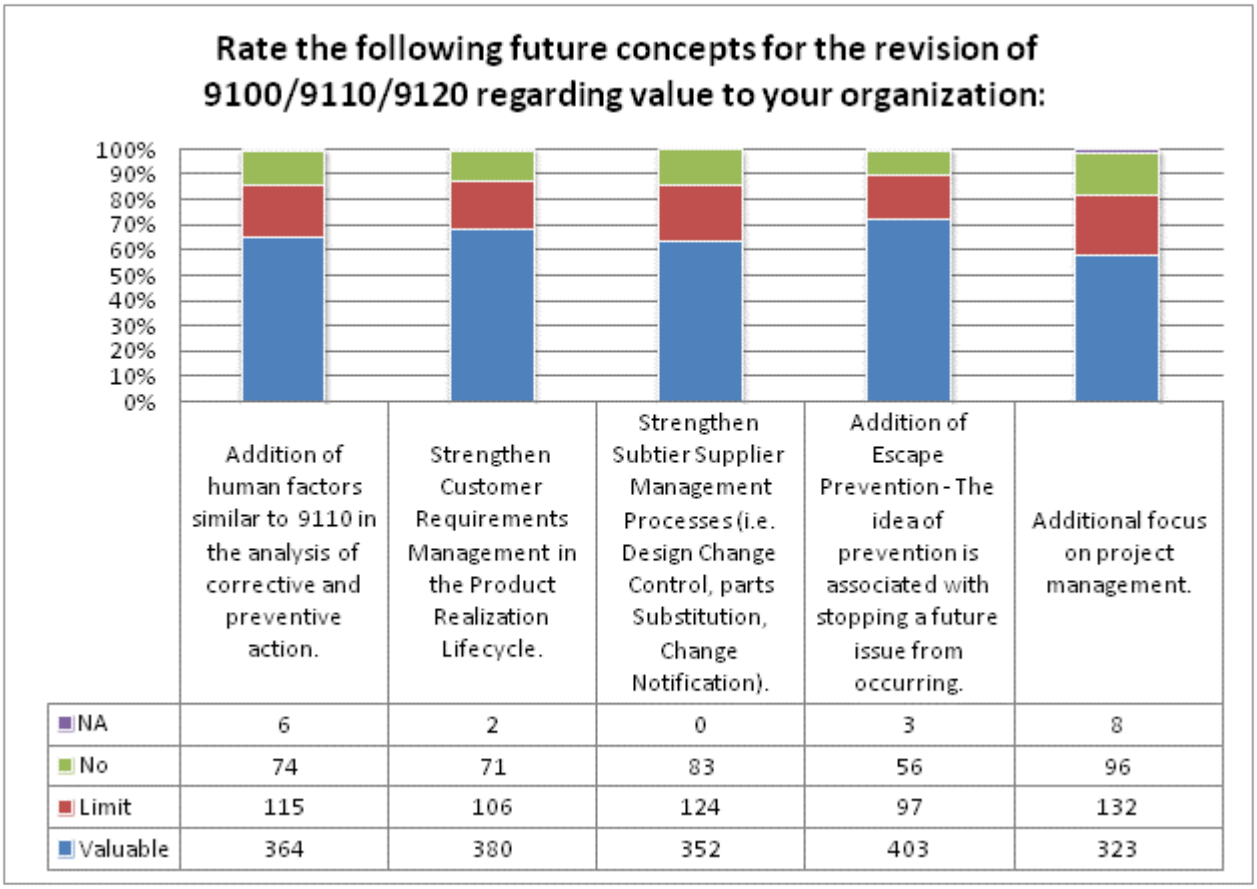


APPENDIX O

(Question 11)



	Additional requirement for prevention of counterfeit parts to product.	Additional focus on risk management.	Addition of Environmental, Health, and Safety (personnel safety).	Addition of Safety Management System Principles (product safety and flight safety awareness).	Addition of operator self verification requirements.
NA	3	1	1	5	3
No	100	68	104	93	68
Limit	122	129	132	125	86
Valuable	334	361	322	336	402



	Addition of human factors similar to 9110 in the analysis of corrective and preventive action.	Strengthen Customer Requirements Management in the Product Realization Lifecycle.	Strengthen Subtier Supplier Management Processes (i.e. Design Change Control, parts Substitution, Change Notification).	Addition of Escape Prevention - The idea of prevention is associated with stopping a future issue from occurring.	Additional focus on project management.
NA	6	2	0	3	8
No	74	71	83	56	96
Limit	115	106	124	97	132
Valuable	364	380	352	403	323

APPENDIX P

(Question 12)

APPENDIX Q

Chi-Square & Pearman's

Results from Chi-Square Test

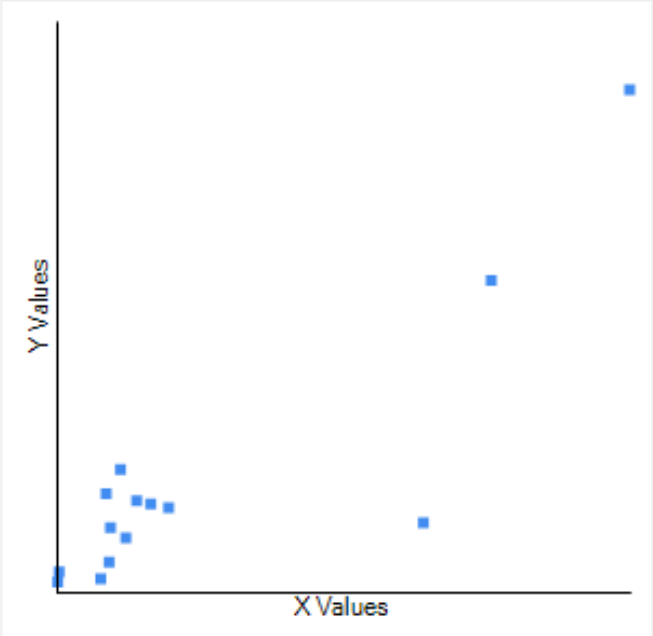
Table of Location by IndAviation			
Location(What is your Sector or Geographical Area?)	IndAviation(What is your primary type of industry (select all that apply)? - Aviation)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	90 16.10 24.75 76.27	274 49.02 75.27 62.13	364 65.12
2	13 2.33 18.31 11.02	58 10.38 81.69 13.15	71 12.71
3	15 2.58 12.10 12.71	109 19.50 87.90 27.72	124 22.08
Total	118 21.11	441 78.89	559 100.00

Statistics for Table of Location by IndAviation

Statistic	DF	Value	Prob
Chi-Square	2	9.24	0.0099

The chi-square statistic is 9.24. The *P*-Value is 0.0099. The result is significant at $p < 0.05$ for the Question 1 "What is your Sector or Geographical Area" comparison to Question 2 "What is your primary type of industry" if the response is "Aviation".

Results from Pearman's Rank Correlation Test
Chart of Location by IndAviation



The value of *R* is 0.8727. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.7616. The relationship is strong with Question 1 "What is your Sector or Geographical Area" comparison to Question 2 "What is your primary type of industry" if the response is "Aviation".

Results from Chi-Square Test

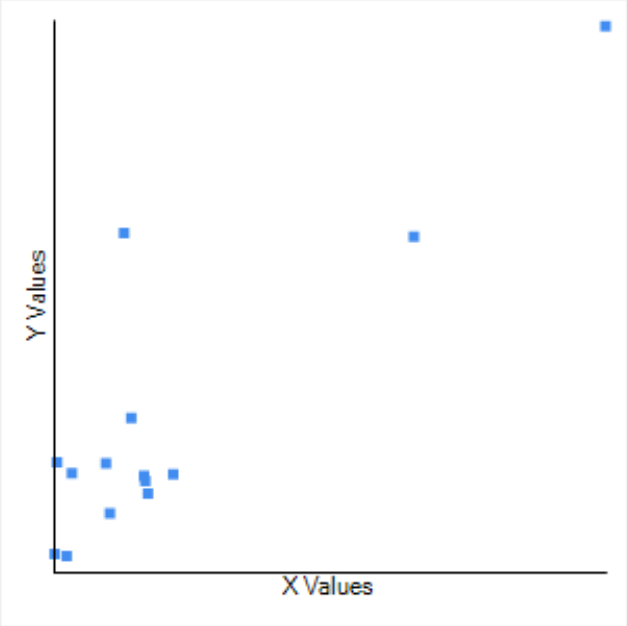
Table of Location by IndSpace			
Location(What is your Sector or Geographical Area?)	IndSpace(What is your primary type of industry (select all that apply)? - Space)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	303 54.20 83.24 65.87	61 10.92 16.76 61.62	364 65.12
2	51 9.12 71.83 11.09	20 3.58 28.17 20.20	71 12.70
3	106 18.96 85.48 23.04	18 3.22 14.52 18.18	124 22.18
Total	460 82.29	99 17.71	559 100.00

Statistics for Table of Location by IndSpace

Statistic	DF	Value	Prob
Chi-Square	2	6.4235	0.040286

The chi-square statistic is 6.4235. The *P*-Value is 0.040286. The result is significant at $p < 0.05$ for the Question 1 “What is your Sector or Geographical Area” comparison to Question 2 “What is your primary type of industry” if the response is “Space”.

Results from Pearman's Rank Correlation Test
Chart of Location by IndSpace



The value of *R* is 0.868. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.7534. The relationship is positive with Question 1 "What is your Sector or Geographical Area" comparison to Question 2 "What is your primary type of industry" if the response is "Space".

Results from Chi-Square Test

Table of Location by IndDefense			
Location(What is your Sector or Geographical Area?)	IndDefense(What is your primary type of industry (select all that apply)? - Defense)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	204 36.49 56.04 63.64	160 28.63 43.96 68.66	364 65.12
2	41 7.33 57.75 12.50	30 5.37 42.25 12.99	71 12.70
3	83 14.85 54.24 25.30	41 7.33 45.76 17.75	124 22.18
Total	328 58.68	231 41.32	559 100.00

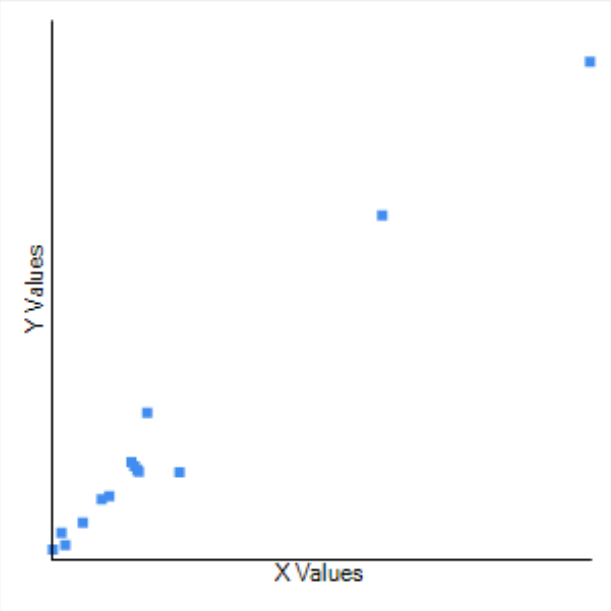
Statistics for Table of Location by IndDefense

Statistic	DF	Value	Prob
Chi-Square	2	4.554	0.102592

The chi-square statistic is 4.554. The *P*-Value is 0.102592. The result is *not* significant at $p < 0.05$ with the "Location" comparison to "Defense" industry. Question 1 "What is your Sector or Geographical Area" does not have a significant relation to Question 2 "What is your primary type of industry" if the response is "Defense".

Results from Pearman's Rank Correlation Test

Chart of Location by IndDefense



The value of *R* is 0.9892. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.9785. The relation is positive with Question 1 "What is your Sector or Geographical Area" comparison by Question 2 "What is your primary type of industry" if the response is "Defense".

Results from Chi-Square Test

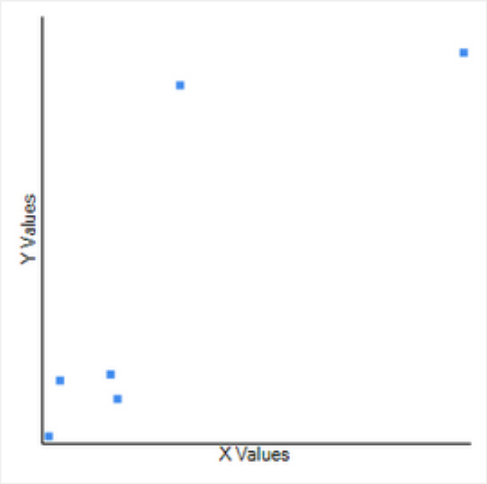
Table of DeployHelp by Location				
DeployHelp(The 9100/9110/9120 Deployment Support Material located on the IAQG website (http://www.iaqg.org/) is helpful.)	Location(What is your Sector or Geographical Area?)			
Frequency Percent Row Pct Col Pct	1	2	3	Total
1	166 29.69 60.36 45.60	43 7.69 15.64 60.56	66 11.81 24.00 53.22	275 49.19
2	25 4.47 78.12 6.87	3 0.54 9.37 4.22	4 0.71 12.50 3.22	32 5.72
3	173 30.95 68.65 47.53	25 4.47 9.92 35.21	54 9.66 21.43 43.55	252 45.08
Total	364 65.12	71 12.70	124 22.18	559 100.00

Statistics for Table of DeployHelp by Location

Statistic	DF	Value	Prob
Chi-Square	4	7.7736	0.100234

The chi-square statistic is 7.7736. The *P*-Value is 0.100234. The result is *not* significant at $p < 0.05$ with the Question 9 “The 9100/9110/9120 Deployment Support Material” comparison by Question 1 “What is your Sector or Geographical Area”. The data analysis shows varying results with specific locations identified.

Results from Pearman's Rank Correlation Test
Chart of DeployHelp by Location



The value of *R* is 0.8339. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.6954. The relation is positive with Question 9 "The 9100/9110/9120 Deployment Support Material" when compared by Question 1 "What is your Sector or Geographical Area".

Results from Chi-Square Test

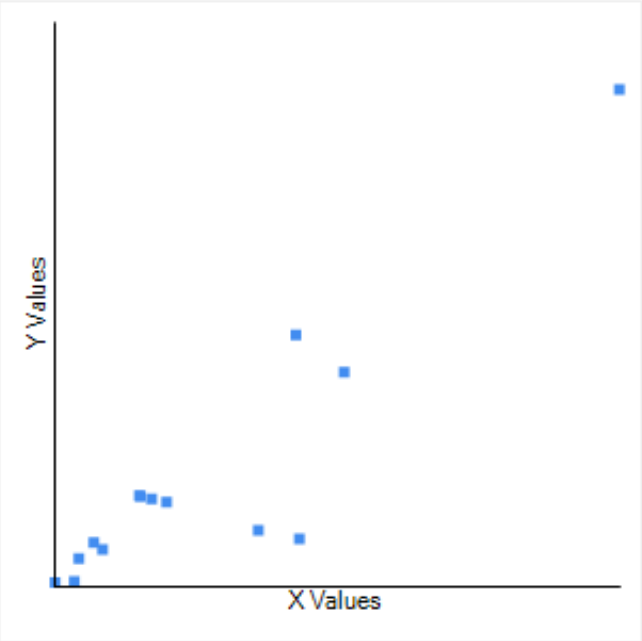
Table of DeployHelp by IndAviation			
DeployHelp(The 9100/9110/9120 Deployment Support Material located on the IAQG website (http://www.iaqg.org/) is helpful.)	IndAviation(What is your primary type of industry (select all that apply)? - Aviation)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	51 9.12 18.54 43.22	224 40.07 81.45 50.79	275 49.19
2	6 1.07 18.75 5.08	26 4.65 81.25 5.89	32 5.72
3	61 10.91 24.21 51.69	191 34.17 75.79 43.31	252 45.08
Total	118 21.11	441 78.89	559 100.00

Statistics for Table of DeployHelp by IndAviation

Statistic	DF	Value	Prob
Chi-Square	2	2.6439	0.266618

The chi-square statistic is 2.6439. The *P*-Value is 0.266618. The result is *not* significant at $p < 0.05$ with the comparison of Question 9 “The 9100/9110/9120 Deployment Support Material” by Question 2 “What your primary type of industry” if the response is “Aviation”.

Results from Pearman's Rank Correlation Test
Chart of DeployHelp by IndAviation



The value of *R* is 0.9085. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.8254. The relation is positive with Question 9 "The 9100/9110/9120 Deployment Support Material" by Question 2 "What your primary type of industry" if the response is "Aviation".

Results from Chi-Square Test

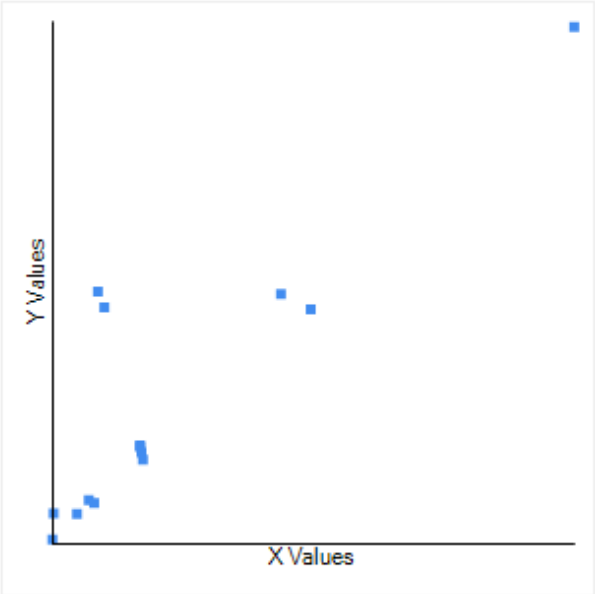
Table of DeployHelp by IndSpace			
DeployHelp(The 9100/9110/9120 Deployment Support Material located on the IAQG website (http://www.iaqg.org/) is helpful.)	IndSpace(What is your primary type of industry (select all that apply)? - Space)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	230 41.14 83.64 50.00	45 8.05 16.36 45.45	275 49.19
2	26 4.65 81.25 5.65	6 1.07 18.75 6.06	32 5.72
3	204 36.49 80.95 44.35	48 8.59 19.05 48.48	252 45.08
Total	460 82.29	99 17.71	559 100.00

Statistics for Table of DeployHelp by IndSpace

Statistic	DF	Value	Prob
Chi-Square	2	0.6752	0.713488

The chi-square statistic is 0.6752. The *P*-Value is 0.713488. The result is *not* significant at $p < 0.05$ with the Question 9 “The 9100/9110/9120 Deployment Support Material” by Question 2 “What your primary type of industry” if the response is “Space”.

Results from Pearman's Rank Correlation Test
Chart of DeployHelp by IndSpace



The value of *R* is 0.873. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.7621. The relation is positive with Question 9 "The 9100/9110/9120 Deployment Support Material" by Question 2 "What your primary type of industry" if the response is "Space".

Results from Chi-Square Test

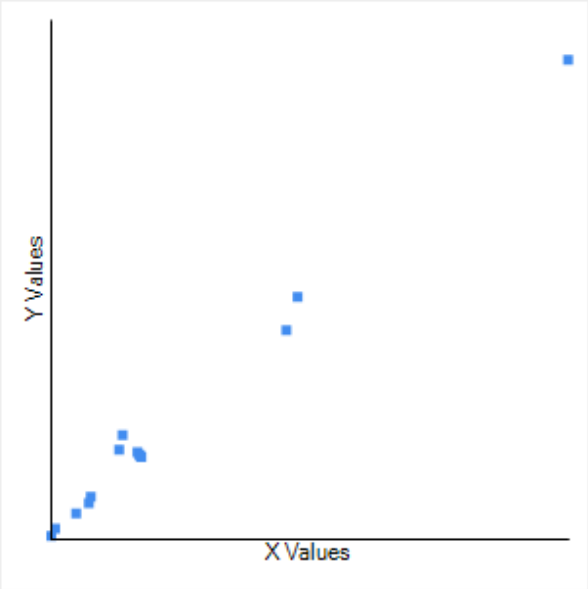
Table of DeployHelp by IndDefense			
DeployHelp(The 9100/9110/9120 Deployment Support Material located on the IAQG website (http://www.iaqg.org/) is helpful.)	IndDefense(What is your primary type of industry (select all that apply)? - Defense)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	158 28.26 57.45 48.17	117 20.93 42.54 50.65	275 49.19
2	19 3.40 59.37 5.79	13 2.32 40.62 5.63	32 5.72
3	151 27.01 59.92 46.04	101 18.07 40.08 43.72	252 45.08
Total	328 58.68	231 41.32	559 100.00

Statistics for Table of DeployHelp by IndDefense

Statistic	DF	Value	Prob
Chi-Square	2	0.6229	0.7324

The chi-square statistic is 0.6229. The *P*-Value is 0.7324. The result is *not* significant at $p < 0.05$ with the Question 9 “The 9100/9110/9120 Deployment Support Material” by Question 2 “What your primary type of industry” if the response is “Defense”.

Results from Pearman's Rank Correlation Test
Chart of DeployHelp by IndDefense



The value of *R* is 0.9956. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.9912. The relation is positive with Question 9 "The 9100/9110/9120 Deployment Support Material" by Question 2 "What your primary type of industry" if the response is "Defense".

Results from Chi-Square Test

Table of DeployHelp by IndDefense			
DeployHelp(The 9100/9110/9120 Deployment Support Material located on the IAQG website (http://www.iaqg.org/) is helpful.)	IndDefense(What is your primary type of industry (select all that apply)? - Defense)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	158 28.26 57.45 48.17	117 20.93 42.54 50.65	275 49.19
2	19 3.40 59.37 5.79	13 2.32 40.62 5.63	32 5.72
3	151 27.01 59.92 46.04	101 18.07 40.08 43.72	252 45.08
Total	328 58.68	231 41.32	559 100.00

Statistics for Table of DeployHelp by IndDefense

Statistic	DF	Value	Prob
Chi-Square	2	0.3367	0.845076

The chi-square statistic is 0.3367. The *P*-Value is 0.845076. The result is *not* significant at $p < 0.05$ with the Question 9 “The 9100/9110/9120 Deployment Support Material” by Question 2 “What your primary type of industry” if the response is “Defense”.

Results from Chi-Square Test

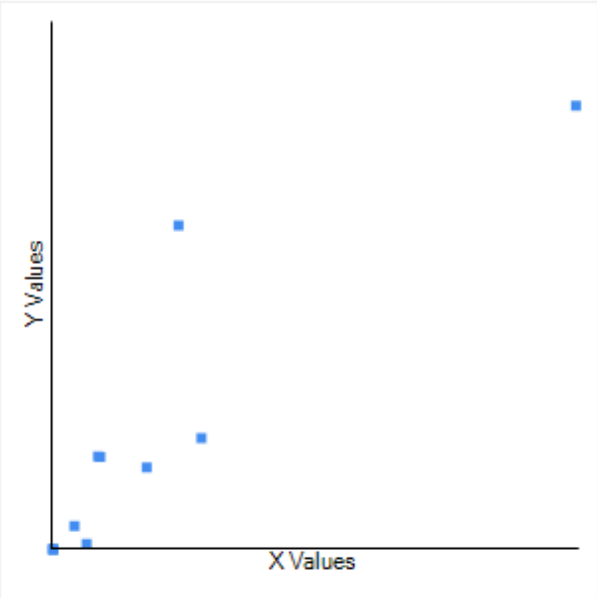
Table of BenefitOrg by Location				
BenefitOrg(Implementing the 9100/9110/9120:2009 requirements has benefits for my organization that outweight the cost.)	Location(What is your Sector or Geographical Area?)			
Frequency Percent Row Pct Col Pct	1	2	3	Total
1	263 47.05 63.01 72.25	60 10.73 23.72 84.51	94 16.82 22.54 75.81	417 74.60
2	101 18.67 73.68 27.75	11 5.33 21.05 15.49	30 1.33 21.13 24.19	142 25.40
Total	364 65.12	71 12.70	124 22.18	559 100.00

Statistics for Table of BenefitOrg by Location

Statistic	DF	Value	Prob
Chi-Square	2	4.381	0.089322

The chi-square statistic is 4.831. The *P*-Value is 0.089322. The result is *not* significant at $p < 0.05$ with the Question 8 “Implementing the 9100/9110/9120:2009 requirements…” with comparison by Question 1 “What is your Sector or Geographical Area”.

Results from Pearman's Rank Correlation Test
Chart of BenefitOrg by Location



The value of *R* is 0.886. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.785. There is a positive correlation of Question 8 "Implementing the 9100/9110/9120:2009 requirements…" if compared by Question 1 "What is your Sector or Geographical Area" meaning different locations are inclined to experience benefits.

Results from Chi-Square Test

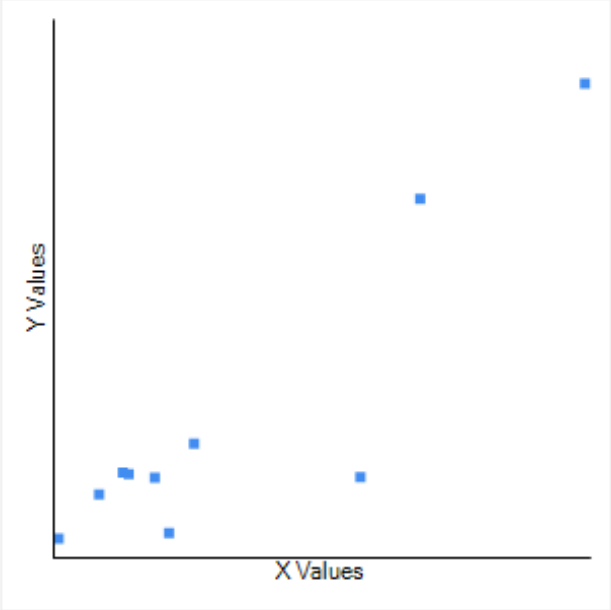
Table of BenefitOrg by IndAviation			
BenefitOrg(Implementing the 9100/9110/9120:2009 requirements has benefits for my organization that outweight the cost.)	IndAviation(What is your primary type of industry (select all that apply)? - Aviation)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	83 14.85 19.90 70.34	334 59.75 80.09 75.74	417 74.60
2	35 6.26 26.65 29.66	107 19.14 75.35 24.26	142 25.40
Total	118 21.11	441 78.89	559 100.00

Statistics for Table of BenefitOrg by IndAviation

Statistic	DF	Value	Prob
Chi-Square	1	1.4314	0.231531

The Chi-square statistic is 1.4314. The *P*-Value is 0.231531. This result is *not* significant at $p < 0.05$ with Question 8 “Implementing the 9100/9110/9120:2009 requirements…” with comparison by Question 2 “What is your primary type of industry” if the response is “Aviation”.

Results from Pearman's Rank Correlation Test
Chart of BenefitOrg by IndAviation



The value of *R* is 0.896. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.8028. There is a positive correlation of Question 8 "Implementing the 9100/9110/9120:2009 requirements…" with Question 2 "What is your primary type of industry" if the response is "Aviation".

Results from Chi-Square Test

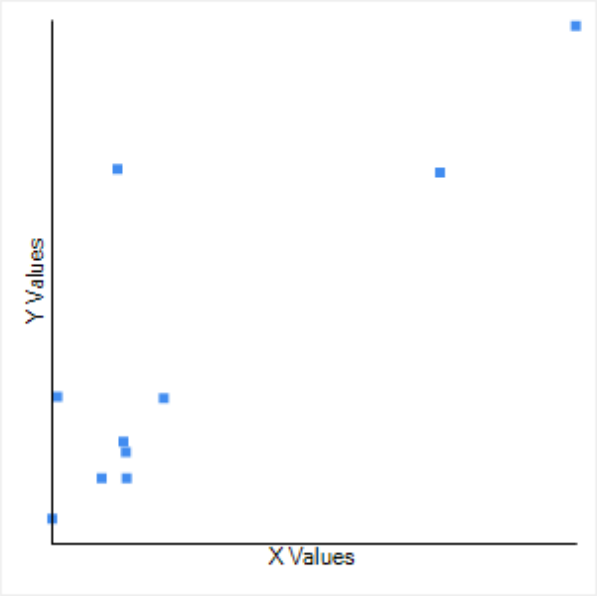
Table of BenefitOrg by IndSpace			
BenefitOrg(Implementing the 9100/9110/9120:2009 requirements has benefits for my organization that outweight the cost.)	IndSpace(What is your primary type of industry (select all that apply)? - Space)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	346 61.90 82.97 75.22	71 12.70 12.70 71.72	417 74.60
2	114 20.39 80.28 24.78	28 5.01 19.72 28.28	142 25.40
Total	460 82.29	99 17.71	559 100.00

Statistics for Table of BenefitOrg by IndSpace

Statistic	DF	Value	Prob
Chi-Square	1	05.267	0.467994

The Chi-square statistic is 0.5267. The *P*-Value is 0.467994. This result is *not* significant at $p < 0.05$ with Question 8 “Implementing the 9100/9110/9120:2009 requirements…” with the Question 2 “What is your primary type of industry” if the response is “Space”.

Results from Pearman's Rank Correlation Test
Chart of BenefitOrg by IndSpace



The value of *R* is 0.83. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.6889. There is a positive correlation of Question 8 "Implementing the 9100/9110/9120:2009 requirements…" with Question 2 "What is your primary type of industry" if the response is "Space".

Results from Chi-Square Test

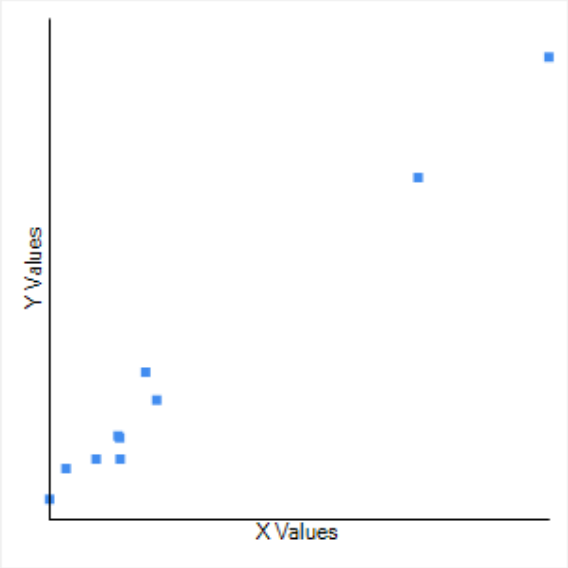
Table of BenefitOrg by IndDefense			
BenefitOrg(Implementing the 9100/9110/9120:2009 requirements has benefits for my organization that outweight the cost.)	IndDefense(What is your primary type of industry (select all that apply)? - Defense)		
Frequency Percent Row Pct Col Pct	0	1	Total
1	246 44.01 58.99 75.00	171 30.59 30.59 74.02	417 74.60
2	82 14.67 57.75 25.00	60 10.73 42.25 25.97	142 25.40
Total	328 58.68	231 41.32	559 100.00

Statistics for Table of BenefitOrg by IndDefense

Statistic	DF	Value	Prob
Chi-Square	1	0.0679	0.794478

The Chi-square statistic is 0.0679. The *P*-Value is 0.794478. This result is *not* significant at $p < 0.05$ with the Question 8 "Implementing the 9100/9110/9120:2009 requirements…" with Question 2 "What is your primary type of industry" if the response is "Defense".

Results from Pearman's Rank Correlation Test
Chart of BenefitOrg by IndDefense



The value of *R* is 0.9935. This is a strong positive correlation, which means that high *X* variable scores go with high *Y* variable scores (and vice versa). The value of R^2, the coefficient of determination, is 0.987. There is a positive correlation of Question 8 "Implementing the 9100/9110/9120:2009 requirements…" with Question 2 "What is your primary type of industry" if the response is "Defense".

APPENDIX R

Copy of IRB Approval Letter

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

May 16, 2014

Jewel Cowart

Protocol #: E0414D04
Project Title: Organizational Leadership: A Study on the Effects of Certification to International Organization for Standardization (ISO)

Dear Ms. Cowart:

Thank you for submitting your application, *Organizational Leadership: A Study on the Effects of Certification to International Organization for Standardization (ISO)*, for exempt review to Pepperdine University's Graduate and Professional Schools Institutional Review Board (GPS IRB). The IRB appreciates the work you and your faculty advisor, Dr. Sparks, have done on the proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations (45 CFR 46 - http://www.nihtraining.com/ohsrsite/guidelines/45cfr46.html) that govern the protections of human subjects. Specifically, section 45 CFR 46.101(b)(2) states:

> (b) Unless otherwise required by Department or Agency heads, research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from this policy:
>
> **Category (2) of 45 CFR 46.101**, research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: a) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit a **Request for Modification Form** to the GPS IRB. Because your study falls under exemption, there is no requirement for continuing IRB review of your project. Please be aware that changes to your protocol may prevent the research from qualifying for exemption from 45 CFR 46.101 and require submission of a new IRB application or other materials to the GPS IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the GPS IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the GPS IRB and the appropriate form to be used to report this information can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* (see link to "policy material" at http://www.pepperdine.edu/irb/graduate/).

Please refer to the protocol number denoted above in all further communication or correspondence related to this approval. Should you have additional questions, please contact Kevin Collins, Manager of the Institutional Review Board (IRB) at gpsirb@peppderdine.edu. On behalf of the GPS IRB, I wish you success in this scholarly pursuit.

Sincerely,

Thema Bryant-Davis, Ph.D.
Chair, Graduate and Professional Schools IRB

cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives
Mr. Brett Leach, Compliance Attorney
Dr. Paul Sparks, Faculty Advisor

APPENDIX S

Permission to Use Copyrighted Material

Letter 1

January 28, 2015

To: permissions (US)
Subject: Request to use copyright material from 2009

To whom it may concern,

My name is Jewel S. Cowart and I am a fourth year doctoral student presently in the dissertation phase, at Pepperdine University Graduate School of Education.

I am writing to request permission to copy, recreate, or reproduce the chart Table 1.4 qualitative, quantitative, and mixed methods approach found on page 17 of *Research design*: Qualitative, quantitative, and mixed methods approaches (3rd ed.), Thousand Oaks, CA: Sage Publications (2009).

The information provided in the chart will be used in my dissertation, for educational purposes only. If permission is granted, I will be sure to cite and give credit to the original author(s).

If any changes are made to the chart, I will be mindful of the change(s) and cite the original source(s) inside of the document.

Thank you in advance,

- - - - - - - - - - - - - -

Jewel S. Cowart

GSEP Student

Reply from Michelle Binur

January 28, 2015

Dear Jewel S. Cowart,

Thank you for your request. You can consider this email as permission to reprint the material as detailed below in your upcoming dissertation. Please note that this permission does not cover any 3rd party material that may be found within the work. We do ask that you properly credit the original source, *Research Design*. Please contact us for any further usage of the material.

Best regards,

Michelle Binur

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