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The Impact of Industrial Technician Skill Losses at a West Tennessee Manufacturer

Kenneth W. Moten
Walden University

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Walden University

College of Management and Technology

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Kenneth Moten

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Review Committee

Dr. Alexandre Lazo, Committee Chairperson, Doctor of Business Administration Faculty

Dr. Peter Anthony, Committee Member, Doctor of Business Administration Faculty

Dr. Kathleen Barclay, University Reviewer, Doctor of Business Administration Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2014

Abstract

The Impact of Industrial Technician Skill Losses at a West Tennessee Manufacturer

by

Kenneth W. Moten

MBA, University of Memphis, 1984

BS, University of Memphis, 1976

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

Walden University

October 2014

Abstract

Business survival requires that decision makers understand the critical knowledge resources that support the business' core competencies, while also facing the challenges of current labor trends. The purpose of this study was to explore the lived experiences of the management staff at a west Tennessee manufacturing facility about industrial technician skill losses. This phenomenological design included semistructured interviews of 20 managers, supervisors, and engineers and was an exploration of the potential losses from skilled worker attrition. The foundations of labor theory; knowledge management; and accounting measurements of intangible assets in advanced technology, communications, and economic systems provided the key elements of the conceptual framework. Interview data were sorted and grouped into 6 principle themes: attrition/succession planning, skills technology support, training requirements, economic benefits, support to lean operations, and skills alternative sources. These findings may enhance positive social change by informing manufacturing business leaders on the benefits of active learning organizations, collaboration with administrators of technical educational programs for improved training, replacement technologies, and utilization of the global economy for replacement workers. For skilled technical employees, the social impact of this study might ensure another generation of craft workers to help promote the prosperity of American industries and provide competitive paying worker jobs to the supportive employers, communities, and institutions.

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Dedication

I dedicate my dissertation work to my family and supportive close friends. A special expression of gratitude is given to my loving wife Shelia who encouraged and supported me throughout the process by allowing me to put my housework and personal time with her on hold to complete this process. My sister, Karen Moten, provided editing support when no one else would. I am eternally indebted to her. There are others to whom I am grateful that provided support. In this regards, I would like to mention Mrs. Eddie Mae Pirtle and Dr. Cyronose Spicer for the support they provided in reviewing my study; and Mr. Jeff Garner for study accommodations.

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Finally, I dedicate this work to Dr. Alexandre Lazo's 9000 class. There are too many peer members to name individually, as I might omit a name. This was a fantastic peer group with very supportive relationships to encourage each other.

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Section 1: Foundation of the Study

Global, technological, and information-based economy requires successful management of intangible assets, such as employee knowledge and skills because of the potential effect on a business enterprise's performance (Dumay & Cuganesan, 2011; Siddiqui, 2012). Understanding the contribution of employee knowledge and skills is crucial to the implementation of the business survival strategy (Conklin & Patel, 2012) and supports the alignment of strategy, structure, and other management systems toward achieving business success (Abdul-Rahman & Wang, 2010; Giju, Badea, Ruiz, & Peña, 2010; Yang, 2011). Decision makers not properly taking into consideration the impact of intangible asset losses to a business is an oversight when developing strategic plans (Nyberg & Ployhart, 2013). This position is especially true when reviewing approaching labor changes that may arise from attrition trends (Nyberg & Ployhart, 2013), such as Baby-Boomer retirements.

Recruiting and retaining human intangible assets can help protect a company's acquired technical knowledge and skills base (Coff & Kryscynski, 2011), which if lost via pending changes to the labor supply, would result in the company becoming less competitive (Wysocki, 2010). Employees' knowledge and skills are indispensable intangible components of the knowledge-based economy, needing proper design consideration, and consistent management for organizations to remain competitive (Daly, Adams, & Bodner, 2012). In this study, I explored the experiences and perceptions of managers, supervisors, and engineers pertaining to the organizational awareness and

readiness for addressing the loss of industrial maintenance technicians' knowledge and skills.

Background of the Problem

Maintaining technical employee knowledge and skills is an essential component of intangible asset management for manufacturing operations. Organizational leaders recognize the importance of recruiting and training employees. However, leaders do not have the same level of discernment to develop and retain the knowledge and skills of employees already trained, or at a minimum to have viable attrition plans (Coff & Kryscynski, 2011). The knowledge and skills existing in industrial maintenance technicians, such as (a) electrical, (b) mechanical, (c) plumbing, (d) machining, and (e) computer-programmable logic controller, along with the derivatives of each of the essential skill disciplines, are some of the most valuable non-physical assets of an organization and worth reevaluation to include in strategic planning (Wang, Goodrum, Haas, & Glover, 2009).

In facing the challenges of the current labor trends affecting human knowledge and capital by organizational leaders, business survival requires recognition of the essential knowledge, skills, and resources that support the business core competency. It is essential that organizational leaders understand the impact of knowledge and skill loss toward maintaining competitiveness (Siddiqui, 2012). The findings of this qualitative phenomenological study stemmed from an exploration of the perceptions and lived experiences of managers, supervisors, and engineers, regarding the awareness and readiness for potential loss of knowledge and skills that may occur through current labor

trends. The findings from the research study might assist in determining how prepared organizational leaders are in responding to future knowledge and skill demand.

In-depth interviews revealed themes that indicated potential opportunities for manufacturing decision makers to determine the preparedness of the organization in retaining experienced, knowledgeable, and skilled maintenance workers as suggested by Coff and Kryscynski (2011). The themes that emanated from this research study may offer decision-makers insights into the parameters for sustaining organizational efficiency, despite the loss of knowledge-workers. This doctoral study was an exploration of the major topics of influence to consider in the planning of industrial maintenance technicians' knowledge and skills lost to attrition in the manufacturing business.

Problem Statement

There is a 33% increase in the demand for skilled workers projected through 2018 versus a projected 15% decline in the supply of skilled workers (Bureau of Labor Statistics, 2012; Wysocki, 2010). With 25 million Baby-Boomers retiring after 2013 (Holt, 2011), a knowledge and skills gap will develop when skilled workers leave the job market. This gap will become a strategic business concern for maintaining a competitive workforce (Shore, Chung-Herrera, Dean, Ehrhart, Jung, Randel, & Singh, 2009; Sitlington & Marshall, 2011). However, business leaders do not fully understand the contributions to competitiveness of skilled workers and are unaware of the impact of the depletion of these positions (Shore et al., 2009; Sitlington & Marshall, 2011). The general business problem is the shortage of skilled labor occurring over the next 5 years. The specific business problem is the uncertainty of how manufacturing leaders are preparing

for managing the impending knowledge and skill shortages among industrial maintenance technicians resulting from Baby-Boomer retirement.

Purpose Statement

The purpose of this qualitative, phenomenological study was to explore the preparedness of manufacturing decision makers in addressing the knowledge and skills loss of industrial maintenance technicians as perceived by supervisors, managers, and engineers because of changes in the labor supply. While assessing the perceptions and the organizational leaders' actual business plans to address the impact of industrial maintenance technicians' knowledge and skill losses, the study findings may assist decision makers in identifying remedies to assure global competitiveness. The findings may translate to similar-sized industrial manufacturing operations.

Research for the study took place at a rural west Tennessee industrial manufacturer employing approximately 350-500 employees. The study included the use of the van Kaam method for data analysis as modified by Moustakas (1994), using audiotaped and transcribed interviews of a composite of 20 supervisors, managers, and engineers. The analysis of interview data included identification of codes and themes about the perceptions of the organization's leaders' preparedness for changes in the available supply of the industrial maintenance technicians. This data may become the basis of additional information for leaders to consider in planning for knowledge and skill loss to protect competitiveness. The findings may catalyze social change by assisting leaders in developing strategies to offset and prepare for (a) knowledge and skill losses, (b) reduction in offshore-outsourced resources, (c) the protection of industrial

maintenance technicians' jobs, and (d) catalyzing an increased appreciation for the importance of human assets and knowledge and skills contributions within manufacturing operations.

Nature of the Study

This qualitative, phenomenological study was an exploration of the lived experiences of a composite sample of 20 managers, supervisors, and engineers. I used the modified van Kaam method, which stated that research explored should explain, and empirically test human behavior while maintaining the participants' *lived* experience (Phillips-Pula, Strunk, & Pickler, 2011). The modified van Kaam approach is the phenomenological tool that helped me explore the preparedness of business leader to address industrial maintenance technicians' supply losses due to attrition.

Phenomenology, as a research design, represents a paradigm shift from research designs of quantitative methods and allows the researcher to explore the participants' lived experiences (Finlay, 2013; Loidolt, 2009). Unlike other approaches, phenomenology accentuates the meaning of the participants' perceptions. Phenomenological inquiry seeks to understand personal motivations from actions, and experiences. The phenomenological design allows the researcher to design questions and methods dependent on the participants' orientation and research objectives (Loidolt, 2009).

Purely quantitative methods of understanding the technical management team's perceptions would require categorizing, calculating, and amassing simulation data from models in an attempt to analyze the observations to find defined measurements and

investigations (Loidolt, 2009). This study is an outline of the perceptions held by the interviewed participants in a qualitative approach (Loidolt, 2009). In contrast, the grounded theory approach is most suitable to generate or discover theories about phenomena of interest, whereas the case study approach focuses on an experience or distinct occurrence (Gambetti, Graffigna, & Biraghi, 2012). The phenomenological approach facilitates in-depth exploration of the sampled managers', supervisors', and engineers' experiences at the manufacturing organization. To delve into the essence of the phenomenological inquiry, the modified van Kaam method is suitable for obtaining the goals of the research (Moustakas, 1994).

The selection of a qualitative methodology for the research study facilitated obtaining managers, supervisors, and engineering participants' relevant experiences of industrial maintenance technicians' knowledge and skill contributions that may help explain the examined phenomena. The qualitative research method was more appropriate than a quantitative method for this study because the participants articulated and described his or her views and perceptions of existing manufacturing business readiness for industrial maintenance technicians' attrition. Findings from a qualitative study provide accounts of the events, experiences, and encounters that form the participants' worldview (Rozas & Klein 2010). According to Mason (2010) and supported by O'Reilly and Parker's (2013) saturation study, the 20 person participate pool is sufficient to establish a meaningful explanation of the perception, while providing a reasonable sample size for a study of the experiences of the participants in a phenomenological research project.

Research Question

The central research question in phenomenological research requires the participants to present his or her lived experiences (Finlay, 2013). The central research question was: How are manufacturing leaders preparing for the impending knowledge and skill shortage among industrial maintenance technicians?

This guiding research question and interview questions allowed me to explore, through face-to-face or telephone interviews of supervisors, managers, and engineers, their perceptions of the phenomenon. A controlled environment encouraged open and candid dialogue between the participants and me in an informal conversation format.

Interview Questions

I followed the prescribed methods of qualitative interviewing participants and adhered to the standards for research on individuals as required by Walden University (Institutional Review Board for Ethical Standards in Research, 2010). I asked the following open-ended interview questions (also contained in Appendix A) to each participant, according to his or her position and role within the organization, to generate the phenomenological data for the research study.

1. Tell me about your experiences planning any attrition of industrial maintenance technicians' that would affect the manufacturing business core competencies? If no plan, what type plan would you develop? How would you implement this plan?

2. Tell me about your experiences that relate to the importance of the contribution of industrial maintenance technicians to supporting the core competencies of the organization in preparation for attrition losses?
3. Tell me about your experiences on the benefit of the organization preparing to address the industrial maintenance technicians' labor attritions that would help the manufacturing facility survive through a period of limited technical labor supply?
4. Tell me your experiences with the specialized skills that industrial maintenance technicians possess, which would not be available from other organizational employees in preparation for attrition losses?
5. Tell me your experiences about the economic impact that might occur if existing levels of maintenance knowledge and skills are not replaced at sufficient levels due to changes in the supply?
6. Tell me about your experiences with the knowledge and skills that industrial maintenance technicians possess that cannot be automated in preparation for attrition losses?
7. Tell me about your experiences with trends impacting the business that might occur from changes in the supply of industrial maintenance technicians?
8. Tell me about your experiences of measurements that would be useful in understanding the available supply of industrial maintenance technicians' in preparation for attrition losses?

9. Tell me about your experiences with outsourcing, temporary workers, and contract workers might impact the supply of industrial maintenance technicians due to preparation for attrition losses?
10. Tell me about your experiences with the cost of training new industrial maintenance technicians that might impact the organization due to preparation for attrition losses?
11. Tell me about your experiences that help describe new knowledge and skill requirements that will be required to ensure an adequate supply of industrial maintenance technicians?

Conceptual Framework

Through the conceptual framework grounding the qualitative, phenomenological study, I explored the preparedness of organizational leaders to replace knowledge and skills of industrial maintenance technicians. The fundamentals of knowledge-transfer theory and human capital accounting theory help decision makers understand the existing organizational knowledge to transfer from older retiring industrial maintenance technicians to new workers in a globally and technologically competitive environment.

Knowledge-Transfer Theory

Knowledge is the most valuable intangible asset for maintaining and gaining a competitive advantage in a global economy (Charterina & Landeta, 2013; Kumar & Ganesh, 2009; Vargas-Hernández & Noruzi, 2010). Knowledge management is a link to knowledge creation and knowledge transfer (Kumar & Ganesh, 2009). Capturing and transferring organizational knowledge and skills to ensure the continuance of an

organization is essential and additionally can be a mechanism to improve organizational performance (Charterina & Landeta, 2013). Organizational leaders have to combine specialized knowledge from different sources in producing goods and services. Kumar and Ganesh (2009) called the integration of knowledge as the manifestation of an organization's core competencies or capabilities that allow it to exist.

Global competition has motivated organizational leadership to transform businesses to develop knowledge-based initiatives, wherein gaining competitive advantages focuses on the ability to capitalize on current organizational knowledge and to generate and deploy new knowledge solutions (Nold, 2012; Zhou, Barnes, & Lu, 2010). Particularly among industrial competitors, knowledge emerges as one of the most strategic resources (Charterina & Landeta, 2013). The requirement of today's global and knowledge-driven economy, powered by the Internet and advanced technologies, further highlights how improved management of intellectual knowledge and skills will promote achievement of competitive goals (Charterina & Landeta, 2013; Nujjoo & Meyer, 2012; Vargas-Hernández & Noruzi, 2010).

Leveraging the transfer of knowledge through capturing existing knowledge and transferring the knowledge and skills within the organization is an essential aspect of the comprehensive plan that supports an organization's competitive advantage (Markos & Sridevi, 2010). Markos and Sridevi (2010) found that successful knowledge-transfer includes the information captured, transferred, and supported by the organization's leadership.

Human Capital Accounting Model

Coff and Krzyscynski (2011) posited that human capital represents the combined intelligence, skills, and expertise that give the organization a distinct character.

Samudhram, Shanmugam, and Low (2008) noted that accounting for human capital dates back several decades with interest in this area rising, falling, and rising again since the 1960s. The development eras evolved as the early to the mid-1960s, late 1960s, early to mid-1970s, late 1970s, and from the 1980s to the present.

Human capital accounting comprises the selection of business variables that are true measurements of the human contributions and how these variables relate to human capital decisions (Bryan, 2010). The ambiguity of the proper relationships of the variables still exists in today knowledge-based economy and finding new approaches may aid decision-makers' utilization of human capital assets (Bryan, 2010). Cui (2102) explored four variables to provide a better understanding of the factors that influence human capital decisions and the need to control these assets.

The first factor is the traditional accounting measurements that include profit rate, ROA (return on assets), long-term profitability, and sales growth rate. The second factor addresses the nonfinancial indexes and nontangible measurement of the organization, such as employee satisfaction, custom satisfaction, turnover rate, quality of products/services, and some of the other intangible assets of the organization. The third factor reflects the added value of intangible assets such as management and governance (Xiaoming, 2102). These traditional financial measurements do not reflect the intangible

factors of human contribution to corporate value because the nonfinancial variables are difficult to decipher and measure in the form of *value added* (Xiaoming, 2102).

Therefore, exploring the movements and shifts in human resources may offer business leaders new insights of the impact in the human-knowledge investment. The drivers for the current interest in human accounting are the increasing attention given to intangibles, with the recognition that primarily intangible assets drive the wealth creation capabilities of an organization (Xiaoming, 2102). The literature review provides greater details of human capital and related theoretical concepts. The recommendation from Xiaoming on this topic indicates that no single factor provides a comprehensive picture of the performance. Consequently, new or improved accounting measures need development and implementation to account for the influence of human capital intangibles to global organizational competitiveness.

Definition of Terms

Human capital: The combination of the learned process knowledge, previously acquired expertise, and specific skills of a company's employees retained by the employees. Human capital includes employee competencies, commitment, excitement, and loyalty (Coff & Kryscynski, 2011).

Industrial maintenance technician: A technical worker with knowledge and a number of related skills (electrical, mechanical, information technology, etc.) that troubleshoot and provide technical support to the manufacturing equipment and processes in an industrial facility (Wang et al., 2009).

Intangible assets: Intellectual capital can consist of human capital, customer capital, and structural/organizational capital. Steenkamp and Kashyap (2010) defined intangible assets as a sundry of terms such as knowledge assets, intellectual capital, intangible capital, and knowledge resources that represent non-physical factors that contribute or have usefulness in producing goods or providing services, or have expectations to generate future productive benefits for individuals or firms that control the use of those factors.

Intellectual capital: An organization's knowledge, experience, expertise, corporate culture, customer relationships, and professional skills used with tangible assets to create a competitive advantage (Dumay & Cuganesan, 2011).

Knowledge management: the process of identifying/creating, assimilating, and applying organizational knowledge to exploit new opportunities and enhance organizational performance (Yang, 2011).

Knowledge transfer: An event through which one entity learns from the experience of another, suggesting thereby that the effect of one unit on another is in terms of learning that the second unit experiences (Kumar & Ganesh, 2009).

Organizational capital: The systems and technology used to transform knowledge and physical capital into a unique value proposition for the firm and represent a significant source of competitive advantage (Coff & Kryscynski, 2011).

Organizational culture: Corporate culture that provides a framework for organizational values, effectiveness, and efficiency (Coff & Kryscynski, 2011; Khan, Khan, Ahmed, & Head, 2102). An organization has a distinct personality that includes

shared values and beliefs that help individuals understand the organizational function and expected behaviors. According to Schein (2010), organization culture is the way we do things.

Perceptions: Responses in the workplace that comprise judgments produced as the result of behavioral observations (Yang, 2010).

Relationship capital: The capacity of employees of an organization to develop links and connection with themselves and coalition partners, such as customers and suppliers. Such interactions require the establishing of social networks and the sharing of diverse knowledge, which, in turn, facilitate the accumulation of the relational capitals in these firms (Seleim & Khalil, 2011).

Relationship assets and liabilities: The relationship asset and liabilities stage are the conversion of relationship capital into a monetized asset or a liability (positively or negatively) by a firm. An example is the transformation of an intangible such as positive trust into a relationship asset such as increased customer loyalty. The leaders of a firm through lower costs and increased revenues can monetize customer loyalty. Therefore, relationship assets liabilities act as a critical bridge between intangible assets and value creation (Garcia-Parra, Simo, Sallan, & Mundet, 2009; Lusch, Brown, & Obrien, 2011).

Rural manufacturing business: A manufacturer located away from the main metropolitan business centers in the United States (Dorfman, Partridge, & Galloway, 2011).

Assumptions, Limitations, and Delimitations

Assumptions

I assumed the following considerations relevant to the study. It was my assumption that the participants were honest and truthful in answering the interview questions from the assurance given of complete confidentiality. An additional assumption was that participants' experiences were adequate to support the phenomenological goals of the research study. The phenomenological information and perceptions about organizational readiness provides the necessary research information about the shifting labor supplies.

Limitations

Phenomenological inquiry requires thoroughly analysis and syntheses of collected participant data. Each research study has limitations because of the inability to explore all contributing parameters (Neuman, 2006). The limitations of this study included the: (a) limited quantity of managers, supervisors, and engineers willing and volunteering to participate, and (b) different levels of the participants' experiences. All selected participants were from a single manufacturing facility in the rural west Tennessee area. Exploring the participants' perceptions and understanding of the preparation for knowledge and skills' loss all from one manufacturing facility versus participants' perception from multiple facilities was a limitation.

Delimitations

Delimitations aid the researcher in refining the scope of research by identifying the exclusions from the study (Yang & Kenagy, 2011). The delimitations in this study

were the (a) selection of the research problem and the interview environment, (b) target population, (c) sample size, and (d) location. I know and have had a previous working relationship with a few of the participants. The research study did not include participants outside the rural west Tennessee area.

Significance of the Study

Contribution to Business Practice

In this study, my intent was to address one of the most significant challenges facing managers today, namely, the adequacy, or existence of planning for the impending loss of knowledge and skills (Shore et al., 2009; Sitlington & Marshall, 2011), due to industrial maintenance technicians' attrition. Consequently, the significance of this study to industrial manufacturing managers is the reduction of the impact of knowledge and skill losses to the organization from industrial maintenance technicians leaving the job market. Possessing an understanding of the current and forecast organizational knowledge and skills requirements, the managers of these workers can prepare the proper planning and development programs for transferring knowledge and skills to new employees or the managers can find alternative labor sources.

This study's design reflected a synthesis of a broad range of topical writings to help develop an understanding of the research methodologies that linked the knowledge and skills contribution of industrial maintenance technicians to organizational success. Manufacturing and industrial decision makers can use the findings to create strategic plans and create increased attrition awareness. By addressing the maintenance

technicians' knowledge and skill losses, decision makers can provide the improved business labor preparation necessary for growth and business survival.

Implications for Social Change

The expected social change impact of this study is a better understanding of the utilization of existing human resources and planning for the transfer of knowledge and skills to a new generation. Findings and recommendations stemming from the research study can contribute to the business environment by identifying the need to protect the American skills knowledge base by understanding the contributions of maintenance technicians' knowledge and skills toward business success.

With the influence of the knowledge base and intangible assets to competitiveness, as described by Steenkamp and Kashyap (2010), the business world is shifting in favor of these intangible assets. Proper planning for industrial maintenance technicians' knowledge losses will assist managers in developing organizational needs that reflect these modern issues and trends. By exploring the assessment, planning, and preparation for the impact of industrial maintenance technicians' knowledge and skill losses, this study's focus may aid in identifying areas of competitive deficiencies.

Understanding the competitive deficiencies may help improve the emphasis for industrial manufacturing leaders to acknowledge and prepare for the shifting technical labor supply. With this knowledge about labor trends, manufacturing leaders can address strategies and strategic planning, or lack of, to improve global competitiveness. Employees will benefit in the reduction in offshore-outsourced resourcing, and improvements in worker training and development. Communities will benefit from the

social-economic contributions that result from more local jobs and greater area job security.

The Professional and Academic Literature Review

In this literature review, I focused on several themes related to human capital accounting. I searched the keywords (a) *human assets*, (b) *intelligent capital*, (c) *intangible assets*, (d) *knowledge management*, (e) *knowledge-transfer*, (f) *employee training*, (g) *employee turnover*, and (h) *employee motivation* to develop the literature review. The sources that I used to conduct this search included: (a) scholarly professional journals, (b) peer-reviewed articles, (c) books, (d) web-based research, and (e) other doctoral dissertations. I used the Walden University library electronic databases EBSCOhost, Infotrac, Emeraldinsight, Academic OneFile via Thomas Gale, Academic Search Premier Database, ProQuest, ERIC database, and ProQuest Digital Dissertations in writing the literature review. Additional sources consulted were relevant websites, and scholarly texts and electronic texts available through the Walden University library. My investigation of this literature under these broad topics opened the following related areas to the research study: employee motivation, offshoring, outsourcing, immigration, cultural influences, and the impact of globalization and technology.

Summary of Literature Review Sources

To establish the perspectives of past and current writings for the phenomenological study, I conducted a literature review, composing 86% of the total published sources within 5 years of Walden's CAO expected approval date of June 30, 2014. In 2010 there were 56 peer reviewed (35%) and no non-peer-reviewed sources; in

2011 there were 38 peer reviewed (24%) and no non-peer-reviewed sources, in 2012 there were 29 peer reviewed (18%) and no non-peer-reviewed sources, and in 2013 there were 13 peer reviewed (8%) and no non-peer-reviewed sources. There were 22 peer reviewed (14%) and no non-peer-reviewed sources prior to 2010. The total percentage of peer-reviewed references in this study is 87%.

I begin this review with a brief historical overview and discussion on changes to the American labor force resulting from globalization and technological innovations. I closed Section 1 with an historical synopsis and summary of the findings from the researched literature and conclude with a transition to the project phase (Section 2) of the study.

Historical Overview of Intangible Assets

The term *intangible asset* has a historical definition within the economic and accounting fields. Accounting models frequently mention intangible assets in terms of the difficulty of characterizing these assets to provide a cost basis for establishing value (Finch, 2010; Lin & Tang, 2009; Steenkamp & Kashyap, 2010). This difficulty of giving assets an accounting cost basis is particularly true of the classification of intangible-intellectual assets. Intellectual capital and assets have helped to raise awareness for the importance of knowledge in organizations among scholars and practitioners, including the accounting profession (Beattie & Smith, 2010).

Analyzing intangibles from a historical perspective helped to show how technological advances have changed the requirements for including intangibles on the balance sheets and the implications to business success (Bassey, 2012). Since the 1900s,

business history showed that Western economies evolved from primarily industrial-based to knowledge-based entities (Finch, 2010). The historical development of human and intellectual capital divided into following timeframes. In the early to the mid-1960s, the focus was on establishing the foundational concepts for intangible accounting. The next crucial period, covering the late 1960s, highlighted the advances in academic research and modeling measurement for intangibles. The period from the early to mid-1970s emphasized a greater interest, and enlightenment in accounting systems to develop the underlying human resource accounting concepts. However, the interest in human asset accounting declined in the late 1970s and did not renew until the decade of the 1980s; the accounting focus on intangible assets continues through today with global economics (Samudhram et al., 2008).

The latest impetus drives the fact that intangible assets helped create much of the wealth capabilities in today's organizations (Dumay & Cuganesan, 2011). With the majority of New York Stock Exchange firms' stock market value primarily composed of intangible assets, managing intangible assets represents a significant challenge to determining organizational and shareholder benefits and competitiveness (Nyberg, Fulmer, Gerhart, & Carpenter, 2010). However, understanding the management of intangible assets and the value these assets' contribution to an organization is inherently subjective, contextually dependent, and future-oriented (Abdel-Aziz, Shawqi, & Bontis, 2010; Finch, 2010).

Human and Intellectual Capital

The technology and knowledge-based world consists of exposure to vast amounts of information (El-Tawy & Abdel-Kader, 2013). Beginning with the new millennium, organizations began to accept that human assets, not the building, equipment, or other cash assets, produce the competitive edge (Steenkamp & Kashyap, 2010). Managers direct the dynamics of the global economic environment in developing knowledge bases, therefore, the role and perspective of human capital management is to integrate new business strategies that support the business core competencies and ultimately determine the business' competitive success (Bissett, Cheng, & Brannan, 2010; Wright & McMahan, 2011).

The main issue with having human capital management at the root of knowledge transformation is that the extant literature has not yet answered the unknowns of the impact of human capital management (Herremans, Isaac, Kline, & Nazari, 2011). The research reviews helped disclose and indicate how the integrated concepts of information technology, knowledge management, intellectual capital, human resources, employee behavior, and accounting measurements form the new leadership movement (Herremans et al., 2011). The new areas of human and intellectual capital discourse are (a) the types and influence of human capital management; (b) the relationships between and among the conceptual developments of human capital models; (c) benchmarking of the participation of organizations; (d) establishing advanced and innovative concepts for intellectual capital and knowledge management; and (e) human capital, financial-capital trending, and forecasting (Herremans et al., 2011).

Types and influence of human and intellectual capitals. The types of human capital are structural capital, relational capital, and the associated concepts of each (Lennox, 2013; Shih, Chang & Lin, 2010). Organizational influences on the various types of human capital are employee sentiment, leadership, knowledge management, and employee movement (Lennox, 2013; Shih et al., 2010). Therefore, the total level of human capital investment in each of the above areas is the competitive barometer of the knowledge economy. The greater the investment in an organization's human capital, the greater the ability that the organization is ready for competitiveness (Mihm-Herold, 2010).

Employees possess the acquired knowledge and skills needed to perform organizational jobs, and many business processes use the intangible information, and intangible inputs of employees to produce tangible information and tangible outputs that fuel organizational growth (Hall, Sobel, & Crowley, 2010). Intellectual and human capitals are the sources of innovation and strategic renewal for an organization that require leadership support from the top (Coff & Kryscynski, 2011). The competitive essentials of intellectual and human capital are the business knowledge and intelligence that leadership allows to develop within the organization.

Sustained organizational results come from the human capital assets that decision-makers do not traditionally associated with determining the organization's competitive capability (Coff & Kryscynski, 2011). This competitive capability or core competency helps the organization achieve competitiveness through value, uniqueness, or rarity and provides resources not available from competing firms to customers (Wang, 2011).

Therefore, human capital embodies the intangible assets with unique combinations of skills or knowledge of the customers' needs within the organization (Vargas-Hernández & Noruzi, 2010).

An effective process of managing intangible assets utilizes a firm's repository of human capital assets to convert the form, mobilize, recombine, and transform tangible materials to add value to the ultimate product or service (Wang, 2011). The firm's value becomes the human knowledge that interacts with the collective knowledge or intellectual capital of individuals and the organization's physical capital assets (Ling, 2012; Sveiby, 2007). The results of this valuation, through the recombination and conversion process, are new knowledge, organizational learning, and innovation (Charterina & Landeta, 2013; Zhou, Barnes, & Lu, 2010).

The construction or makeup of intellectual capital within an organization builds from the human components of talents, knowledge, and experiences within the organization into structural and relational categories (Ling, 2012). The structural capital components are the knowledge that does not exist within the organization's human assets (Lennox, 2013), whereas, the relational capital components identified in the research literature characterizes the knowledge developed that comes from within the organization (Lennox, 2013). The relational capital becomes the value chain, generated from the relationships partnered with suppliers, customers, and external entities (Lennox, 2013). Still of the three constructs, none identifies a clear validation methods that drive organizational performance (Bontis & Serenko, 2009). The literature findings help in corroborating the obligation of managing and valuing the skilled assets of an

organization's workforce that allows the organization to benefit from the contributions of human capital investments.

Leadership for human and intellectual capital management. The definition of a leader is the ability to influence others and leadership can occur inside and outside the managerial role (Schein, 2010). Leadership is the ability to influence behavior and in turn, leaders can influence or create change (Schein, 2010). According to Schein (2010), leading reactions and responses to intellectual capital are critical factors and demonstrate how an organizational leaders leverage human capital. Leadership, as explained by Xian, Colwell, and Ma (2010), represents the central motivator of the organizational members. However, globalization adds new dimensions to leadership within the current economy; the new leadership responsibilities it creates to manage intangible assets come with a sundry of obstacles within and outside of the organizational structure (Birasnav & Rangnekar, 2010; Birasnav et al., 2011).

Despite the availability of many methodologies, management approaches, and philosophies on strategy execution, research has suggested that the majority of organizations fail because leaders cannot execute strategic plans (Birasnav et al., 2011; Schein, 2010). Organizational leaders have to be the knowledge pioneers, the technological and organizational intelligence investors who have prominent roles in facilitating and aligning value derived from intangible assets in support of innovative capacities and the catalysts for fueling learning (Yusof & Abu Bakar, 2012). Although organizational learning needs a champion, who may not be the organizational leader, learning also needs knowledgeable, skilled, and dedicated subordinates or followers

along with supportive leaders (Birasnav et al., 2011; Schein, 2010). Leaders and followers working in concert are the requirements to exploit human capital capabilities, but other contributing factors come into play, such as employee sentiment, employee movement, organizational culture, and globalization (Nujjoo & Meyer, 2012; Schein, 2010). Leadership has an effect on each of the contributing factors.

Factors Affecting Human and Intellectual Capital

Impact of sentiment and culture. Human capital development that involves employee sentiments through culture is a significant contributor to improving competitiveness. Bontis and Fitz-enz (2002) and Cooper (2013) defined employee sentiment as the coexistence of employee job dedication, job motivation, and job satisfaction embedded in the entire organizational culture. Culture, as a common component of managing intangible assets, appears extensively in the literature review findings (Suppiah & Manjit, 2011). Organizational culture helps support and encourages cooperative innovation that gives a business competitive advantage and further develops and nurtures the contributing human factors (Schein, 2010). Notwithstanding the importance of human capital factors, Schein (2010) strongly emphasized that the role of culture is paramount in explaining the successes and failures of organizations.

Organizational culture comprises the beliefs, values, and attitudes persistent throughout the organization that affect the organization's language, symbols, behaviors, and thoughts (Khan et al., 2012; Schein, 2010). Culture is the conscious and unconscious product of management's beliefs. Birasnav, Rangnekar, and Dalpati (2011) consider organizational culture as holistic, historically determined, socially constructed, and

involving the organizations and the employees' beliefs and behaviors. Culture exists at different levels and reflects a wide range of the organizational life (Nold, 2012). Having an organizational culture that creates a stable workforce with a trustworthy work environment is difficult for organizational leaders to maintain when considering factors such as employment movement. Turnover, the movement of employees, becomes a challenge for leaders in balancing the human capital requirements of an organization (Iqbal, 2010; Khan et al., 2012). Nyberg (2010) acknowledges that organizational culture can provide a competitive advantage, but concludes that firms without the necessary culture changes cannot modify the organization to generate sustained competitive performance. Culture does not change overnight; therefore, human capital developments suffer if the organizational members do not remain stable (Khan et al., 2012).

Impact of employee movement. The rotation, attrition, or turnover among jobs, employers, trades, and the employment conditions of employees (Iqbal, 2010) can be costly for employers (Eady & Nicholls, 2011). Turnover can cost organizations tens of thousands of dollars per employee and up to twice the employee's salary (Wysocki, 2010). The two categories of turnover are the involuntary and voluntary change in an employee's job employment status. Involuntary turnover results from the forced discharge of employees by employers. Alternatively, voluntary turnover occurs when employees initiate the job change action by quitting or resigning. Because management does not control voluntary turnover, the need to examine the reasons and implications of the voluntary turnover phenomenon helps to develop preventative measures to decrease the impact of this important human capital concern (Nyberg & Ployhart, 2013).

Voluntary turnover occurs when employees go to competing firms or leave the organization on his or her own initiative. Turnover can create potentially detrimental business conditions because the existing employees can transfer to new employers' knowledge that was not already available to those employers (Nyberg & Ployhart, 2013). Voluntary turnover had been increasing over the last decade, forcing employers to put strategies into place to lessen the repercussions of employee turnover (Nyberg & Ployhart, 2013). Organizational leaders who do not manage turnover effectively will lose large amounts of the organization's knowledge management (Kumar & Ganesh, 2009), and will allow some of the organization's knowledge to be lost from the organization to competitive firms. The management of turnover should address both the individual and collective turnover of employees (Kumar & Ganesh, 2009).

Specific studies on turnover indicate that collective turnover is a more crucial management concern than individual turnover because of the aggregate impact of the employee departures that occur within work groups, work units, or organizations (Hausknecht & Trevor, 2011). The new emphasis for understanding the business consequences of turnover helps leaders to focus on organizational productivity, performance, and competitive advantage (Hancock, Allen, Bosco, McDaniel, & Pierce, 2013; Hausknecht & Trevor, 2011; Nyberg & Ployhart, 2013). The paramount importance of understanding collective turnover highlights strategic human resource management (HRM) literature, where collective turnover is the primary mechanism driving human capital depletion (Gardner, Wright, & Moynihan, 2011; Nyberg & Ployhart, 2013). Thus, examining collective turnover is vital for understanding how

collective turnover affects an organization's ability to use human capital to achieve competitive advantage (Nyberg & Ployhart, 2013).

This employment movement has a paramount effect on a firm's ability to manage intangible assets (Wang, 2011). The primary knowledge components to understand and manage include (a) the initiation of how employees conceive knowledge and how organizations create knowledge; (b) the integration of internal knowledge into open and shared knowledge; and (c) the sharing of knowledge between and among employees in a socialization process (Beattie & Smith, 2010; Cooper, 2013; Suppiah & Manjit, 2011). Therefore, leveraging a firm's intellectual capital and converting knowledge into a competitive advantage through a stable workforce is one goal of knowledge management plans and strategies. To maintain a stable workforce, organizational leaders must take into consideration the existence of a new type worker and a globally competitive business environment.

Globalization and the demand for new skilled workers. Skilled industrial maintenance technicians in the global labor market are in high demand, and the organization's competitiveness will depend on the skills of its workforce (Ployhart & Moliterno, 2011). The increased demand for skilled workers continues to spark political debates in the media and the public, focusing on how globalization affects wages and employment levels domestically (Ployhart & Moliterno, 2011). According to the 2010 Manpower, Inc., survey, the U.S. educational system has been a failure in training skilled workers in the crucial craft trades that drive the foundation of a technologically advanced global economy (Manpower, Inc., 2010). By channeling all students into a four-year

college track and neglecting the skilled trades, United States schools waste the potential talents of generations of students, and that fact is becoming apparent in the global economy (Manpower, Inc., 2010). Research on the effects of globalization on continual investments in human capital is forthcoming, and the scant amount of research on the impact of globalization on domestic labor markets needs to increase and advance to meet globalization challenges (Ployhart & Moliterno, 2011). The response to misconceptions of the impact of globalization on labor demands should lead to increased investments in American worker skill, and development of the knowledge needed for these workers to compete globally.

Hickman and Olney (2010) and Kapoor (2011) looked at the dataset of U.S. higher education institutions and identified a correlation between globalization, with its changing worker skills requirements and the use of immigrant workers, and offshore-outsourcing. According to Hickman and Olney, immigration and offshoring from globalization increases the pool of low-skilled workers available to domestic firms. As a result, American firms have access to greater pools of low-skilled immigrant workers and the increased opportunities to shift production capacities to low-skilled labor-abundant countries (Hickman & Olney, 2010). Consequently, labor market competition caused by globalization predominantly affects low-skilled domestic workers (Kapoor, 2011).

The American skilled worker supply and labor retention affect the immigration of foreign skilled workers and the outsourcing of American work to offshore manufacturing facilities (McIvor & Ronan, 2010; Rosebush, Leavell, & Maniam, 2012). Considering the long term implication of how the globalization of offshore-outsourcing and immigration

affects domestic workers' human capital investment decisions, investigations by Hickman and Olney (2010) and Mbale, Kadzamina, Martin, and Kyalo (2012) justified the need for a higher educated work pool. Hickman and Olney's determination, aided by the measurement of enrollment numbers at local educational institutions correlates their study's findings to local labor market conditions on the impact of immigration. Specifically, increases in educational enrollment beyond high school reduced the unemployment rate and increased the wages of the post high school educated workforce (Hickman & Olney, 2010). Both offshoring and immigration effectively increase the labor supply available to domestic firms (Kumar, Deivasigamani, & Omer, 2010). The increases in offshore- outsourcing and inflow of immigrant workers have led to many American workers returning to school (Hickman & Olney, 2010; Jannifer, 2010). In other words, domestic employees respond to competition, resulting from low-skilled immigrant workers and outsourced offshore production, by increasing the human capital investments in education (Nadrag & Mitran, 2011). Therefore, the value of skilled workers increases due to the globalization of workers, whereas the value of general labor decreases (Ployhart & Moliterno, 2011).

Skilled migration networks. The role of migrant networks in promoting skills movement and investment is another management consideration that affects planning for technical worker attrition. According to the United Nations, since 1960, the population of international migrant numbers to the United States continues to increase to beyond 200 million (Docquier & Lodigiani, 2010). Although large numbers of migrants migrate to technologically advanced countries, the movement has continued to increase the gap in

wages, diversities, and the diverse demographics in the globalization phenomenon. The consequences of global immigration are of enormous concern to scientists, policymakers, international agencies, and other stakeholders (Docquier & Lodigiani, 2010). The movement and emigration of workers from underdeveloped to developed countries is also a close association with the concept of brain drain (Docquier & Lodigiani, 2010).

Brain drain phenomenon. The brain drain pattern and diaspora network describe the back-and-forth movement of talented students from underdeveloped countries who work and study in developed economies and use his or her own global networks to help build networks in the home countries (Mbale et al., 2012; Shah, 2011; Sung-Jo, 2013). This global movement of high-skill labor from poor economies to rich countries and back again has opened new possibilities for economic development (Mbale et al., 2012; Shah, 2011; Sung-Jo, 2013). The brain drain pattern of migration, according to Sung-Jo draws the most promising students from underdeveloped countries to lucrative and challenging careers in developed countries. This emergence of brain circulation networks with the back-and-forth movement of talent is prevalent in documentation (Sung-Jo, 2013). The trends surrounding the brain drain and diaspora networks include changes in national innovation systems, the erosion of the critical mass of innovation clusters, and the decrease in innovation-driven value chains that result in the loss of knowledge creation (Mbale et al., 2012; Shah, 2011; Sung-Jo, 2013).

Ciomasu (2010) and Iravani (2011) also defined brain drain, or human capital flight, as a large emigration of individuals with technical skills or knowledge normally due to conflict, lack of opportunity, political instability, or health risks. A brain drain

phenomenon is typically an economic cost to the losing country because emigrants normally take to migrating countries the value of his or her training sponsored by the government. Brain drain is a parallel of capital flight, which refers to the same movement of financial capital (Ciumasu, 2010; Irvani, 2011). Ciumasu's research on brain drain has underscored the benefits of unskilled movements and the associated costs from developing countries. In addition to the direct impact on the labor market, migrant movements generate multiple dimensional corollaries in the home country's economy (Ciumasu, 2010).

Brain drain models indicate the benefits of skilled migration on educational enrollment and the skills and knowledge that provide advantages to those studying or working out of the home country (Shah, 2011). The global impact of skilled migration on human capital, according to Shah, is unclear. Migration networks or diaspora externalities represent conduits of skill movement that impact the home countries by lowering the average level of education (Shah, 2011). The negative link between the depressions of the general educational level and the available skills in the home country has a negative effect on skill movement due to the diasporas and the brain drain phenomenon (Mbale et al., 2012; Shah, 2011; Sung-Jo, 2013).

Regarding the migration of skilled and unskilled migrants, the data on international migration when categorized by educational achievements, indicate significant losses of skilled workers for countries in the Organization for Economic Cooperation and Development (OECD) specifically from Australia, Canada, United States, United Kingdom, France, and Germany (Docquier, Lowell, & Marfouk, 2009). A

goal of the analysis was to distinguish the role of migrants' education by assessing the total effect of immigration on foreign direct investment (FDI) and capital accumulation at the global level (Talpos & Enache, 2010). In the technology economy, FDI has become a significant component of the global economic circuit (Talpos & Enache, 2010). These FDI investments compare to the contemporary bilateral approach and showcase the importance of network standardization (Docquier et al., 2009), confirming that skilled migrants drive and support these networks.

The size of diaspora is a crucial factor affecting the brain drain phenomenon as it relates to the population of the home country (Docquier et al., 2009). The brain drain movement indicates that although migration affects large countries in a positive manner, small countries gain little benefit from the movement. Large countries benefit by having educated networks abroad that produce increased physical capital accumulation. Diaspora networks assemble the best performers, bring the forward-looking parts of domestic private and public sectors together, and promote reform, all of which are the central conceptual building blocks for a new open economic industrial policy (Mbale et al., 2012; Shah, 2011; Sung-Jo, 2013).

Migrant educational network. Analysis of United Nations data by Docquier and Lodigiani (2010) from a sample of the population over age 25 indicated that labor force factors separate into educational groups using global human capital indicators. From these data, there are three distinctive categories: (a) low-skilled workers with less than upper secondary education completed, (b) medium-skilled workers with upper secondary education completed, and (c) and high-skilled workers with more than upper-secondary

education completed. From 1990 to 2000, the loss of skilled workers to the OECD for all countries used in the studies covering the timeframe showed similar educational groups as in the human capital studies (Docquier & Lodigiani, 2010). Docquier and Lodigiani from modeling of the studied countries identified the existence of strong migrant and business network externalities.

Diaspora externalities, according to Docquier and Lodigiani, are a channel wherein the brain drain phenomenon positively impacts the sending countries in terms of economic benefit. The positive findings of Docquier and Lodigiani's study held true even when the brain drain depressed the average level of schooling because it increased FDI inflows. Again, in the Docquier and Lodigiani study, the size of the diaspora was more significant because business externalities were likely to become stronger in large countries. The positive effect of the diaspora in FDI reinforced the potentially beneficial effects on worker migration from the larger countries. Therefore, skilled migration and business networks prospects will induce new human capital investments for large countries, whereas smaller countries are less likely to benefit from skilled migration both in terms of human capital and physical capital according to Docquier and Lodigiani. Understanding the educational levels, size of networks, trends, and the impact to affected countries becomes one of many factors to consider for effective global competition.

Value Drivers, Value-Cost Relationships, and Value Management Systems

Lin and Tang (2009) developed valuation models to appraise intangible capital from the position of value drivers. Lin and Tang (2009) also assisted in developing accounting requirements to help value intangible assets. Moreover, the research

investigated the allocation of the relative values of a firm's intangible assets and linked these values to the application of the concepts of value drivers using the analytic hierarchy process (AHP). Lin and Tang (2009) defined the AHP as a useful mechanism that compares statistical changes between the qualitative and quantitative features of assets on the same scale.

The comparative value distribution of intangible assets within an organization provided additional ties to the theories and philosophies of value drivers (Lin & Tang, 2009). The attributes or value drivers determined how firms create basic intangible values. According to Lin and Tang, when applying the AHP for intangible asset value creation, firms often lose the focus for value building. Inadvertently, decisions made by management decrease the future and sustainable value of the businesses because the design measurements of traditional accounting systems are more applicable to tangible assets (Beattie & Smith, 2010; Dumay & Cuganesan, 2011; Steen & Welch, 2011; Tollington & El-Tawy, 2010)

Tangible and intangible asset value in traditional accounting systems comes from comparing the expected future discounted cash flow with the initial investment (Finch, 2010; Lin & Tang, 2009). One of the first attempts to classify intangibles began in the early 1960s (Lin & Tang, 2009). Research similar to that of Lin and Tang helps present intangible assets classification as the non-fiscal driver of value; this necessitates the need to re-categorize intangible assets from other value drivers to formulate the driver's values (Beattie & Smith, 2010; Dumay & Cuganesan, 2011; Steen & Welch, 2011; Tollington & El-Tawy, 2010). Lin and Tang redefined intangible assets and defined the new

implications for value drivers. The modern value driver is an attribute responsible for increasing the intangible asset value. Value drivers are non-fiscal assets, are characteristic of intangible assets, and the magnitude of the strength of the drivers can influence the intangible asset value formation within the organization (Chareonsuk & Chuvej, 2010). For this reason, the non-fiscal drivers become pivotal in understanding intangible asset valuation.

The intangible assets are human, innovative, structural, and relational assets (Lennox, 2013). Human capital or assets are talents; capabilities; knowledge; skills; superior management; key employees; and employee experience, training, and development (Mzungu, Merrilees, & Miller, 2010). Innovative assets include research and development, technological expertise, patents, and secret formulas. The structural assets are information systems, databases, software, procedures, market research, and distribution channels (Mzungu et al., 2010). The relational assets reflect the company's brand, copyrights, trademarks, and various clients' licensing and franchising contracts (Lennox, 2013; Mzungu et al., 2010).

Appraising intangible assets as value drivers can abnormally affect profits because each investment has unique bearing on each value driver. The intangible asset evaluation model by Lin and Tang (2009) helps business leaders to understand the accounting impact by measuring the asset's value. High technology industries have substantial amounts of intangible assets, and the valuation of these assets is significant. In the structuring of value drivers, Lin and Tang presented different methods for the intangible asset valuation. An intangible asset structure is complex and subjective.

However, the AHP approach supports the intangible asset valuation process and facilitates the quantitative structuring of non-fiscal value drivers. The optimal structure for the distribution of intangible assets helps to identify and compare the main drivers of intangible asset values. Therefore, managers can evaluate the value drivers inside a company based upon the research of intangible structures, and they can establish references for the resource distribution (Lin & Tang, 2009). Appraising intangible assets from the perspective of value drivers gives managers and decision makers most of the information needed to understand the organization's intangible assets. Value Based Management systems are additional tools that may be used to help understand and value intangible assets.

Value Based Management systems. VBM systems provide another approach to understand asset management. The VBM systems, developed during the second half of the 20th century, establishes the framework for measuring and managing performance that focuses the organization on building maximum value for the stakeholders (Raguz & Jelenc, 2010). The VBM concept uses different techniques and methods that enable strategic planning, adjustments of goals and missions, internal communication, metrics, communication with investors, and continual improvement (Raguz & Jelenc, 2010). Globalization, development of technology, organizational learning, and knowledge management have become dominant factors in gaining a competitive advantage (Giju et al., 2010; Nujjoo & Meyer, 2012). As a consequence, organizations have to search for a replacement of traditional financial performance by trying to find a stronger connection among the measures of performance, people, and business processes in an effort to find

strengths and weaknesses not reported in the classical financial reports (Raguz & Jelenc, 2010).

The improvements created using the VBM approach ensure that corporations manage assets consistently based upon the wealth or value creation ability of the firm. Lin and Tang's (2009) work on intangible asset attributes reflected the differences that occur in technology industries and the benefits of value management. Additional research in the area of intangible assets indicates that the dimensions and criteria of VBM are benchmarks for evaluating high-technology intangible assets (Raguz & Jelenc, 2010). Managers in building organizational value, decide the main business drivers of the company's wealth generation system. In addition, considering the value creation resulting from the historical growth of intangible assets, the accounting requirements and the contribution of intangible assets to the changing competitive environment are parts of the organizational valuation awareness process (Beattie & Smith, 2010).

Growth of intangible asset investments. Danthine and Jin (2007) emphasized the importance of the manufacturing business sector's dependence on intangible capital, as opposed to the traditional *brick and mortar* business dependence on tangible capital. With the development of Internet business, Sharp (2009) argued that electronic and Internet capital provided the foremost details for the expansion of corporate valuations during the 1990s to Internet-supported organizations. Danthine and Jin estimated that investments by business in intangible capital were as large as investments in traditional-tangible capital made during the same time frame. Danthine and Jin also estimated that business investments in unmeasured intangibles rose from 3% to over 8% of gross

domestic product (GDP) in the 1990s and that labor productivity growth was under the estimation by 1.2% per year by not accounting for the contribution of intangibles.

Docquier and Lodigiani (2010) made the supposition that the after-tax balances between tangible and intangible capital should be equal, and they estimated that unmeasured intangible capital stock value in the U.S. corporate sector had exceeded 60% of national Gross Domestic Product (GDP).

Intangible capital growth is the result of investing in the launching of new products, marketing, R&D, and software expenditures, investments in firms' organizational capital, and investments in human capital via training, schooling, and on-the-job learning (Danthine & Jin, 2007). These investments indicate a decreasing trend in the historical level of economic productivity (Danthine & Jin, 2007). With human capital investment being a component of intangible capital, the impact is firm specific and is not applicable to all workers. Patents and copyrights protect investments in intangible capital; however, these patented investment ideas produce only a portion of a firm's total intangible capital (Danthine & Jin, 2007). Danthine and Jin defined an organization's ideas, intellectual capital, human assets, and firm-specific knowledge as being non-appropriable. Historically, the Financial Accounting Standards Board (FASB) recognized the growth in intangible capital accounts as operating revenue, and only within the last 10 years has the (FASB) begin to recognize that intangible assets have a legitimate place on financial balance sheets (Bassey, 2012). Proposed rule changes by the FASB required that companies divulge intangible assets as part of the company's financial information,

because conventional balance sheets contain little useful financial data that will promote investing in intangible assets (Danthine & Jin, 2007).

Accounting for Intangible Assets

Global accounting requirements for financial statement purposes in the new competitive environment create the need to value intangible assets. These accounting requirements question the undisclosed, internally developed intangibles that remain hidden (Lin & Tang, 2009). Internally developed intangible assets, without a determined fair value, do not appear on many firms' balance sheets. Therefore, internally developed assets present some of the most complicated problems and subjective measures in the business valuation of intangible assets. Furthermore, the measurements change with current recognition of globalization, technology, and knowledge-based businesses. New accounting valuation methods make intangible asset measurements more crucial for global competitiveness than ever before.

The normal accounting practice treats investments in intangibles asset as expenses against income of the business operations. The normal accounting practice treats investment in tangible asset as capital investments. Marketing, training, and advertising appear in the selling, general, and administrative expenses accounting categories. The controversy around intangibles propagates from the nature of intangible capital that makes direct replicating to physical capital a complicated process (El-Tawy & Abdel-Kader, 2013). This controversy distinguishes intangible assets from what previous literature findings disclosed (El-Tawy & Abdel-Kader, 2013). Namely, physical capital, in the new accounting models, accumulates and compares dollar for dollar with typical

investment expenses. Therefore, viewing intangible capital is subject to imminent breakthroughs leading to exponential growth in value and aligning with the assumptions in the R&D literature (El-Tawy & Abdel-Kader, 2013). The standard physical capital investment accounting methods, particularly for breakthroughs in innovations, processes, and technologies do not explain the rapidly accumulated growth of intangibles.

In the traditional economy, firms use customary methods to produce the goods or service outputs, whereas, in global and technological economies, firms use competitive advantage gained from intangible assets and human capital investments (Chareonsuk & Chuvej, 2010). Intangible capital results from investing in R&D ventures specific to a firm. These non-traded intangible investments are not appropriable and do not appreciate over time (Alwert, Bornemann, & Will, 2009).

Contemporary evidence indicates that unmeasured intangible investments are enormous and widespread (Alwert et al., 2009; Chareonsuk & Chuvej, 2010). Therefore, the proper measurement and accounting of intangible capital is necessary to explain the research observations (Alwert et al., 2009). Specifically, researchers indicated that the property of a pseudo economy, wherein the reporting of intangible investments is significantly different from an economy in which intangible and physical capitals accumulates in the proper manner (Alwert et al., 2009). Therefore, the improper measurements of intangible capital used in traditional accounting measures understate the gains in productivity and investments made in the nineties.

Research results made using the two-sector general equilibrium model with the defined characteristics of the new economy sector require the inclusion of intangible

capital for productivity growth to make better predictions (Danthine & Jin, 2007). Not including intangible capital, corporate valuation, and asset pricing in decision-making translates into counterfactual decisions about the behavior of intangible assets and the economy (Danthine & Jin, 2007). The research by Danthine and Jin indicated that moving from a deterministic to a random accumulation process for measuring intangible capital leads to an increased measurement of GDP volatility with some predictability. The properties of corporate valuation, stock returns, and the price-to-earnings ratio are fundamental assumptions for explaining the random accumulation process for intangible assets.

These findings by Danthine and Jin (2007) lead to the conclusion that random intangible accumulation is instrumental in resolving questions on accounting for the volatility of stock prices and returns, and corporate valuation. Although Danthine and Jin's research is exploratory, the main contribution underlining the interest of accumulating new evidence on intangible capital exists beyond the measurement of intangible investments. Human capital represents the artificial results of the research discovery of the complex structure of knowledge, knowledge management, and business applications. Some approaches to understanding human capital use knowledge management as the means of building human capital (Crook, Todd, Combs, Woehr, & Ketchen, 2011). The tool of knowledge management enables firms to amass the knowledge from human assets to minimize the obsolescence of knowledge that would otherwise occur in the organizations.

Studies on factors that impact organizational performance indicate that the barriers that limit the process of building human capital develop through new means of measuring ROI, implementing continuous improvement, providing personal benefits, assuring personal confidence, and providing a synergistic organization (Xiaoming, 2012). Human capital models indicate human capital as the primary means of structuring organizational synergy and efficacy, and achieving the required business ROI through knowledge-building programs (Xiaoming, 2012). With knowledge management being the catalyst of the process of building human capital, the more an organization and its workers orient toward learning, the more this orientation positions the for competitiveness.

Organizations of Learning and Managing of Knowledge Resources

Knowledge in the organization allows people to develop, learn, and grow. Institutional learning is the application of learned knowledge to the micro- and macro-aspects of the organization's existence (Michailova & Sidorova, 2011). When employees do not learn, decay of institutional knowledge is at the highest point.

Learning institutions establish, organize, and operate with the mindset of having clear procedures, having knowledge repositories, and devising action plans that foster and support the learning environment (Vargas-Hernández & Noruzi, 2010). These organized entities, commonly known as *think-tanks*, acquire and structure conceptual knowledge; and the operational groups develop the structure that promotes working knowledge utilization (Lam & Lambermont-Ford, 2010). Unorganized groups or ventures cannot operate as institutions of learning due to the lack of structured systems for tracking

knowledge. Organizational structure is a precursor for institutional life that extends beyond the members who form the group. Learning institutions in small, underdeveloped countries have to establish micro-cultures of knowledge development to keep from depleting the knowledge base (Iravani, 2011). The more developed the culture is, the greater the predisposition is for that organization to learn.

Learning to enhance employee human capital advantages. A decision maker of contemporary organizations concern with human capital development as strategic intangible resources is greater than that strategic concern in traditional organizations (Vargas-Hernández & Noruzi, 2010). Human capital makes substantial contributions to a firm's sustainable competitive advantage. Human resources management (HRM) practices indicate the relationship of the developmental process between knowledge management (KM) and human capital (Gardner et al., 2011). The hierarchical structure and theoretical framework of HRM explain the relationship between the human capital benefits and the human capital creation aspects of KM; this structure also indicates the gaps in the literature that relate the process and infrastructure to the benefits generated (Gardner et al., 2011).

In the context of industrial development, most organizations explore new ways of creating sustainable competitive advantage through innovation (Gardner et al., 2011; Vargas-Hernández & Noruzi, 2010). Researchers asserted that intellectual capital is an essential source needed to sustain a competitive advantage and emphasize the establishment of an integrated mechanism to develop intellectual capital (Birasnav & Rangnekar, 2010). Organizations rely on employees to generate the organization's

intellectual capital. Those individual contributors, who contribute to the generation of intellectual capital or human capital, are the employees with skills, knowledge, capabilities, commitment, and attributes. Thus, human capital is an integral part of intellectual capital; consequently, the literature has highlighted the importance of human capital management on augmenting organizational performance (Campbell, Coff, & Kryscynski, 2012). The human capital developmental process, leadership, and HRM practices have been the focus of many research studies (Kapoor, 2011; Siddiqui, 2012). Understanding the relationship between KM and human capital development, and a precise theoretical framework explaining the relationship assists with human capital development (Bontis & Fitz-enz, 2002; Gardner et al., 2011).

When organizational leaders consider the structure of KM, the need for a structured method to predict KM performance and effectiveness is apparent. The KM structure allows the process of knowledge documentation, acquisition, transfer, application, and creation to occur (Gardner, 2012; Nold, 2012). The focus on establishing organizational culture and communication flow under the KM infrastructure is important (Michailova & Sidorova, 2011). Apart from leadership and HRM practices, the focus on the contribution of KM on perceived employee human capital creation has been to determine the benefits generated from human capital. Investment in human capital augments an organization's productivity and fiscal performance (Tollington & El-Tawy, 2010); therefore, it becomes predictable to see investments that provide certain benefits to employees (Birasnav & Rangnekar, 2010). The reviews of Tollington and E-Tawy, and

Birasnav and Rangnekar integrate these models and proposals that relate KM investment with human capital benefits.

Management of knowledge and human capital. To manage the business environment, organizational leaders create unique knowledge derived from the company's employees by establishing a knowledge supportive environment. This environment allows the employee to share, to acquire, and to develop new knowledge (Zhou, Barnes, & Lu, 2010). Because knowledge exists in the employees' perceptions of customers, products, processes, experienced mistakes, and learned successes, employee expertise becomes viable in creating organizational knowledge (Vargas-Hernández & Noruzi, 2010). Some firms' concern about organizational knowledge is that other firms are managing employees' knowledge more effectively. KM is the ability to use knowledge resources effectively and in a timely manner to benefit the company or provide an advantage (Abdul-Rahman & Wang, 2010).

Gardner (2012) and Nold (2012) used the tactical and operational perspective of KM whereas; one perspective describes tactical KM, and the other describes strategic KM. In the tactical perspective, employees' involvement in knowledge activities is immense with a focus on strategy and knowledge-based assets (Gardner, 2012; Nold, 2012). Recognizing the contribution of KM to human capital, an organization's strategic KM process is critical because employees are the heart of the KM process (Gardner, 2012; Nold, 2012). The strategic KM decision-making process helps exercise control, express agreement, and motivates employees (Gardner, 2012; Nold, 2012). Therefore, organizations educate employees and align employee thinking with pertinent information

about organizational goals, activities, and directions conveyed by top management in ensuring the implementation of the strategic KM plan.

The strategic KM process integrates with worker knowledge and plays a role in the human capital developmental process within the organizations. According to Steenkamp and Kashyap (2010), one human capital definition is the employees with the capabilities, competence, and innovativeness to accomplish organizational goals. These investments in human capital create intellectual capital for organizations, but they also yield benefits to employees including: increased compensation, ROI, promotional opportunities, opportunities to participate in key projects, and employee standing within the organization (Birasnav & Rangnekar, 2010; Campbell et al., 2012). The benefit of human capital investments assists human capital creation at an individual level and provides employees with the perceived human capital creation gains that ensure mutual benefits of the employee and the organization.

Innovative-supportive culture and knowledge sharing benefits. Culture comes into view sporadically in the literature. Though the literature review disclosed different kinds of organizational cultures, the findings demonstrate that establishing an innovation-supportive culture among employees promotes employees' creativity, risk-taking skills, and willingness to experiment (van Winkelen, 2010). Salamudin, Bakar, Ibrahim, and Hassan (2010) showed that innovation is a component of an organization's human capital. The innovation-supportive culture renders certain human capital benefits to employees, specifically, improving employees' performance and earnings for the organization (Salamudin et al., 2010). The improvement of innovative behavior helps

employees to perform better than the employee would perform without innovative behavior (Carey, 2010).

Organizational culture develops future leaders and enhances human capital benefits when the outcomes are uncertain in the organization (van Winkelen, 2010). Establishing an innovative culture encourages employees to find entirely new ways to solve problems, engage in risk-taking ventures or activities, and explore new ideas. This type culture augments employees' innovative performance (Levy, Hadar, Greenspan, & Hadar, 2010; Markos & Sridevi, 2010). In particular, researchers have found that when detail-oriented cultures do not integrate with innovative cultures, employees' performance is not satisfactory (Levy et al., 2010; Markos & Sridevi, 2010).

When linking organizational culture and human capital benefits, Suppiah and Manjit (2011) suggested that working under a constructive culture creates high-quality performance by reducing product defects. The results of Suppiah and Manjit's study substantiate that having a stable organizational culture causes the employees to deliver greater ROI. Beattie and Smith (2010), Bontis and Serenko (2009), and Cooper (2013) described employee satisfaction, motivation, and commitment as the antecedents of human capital development. Levy et al. (2010) concluded that business organizations that support a constructive culture reduce conflict and ambiguity among employees, and augment employees' performance, commitment, and satisfaction by lowering job-related tension. They also noted that the effective contributions to organizational culture for human capital benefits require the long-term commitment of employees in an organization.

In linking organizational culture and KM, Suppiah and Manjit (2011) described the combination of the employees' tacit knowledge and the behavior patterns of the organizational culture. As a result, new knowledge generation develops among employees. Suppiah and Manjit (2011) also suggested that culture changes employees' behavior toward accepting knowledge activities that improve the KM process. In discussing knowledge creation, organizational leaders should establish a knowledge supportive culture to encourage employees to discuss current developments and job-related problems to deliver knowledge-based solutions (Michailova, & Sidorova, 2011). Thus, a collaborative knowledge culture provides an opportunity to improve managers' technical and conceptual knowledge (van Winkelen, 2010).

Siren (2012) found that organizational culture positively relates to implementing knowledge activities such as knowledge transferring, storing, diffusing, and innovating new knowledge. Siren's study implied that organizational culture promotes creation and transfer of knowledge among employees through the facilitated employees' innovativeness and risk-taking skills. In addition, knowledge supportive cultures encourage employees to participate in expert networks that comprise professionals, suppliers, customers, and employees. In multidisciplinary cultures, employees acquire and share knowledge and improve creativity and problem-solving skills (van Winkelen, 2010). These behaviors result in employees who produce high investment returns and increase the chances of improving his or her salary progression. Siren also found that organizational culture promotes a positive relationship with knowledge sharing.

Specifically, organizational culture significantly predicts the amount of knowledge transfer performance respective to speed, accuracy, and reliability.

Focusing on knowledge sharing and human capital benefits, Giju et al. (2010) discovered from research conducted with management teams that knowledge sharing relates to performance. Knowledge sharing allows employees to produce a high ROI through the organization's intellectual assets. Because knowledge is a component of human capital, improvements in the current knowledge base increase the benefits derived from human capital and enhance the employees' skills (Carey, 2010). To manage the economic environment, organizations can create unique knowledge opportunities derived from the firm's employees by establishing knowledge supportive environments to acquire, share, and create knowledge among employees (Charterina & Landeta, 2013).

Conceptual models that involve participating in high-profile projects that use human capital for organizational benefits can create new knowledge among employees (Gardner, 2012; Nold, 2012). These models indicate that many organizations lack an organizational culture to create, share, and disseminate knowledge (Gardner, 2012; Nold, 2012). The following arguments summarize some of the research propositions: (a) The organizational culture supports employees as they strive to achieve the company's human capital benefits, and (b) organizational culture augments employees' human capital benefits through the implementation of a tactical KM process in the organization (Gardner, 2012; Nold, 2012).

Communication, KM process, and human capital benefits. Communication has a significant role in organizational functioning and effectiveness improvements

(Michailova & Sidorova, 2011) because open and informal communication contributes to the achievement of a competitive advantage. In organizations, communication results by conveying critical information in abating the loss of human capital, disseminating information about management activities to employees, collecting feedback from employees, and using technologies, such as the intranet and Internet facilities to acquire and share information (Sharp, 2009). Employees who perform interdependent jobs in global organizations require the employers' involvement in the communication networks that is vital in acquiring information to communicate effectively completed jobs (Birasnav & Rangnekar, 2010). Consequently, communication and communication networks affect the work continuity of the individual employee's performance.

Michailova and Sidorova (2011) identified a direct relationship between communication and employee performance. In contrast, Robertson, Alex, and Cooper (2012) stated that disengaged employees with negative communications significantly affected employees' performance. However, communication increases employees' commitment to the organization and his or her job satisfaction (Karakas & Manisaligil, 2012). In the 2012 economic environment, many firms have established advanced technology-based communication systems to support human capital. Karakas and Manisaligil found that employees using computer-mediated and electronic communication generated unique and high-quality KM ideas that helped them to improve his or her human capital. The findings of Karakas and Manisaligil indicated the benefits of combining advanced technology and communications to support improved employee performance.

Technological integrated communication networks also have significant contributions to employee creativity (Karakas & Manisaligil, 2012). However, creating a fit between work tasks and technology is essential to any organization, and using computer-mediated communication can provide this assistance to suit many employees. In the comparison of electronic and face-to-face communication, Karakas and Manisaligil findings indicate that employees who used technology-aided communications delivered better performance-on-the job than employees who used face-to-face communication for a limited amount of time.

The direct impact of communication on human capital payoffs helps to explain the effect of the KM process on the relationship between organizational communications and human capital benefits (Karakas & Manisaligil, 2012). The literature also has acknowledged the relationship between knowledge sharing and communication. Knowledge sharing supports employees in generating high ROI through intellectual properties. Secundo, Margherita, Elia, and Passiante (2010) identified insignificant relationships between the communication flow of information and the knowledge transfer between human assets in terms of internal and external organizational knowledge. However, they also found a positive relationship between information and communication technology infrastructure and the quality of knowledge transfer and knowledge assets. Smith, Koohang, and Behling (2010) asserted that the rate of introducing new products is higher when employees use stronger communication networks that support new technologies while striving to incorporate ideas into new

products and processes developed through knowledge creation (Gardner, 2012; Nold, 2012).

Employees who create new knowledge in the organization earn better compensation than employees who do not (Anwar, Sun, & Valadkhani, 2013; Nujjoo & Meyer, 2012). Because this type monetary reward enhances an employees' salary progression, communication has a specific impact on employees' perceived human capital benefits through the KM process (Birasnav & Rangnekar, 2010; Nujjoo & Meyer, 2012). The aforementioned arguments lead to the following conclusions: (a) prevalence of communication flow in an organization enhances employees' perceived human capital benefits and (b) tactical KM processes have the potential to mediate the relationship between communication and employees' perceived human capital benefits to the organization.

Ployhart and Moliterno (2011) investigated the human capital management field and identified the impact of human capital on organizational performance. Their research emphasized the need to develop human capital in the organization. The relationship between KM and human capital is clearly the combination that defines the knowledge management process (Ployhart & Moliterno, 2011).

The tactical KM transfer process integrates with the knowledge of workers and affects the development of the human capital process in organizations (Birasnav & Rangnekar, 2010; Ployhart & Moliterno, 2011). Positive employee perceptions of human capital efforts and benefits occur when employees believe these efforts do not offer mutual benefit to the employee and the organization (Birasnav & Rangnekar, 2010;

Ployhart & Moliterno, 2011). Therefore, the knowledge infrastructure capability of an organization should be the measurement of its KM effectiveness. Nag and Gioia (2012) pointed out the significant understudying in KM and human management field of the perceived human capital benefits. The tactical KM process, organizational culture, communication, and structure of the employees are additional elements of the KM understudying. This gap in the literature has presented an opportunity to explore the relationship between KM and employees' perceived benefits, such as high individual ROI, increased compensation, leadership potential, project or assignment opportunities, and increased responsibility and authority. Nag and Gioia's research recommendations are as follows: (a) establish a culture in the organization to support employees to achieve his or her human capital benefits, (b) communicate the flow of information within the organization to augment employees' perceptions of human capital benefits, and (c) provide the tactical KM process that will allow the best execution by employees. According to Nag and Gioia future research should focus on empirical testing that requires the development of standard scales or constructs for organizational culture, communication, tactical KM process, and employees' perceived human capital benefits. The key focus for organizational culture is effective open and informal communication that contributes to the achievement of a competitive advantage.

Accounting of book value versus market value. The accounting discrepancy between market and book values (true value) on business balance sheets indicates that financial statements are excluding valuable intangible assets (Bassey, 2012). Many definitions of the excluded items refer to intangible and intellectual capital assets. It has

not been the goal of financial accounting to include the value of intangible assets in the price of stock shares (Bassey, 2012; El-Tawy & Abdel-Kader, 2013). Nevertheless, Bassey's research in the intangible area attempts to explain the difference between market and book values by offering an alternative understanding of the contributions of intangible assets.

However, this alternative understanding of the valuation of intangibles has not been a true assumption. Bassey (2012) disclosed that a significant portion of the market-to-book ratios of U.S. firms is not in the financial statements. The accounting professional, according to Bassey, asserted that omitted accounting data for intangible assets, such as human and intellectual capital, have increased substantially in the last decade. The importance of the value contributions of intangible assets is the universal acceptance of the high technology industries; however, acceptable, practical, and consistent measurements of intangible assets have not come to the accounting forefront (Dumay & Cuganesan, 2011). In an attempt to remedy this accounting shortfall, intangibles measurement models examine the four group measurements: scorecards, monetary values, market values, and return on assets (Dumay & Cuganesan, 2011; El-Tawy & Abdel-Kader, 2013). Some research models highlight the goal of making intangible assets visible to decision makers and investors; however, no known methods relate intangibles to measurable financial indicators that meet existing financial reporting standards (El-Tawy & Abdel-Kader, 2013; Samudhram et al., 2008). Addressing this accounting gap in evaluating intangibles in the Samudhram et al. (2008) study is looking at individual assets rather than all of an organization's intangible assets collectively.

Researchers find that using the collective approach of accounting for intangible assets facilitates the development of an acceptable framework for modeling human intangible assets (Bassey, 2012; Dumay & Cuganesan, 2011).

Human Capital and Knowledge Management Accounting

Understanding human capital and knowledge management models helps business leaders evaluate the unique accounting challenges of valuating intangible and tangible asset. The following models are useful to decision makers in developing improved accounting methods for tangible, intangible, and human capital assets. Modeling is useful to decision makers in (a) making predictions, (b) understanding cost-benefit relationships, developing strategy, (c) comparing book and market value, (d) valuating monetary versus nonmonetary measurements, and (e) updating accounting standards and reporting procedures to manifest the growth of intangibles in global business portfolios.

Accounting modeling for intangible assets. A good evaluation model that looks at an organization's intangible assets will improve accounting reporting. According to Samudhram et al. (2008), accounting modeling will assist with prediction, implementation of cost benefits, and provide better managerial decisions for human intangibles. Informed business decisions made using pertinent and relevant facts relating to human assets variables, such as employment movement or variations, clearly impact strategy, competitive ability, and capacity (Iravani, 2011). Externally, human capital values in the portfolio represent the key items of value presently not available to investors (El-Tawy & Abdel-Kader, 2013). Human asset valuation reduces the gap between the accounting market and book values (Salamudin et al., 2010). Accurately portraying

accounting information about the worth of human capital in organizations, providing a decision-making framework, developing a human resource measurement for decision makers and strategic planners: these are all valuable outcomes of accounting modeling.

Several models exist for valuing employees including monetary and nonmonetary factors. The nonmonetary models will indicate the impact of variations in past valuations of employees using organizational and behavioral factors (Bassey, 2012; Garcia-Parra et al., 2009). The monetary value of assets used in the Garcia-Parra's et al. and Bassey's models on a firm's balance sheet and related problems relate to accounting standards for the assessment of human capital.

Accounting standards and capitalizing human capital assets. Human capital, included as an asset on balance sheets and a line item for the context of intangible assets, does not meet the accounting standard, as defined by the International Financial Reporting Standard 138 (Salamudin et al., 2010). However, this information on the accounting values of human assets is paramount to managerial decision-making because it influences investors' decisions about the common stock (Beattie & Smith, 2010). Human capital information yields more accurate forecasts than non-human capital indicators do for net income. Researchers indicated that the value of human resources influences the decisions of accounting professionals based upon the omission of traditional human resources-related values (Alwert et al., 2009; Salamudin et al., 2010).

Accountants recognize assets on the balance sheet when the economic benefits resulting from past expenditures and the benefits of the assets have reliable measurements (Bassey, 2012; Samudhram et al., 2008). The accounting requirements provided by

Samudhram et al. (2008) of having sufficient control of an asset becomes clearer for the current methods of recognizing human capital as assets. For example, the section on employee movement indicates that when employees choose to leave an organization, training investments in the employees are then unavailable to the employer as a benefit the inability to measure this movement in accounting terms presents a challenge to recognizing the value of human capital in accounting statements. This freedom of employee movement is the accounting reason that human capital assets are not on a firm's stock valuation or the balance sheets.

However, not every employee leaves an organization following training. Specialized training is beneficial only to the organization and has limited value or benefit to other organizations, which makes this training opportunity advantageous because such training may encourage employees to stay with the firm that invested in the training (Conklin & Patel, 2012; Nelson & McCann, 2010). If employees choose to stay with the organization, other opportunities for capturing the human accounting value are available to employers. Employees and employers understand that employees remaining with the organization become valuable, respected, and recognized trained resources, yielding the best mutual benefit. Providing a reliable measurement of future benefits from targeted skills and employee training is another challenge in developing a model to predict human assets value (Conklin & Patel, 2012; Nelson & McCann, 2010). , capitalizing the past costs of human assets serves as a financial basis that is acceptable for accounting requirements as a reliable measure of human capital assets.

Investing in capital assets beyond a firm's potential and expected gain in benefits for acquiring, training, and retaining human resources is unlikely to occur unless the benefit can provide a greater value to the firm (Conklin & Patel, 2012; Nelson & McCann, 2010). The benefits generated by human resources expenditures must be equivalent to the monetary value of the investments. In considering modeling cost-benefit accounting requirements, the most common approach is to provide a way to estimate the value of the benefits for human capital assets and indicate that the cost of expenditures equals the investments in the assets (Samudhram et al., 2008). The current accounting practice is to categorize human capital expenditures as an expense. By accounting standards, indicating these investments as expenses supports the conclusion that benefits are financially available only in the current year reporting period (Conklin & Patel, 2012; Nelson & McCann, 2010). Training, development, and skill enhancements remain with the organization only while employee employment is with the organization. Therefore, many human resources-related expenses can provide economic benefits beyond the current accounting period and extend into the future. Developing models for human assets expenditures can help to identify the expenditures that provide the extended benefits, according to the definition of capitalization under the accounting rules versus the group of expense expenditures that are available in the current accounting period.

Samudhram et al. (2008) developed a framework that analyzed the human capital-related expenses and categorized those expenses into related levels according to the benefits that the assets provided. The cost-benefit characteristics of the designated categories indicate how these are capital expenditures rather than expense expenditures.

This pioneering research has been one of the few methods attempting to correct the valuation of human resources in accounting practices (Samudhram et al., 2008).

Modeling framework and analysis. The Samudhram et al. (2008) framework, which models intangible assets, identified different cost-benefit relationships so that appropriate accounting treatments for different types of expenditures on human resources occur. The framework benefits managers as a useful tool for supporting strategic planning. To accountants, the framework meets the reporting practices and builds on existing accounting theory that relates expenditures and benefits of human resources for capitalization. According to Samudhram et al., some limited investments result in greater long-term benefits to the firm, whereas similar levels of investment lead to limited benefits. These classifications of the levels and investment-benefit relationship are (a) low levels of investments that provide high levels of long-term benefits, (b) high levels of investment that provide high levels of long-term benefits, (c) low levels of investments that provide low levels of long-term benefits, and (d) high levels of investments that provide low levels of long-term benefits (Samudhram et al., 2008). Additional descriptions of the four levels of expenditures and common examples follow.

Description of Human Capital Expenditures for Modeling

Human capital expenditures separate into four distinct levels (Samudhram et al., 2008). Level 1 of human capital spending yields large long-term benefits to the company, regardless of the minimal expenditures made for human capital. Paid company educational leave at the employee's expense is an example of this type expenditure. If the company offers employee enticements, such as promotions, the likelihood of employees

remaining with the firm increases (Conklin & Patel, 2012). When employees remain with the company until retirement, expenses become capital expenses for amortization on the accounting records.

Samudhram et al. (2008) stated that training fees from outsiders, in addition to fees from internal employees, can become a profitable long-term benefit resulting from the negative human capital expenditure. Successful training offered to outsiders yield a positive inflow of funds generated from negative expenditures that support activities beneficial to the company's human capital interests. Funds received from outsiders become revenue rather than an expense for the current account period according to current accounting practices. The strategic management accounting potential of offering outside training is a win-win opportunity. Outside training enables internal human resources to become highly trained and can also generate revenue. The key warning is that this type training can only address company-specific needs.

Level 2 of human capital expenditures occurs when companies invest large amounts of human capital spending that increase long-term benefits (Samudhram et al., 2008). Professional education or training for employees is an example of this type expenditure. When companies and employees map career plans cooperatively, the employees receiving the benefit normally remain with the employer who finances the education until completed by the employee. In this scenario, the expenses become capital expenses for accounting amortization while the employees remain with the firm. The company benefits during the training time of the professional employees, and the remaining employment career with the company making it possible within the accounting

definition to capitalize this expense (Gardner et al., 2011). If the employees leave the firm and if the training is mandatory for a period of service after completion of the studies or training, then the funds received from the employees for breaking the agreement would bring additional revenue to the company. The penalty attached to the service bond also would discourage trained employees from leaving prior to the end of the required period of employment service.

Again, the incurred expenses for employee training become a capital expense as well as the amortization of the required period of remaining employment service. Enterprise resource planning (ERP) system is another example of Level 2 spending that yields similar benefits, protections, and accounting treatment of expenditures with capitalization potential (Hald & Mouritsen, 2013). The potential of Level 2 training to strategic accounting is the building of the long-term company value with some revenue protection guarantees.

Level 3 of human capital expenditure limits the human capital investments that yield limited long-term benefits (Samudhram et al., 2008). The investment-human capital return is clear for accounting purposes in this scenario. These companies consciously and hire staff with current training for the organization's business needs. Although the investment in training is minimal, these companies believe in the benefits of trained human resources, so they take innovation, a low-investment approach, in getting the needed training. Negotiating and tying free vendor-supplied training with the purchase of new equipment is one example of the minimum investment strategy.

Although the accounting treatment of training in this scenario is an expense, the training skills provide some limited long-term benefits. The disadvantage of this category is the limited nature of the training obtained from minimal investment expenditure. When organizational training is a part of the purchase of equipment, the training employees receive might be generic and may produce only marginal, if not negative, productivity gains. The quality of Level 3 training is questionable. If outsiders access the low cost training similar to that of the Level 2 training scenario, then the income generated comprises revenues available for financial reporting in the current accounting period. However, Samudhram et al. (2008) discouraged this type training for Level 1 or Level 2 expenditures as a better alternative.

Level 4 expenditures of human capital are the investment by large companies on human assets that result in limited benefits (Samudhram et al., 2008). ERP systems and other high-cost systems fall under this classification. ERP informational systems are systems that companies, especially manufacturers, use to manage and integrate key parts of the business, such as planning, purchasing, inventory, sales, marketing, finance, and human resources (Hald & Mouritsen, 2013). However, ERP systems do not meet investment expectations because the training addresses only the company's direct needs, thus limiting its use outside the company for revenue-generating potentials. An example of this type investment category is web-based training systems that train employee on the use of the Internet to conduct business, gather information, take online training, and perform e-commerce business functions. The downside to this type training is that

employees may find it easier to use the Internet for personal activities that may result in a loss of productivity.

Accounting Treatment of Human Capital for Modeling

Samudhram et al. (2008) developed mathematical models to test the treatment of capitalization and amortization of human capital-related expenditures and the subsequent financial results for the years following the capitalization process. Under the research modeling procedure, the capitalization of expenditures on the balance sheet allows for amortization of a portion of the expenditures. The expenditures for the period appear as expenses on income statements. Amortization expenses for human capital occur evenly in the modeled time frame, similar to standard depreciation method, such as the straight-line method.

The amount capitalized on the balance sheet that will no longer appear on the financial statements is a write-off. However, if firms encounter human capital expenditures under this assumption, there will be an ongoing need to capitalize these expenditures, and human capital will always appear as an intangible asset on the balance sheets (Tollington & El-Tawy, 2010). This finding, on long-term payoff and the continuous presence of this payoff on the balance sheet, indicates that firms can invest in human capital activities that benefit and improve the investment appearance of the firm's financial statements.

Implications to managerial accounting. The analysis of the four levels of investments in human capital has many implications for strategic managerial accounting. Level 1 investment gives firms greater long-term benefits while requiring that firms input

little capital investment. Firms can increase human capital-producing revenues with minimal expenses (Bryan, 2010). Paid educational leave given to employees can enhance his or her labor skills and improve long-term business prospects. There are limitations to the circumstances in which such revenue-generating activities are effective. There also are opportunities for firms to have training courses for human capital development for its own employees, and for outsiders who pay fees, with the goal of developing the human capital. Although the training generates revenue, it would not gain the unique competitive edge because outside competitor's employees have the same exposure to the training benefits. Level 1 investments are suitable only for fundamental skills training programs rather than for detailed, firm-specific training and confidential and proprietary information.

Level 2 investments reflect the high investment in training that provides long-term benefits unique to a firm and the competing industry. This type training's specific design is for a firm's unique operation, and production methodologies and the duplication and transferring of the organizational knowledge to a competitor are not easy. The management strategy for spending on this type training is to gain an advantage over competitors.

Another advantage of Level 2 investments is that trained employees are less likely to leave the organization if the training is more specific to the firm that provided the training (Samudhram et al., 2008). In the planning of Level 2 training, management looks for improved employee occupational development, and other inducements to encourage employee retention because this type training may the firm. When firms do not invest in

non-company specific training and education, many years of loyalty of the employees are mandatory to ensure that these investments will provide some benefit to the firm.

Level 3 investments involve limited human capital expenditures and benefits to the firm. Level 3 expenditures are ways of improving the benefits to the firm by utilizing professional services for developing long-term human capital benefits. A firm might replace Level 3 investments with Level 2 investments to improve long-term benefits and increase the company's competitive advantage.

Level 4 investments result in minimal long-term benefits, despite the investment size. This investment can be more beneficial as a Level 1 or a Level 2 investment. Attention to detail is essential in avoiding any potentially negative intangible impact. Training relating to Internet systems can encourage the abuse of office time, such as personal web surfing by employees. To contain the negative influence of improper Internet use, the organization can warn employees it monitors unauthorized activities and will enforce strict penalties for unauthorized Internet use.

Samudhram et al. (2008) developed a useful framework of four human capital-related expenditures. This model provides a clear perception of the contextual managerial actions that exist for each level. However, the model needs testing and validation study in the field for practical application. In addition, this analytical framework and suggested managerial handling help to analyze other types of intellectual and human assets and investments. Firms that analyze human capital by putting this framework into practice will make improved managerial accounting decisions.

A company's annual report performance section is the typical place to expose investors to the potential long-term value of developing human capital (Beattie & Smith, 2010; Chareonsuk & Chuvej, 2010). As previously stated, human capital expenditures are expenses under current accounting standards. With the handling of intangible assets and related expenditures there exist subgroups of intangible assets that meet normal accounting standards. In these special cases, the subgroups expenditures become a capital expense when using the common approach defined by International Financial Reporting Standard 138 (Alwert et al., 2009).

The value relevance of reported financial statements and benefits, if Samudhram et al. (2008) methodology is acceptable, will help advance intangible accounting reporting. The Samudhram et al. (2008) study described research measuring the organizational results of effective human capital management. In this study, Samudhram et al. (2008) showed a view of the whole system of beliefs that integrates knowledge management, intellectual capital, human resources, employee behavior, information technology, and accounting. In the research study, Samudhram et al. (2008) assimilated quantitative and qualitative methods for a conceptual framework that yields several significant accounting and management implications. The results enabled Samudhram et al. (2008) and the study participants to understand a firm's human capital effectiveness. Dumay and Cuganesan (2011) offered better strategies for allocating human capital resources. According to Samudhram et al., the findings of such studies are limitless and establish formal relationships among human capital management, business economics, and business accounting.

Quantitative Conceptual Modeling for Human and Intellectual Capital

The human capital valuation process has a positive impact that practitioners of human capital management can use (Nyberg et al., 2010). This valuation enables effective measurement and understanding of the results of revenue and profit for each employee. Modeling revenue, profit, employees, turnover, and training information are the basis for the quantitative information provided by the accounting and HR departments of the Saratoga Institute and Accenture firm (Bontis & Fitz-enz, 2002); Nyberg et al., 2010). The purposeful samples used in the research modeling entails the responses from the CEO, CFO, Senior VP of HR, and other senior executives from 25 organizations who represent the comprehensive views of these organizations relating to human and intelligence capital needed to generate the following metrics (Bontis & Fitz-enz, 2002).

Descriptive Statistics and Quantitative Comparative Results

The quantitative measures obtained from the research study on human capital looked at the categories of valuation, effectiveness, depletion, and investment (Bontis & Fitz-enz, 2002). The Saratoga Human Resource Financial Report compared the quantitative results between the organizations and other companies. The benchmarked sampled results included companies in the identified industry groups from the above referenced Saratoga study.

Human Capital Modeling Effectiveness

Bontis and Serenko (2009) used human capital effectiveness in a model as a dependent variable and tested the revenue and expense factors, and human capital ROI. The revenue factor was the measurement of human capital effectiveness resulting from

the value drivers that influenced the employees' behavior. The revenue factor is the calculation of total revenue divided by the organizational headcount. However, in the calculations, Bontis and Fitz-en (2002) argued that full-time equivalents (FTE) rather than the head count are better whenever the FTE is available. Using head count value in the calculation, which is normally lower than the FTE value, can result in overestimations in the modeling predictions.

The mathematical model ($HC\ ROI = \frac{[Revenue - \{Expenses - Compensation\}]}{Compensation}$) shows the calculation for Human capital ROI investment of companies (Danthine & Jin, 2007). In the equation, human capital return is the value-added contribution to the organization's investment in human assets. An organization's revenue minus the costs of expenses and compensation is the same as organizational profits minus the cost of human assets. The model's findings for human capital ROI, as compared to the Saratoga results, are significantly higher. These study findings mean that a greater return is apparent from money spent on employees than on the initial cost of the investment.

Human Capital Investment, Valuation, and Depletion

Human capital valuation models are tools that predict human capital effectiveness by looking at five studied measurements: revenue, compensation expense, compensation, and executive and supervisory compensation factors (Bontis & Serenko, 2009). The compensation revenue factor is compensation to employees as a percentage of total sales. The factor measures the return on the dollar that organizations invest in the employees. The findings predicted by the model indicate that over 13% of the surveyed

organizations' revenues were for salaries and compensation (Bontis & Serenko, 2009). The compensation-expense factor is the general compensation structure and pay to employees as a percentage of total operating costs. The studied organizations expenditures on compensation exceeded 15% of total compensation pay costs. The compensation factor metric measures the average compensation paid to an employee. The measured compensation factor is the compensation level within an industry. The studied organizations' compensation factor was greater than that of the comparative sample (Bontis & Serenko, 2009).

One significant area in the Bontis and Serenko (2009) study that has a positive influence on human capital management is human capital investment. Organizational leaders who invested in human capital through training and development expenditures realized increased benefits over time. The three measures of human capital investment are development rate, training investment, and training cost (Bontis & Serenko, 2009). The development rate explains how well the organization provides employees access to training programs. As a workforce talent pool becomes smaller, organizations begin to think about providing training programs that increase the cumulative level of employee intellectual capital (Charterina & Landeta, 2013; Vargas-Hernández & Noruzi, 2010). Results have shown that organizations in the sample that provide such programs have a development rate than that of the comparative sample from sampled companies that did not have training programs (Bontis & Serenko, 2009).

Training investment is spending on training for each employee. This defined category of investment helps compare industry competitors and indicates how certain

organizations spent more than the comparative sample (Samudhram et al., 2008). The training cost factor is also a spending factor of training for each employee. Compared to the training investment metric this amount is greater. The results training investment study reflect that organizations had significantly higher spending levels than the comparative samples (Bontis & Serenko, 2009).

The human capital depletion factor has a negative influence on intellectual capital that results in organizations experiencing substantial losses from human capital depletion (Samudhram et al., 2008). The model shows a comparison of the three measures that included voluntary turnover, involuntary turnover, and the total separation rate. The percentages of employees who leave an organization by choice become a component of the organization's voluntary turnover rate. The measurements indicate that the impact on human capital management is significantly negative when employees leave an organization to seek better employment opportunities. The results indicate that organizations in the sample are in line with the comparative sample (Bontis & Serenko, 2009; Samudhram et al., 2008). The percentage of employees terminated without choice is the involuntary turnover rate. This measurement includes employees who discharged, disabled, died, or laid off. The measurement is also an indicator of the adverse quality of the hiring practices and economic conditions of a firm. The results reflect that the sampled organizations' rate for involuntary turnover is less than the comparative sample (Bontis & Serenko, 2009).

The percentage of employees terminated without choice, plus those who left of his or her own accord is the total separation rate. The measure combines the two

measurements that represent the human capital loss rate for all reasons. The findings indicate that the sampled organizations have a total separation lower than the comparative sample (Bontis & Serenko, 2009).

Modeling to Understand Practical Applications of Intellectual Capital

Intangible assets represent a significant portion of a typical firm's value (Vargas-Hernández & Noruzi, 2010). To reinforce how industrialized economies transform, Ibrahim and Reid (2009) conducted a study reflecting that the terminology in the field has transformed from one dominated by dimensions of tangible assets, to one founded on intellectual capital. Ibrahim and Reid's research study results confirm the radical transformation of the structure of the Western economies to intangible base valuation systems. Although the market valuation of the typical firm has shifted from tangible assets to intangible assets, it is necessary to note that these two classes of assets remain interdependent.

Research has allowed examination the influence of different resources on organizational performance and the conclusion of the finding are that intangible assets provide capabilities and tangible assets provide resources (Crook et al., 2011; Hancock et al., 2013; Hausknecht & Holwerda, 2013; Nold, 2010; Nyberg, 2010). This distinction is significant because a firm requires resources and capabilities to achieve a competitive advantage. This distinction highlights the central challenge of recognizing the value of intangible assets using traditional accounting methods. The results of the studies suggested that measurements used in the modeling of human capital are crucial in forming an understanding of the strategic management needs that will assist supervisors,

managers, and HR departments in developing and implementing systems that reflect more of the accounting returns. Underestimating the organizational problems of implementing and maintaining the accounting contributions of human assets to the business limits competitiveness and undervalues the firms.

Researchers also indicated that management perception is that of not possessing the skills needed to execute and consistently apply precise and complicated business measurements (Gardner et al., 2011). Nevertheless, the measurement approaches used provide valuable worker information that defines the worker's skills in financial terms to make the measurements meaningful. Complications in the measurement approach have led to problems in the accounting methodologies as well as problems for accounting and finance manager (Gardner et al., 2011).

Bontis and Fitz-enz (2000) described the accounting function that reveals the past and present financial health of an organization, but little information about the future about human capital issues. According to Bontis and Fitz-enz, to see the future, leading indicators need to prepare for the future state of human capital. However, the benefit of establishing a framework for management use is apparent from the modeling results. A framework allows management to understand the business intents and ramifications of the qualitative and quantitative alternatives of human capital that uses unambiguous strategic decisions about the projected organizational results (Zoltowski, Oakes, & Cardella, 2012).

Intellectual Capital at the Forefront

Primarily, work on intellectual and human capital championed by practitioners, industries, and national bodies reflect the need to consider updated-management approaches resulting from globalization and social trends. Sweden leads the global effort in calculating the value of a country's intellectual capital output and in defining the standards of intellectual and human capital evolution at the national level. Researchers in Sweden, working with Skandia AFS, defined and evaluated intellectual capital as a function of structural and human capital (Serenko, Bontis, Booker, Sadeddin, & Hardie, 2010).

A summary of the work on intellectual capital at Skandia (Edvinsson, 1997) defined what remains in the organization after removing all the human assets. The summary included customers and organizational capital elements such as processes, systems, procedures, and culture. Giju et al. (2010) defined human as the knowledge, abilities, skills, ideas, and other value-added components of human resources. This research has helped to conceptualize and refine the defining characteristics of intellectual capital. However, management thoughts on the subject have not taken the advances in understanding from earlier works. Intellectual capital is still not clear in terms of practical ways to apply the concepts to accounting measures and management practices (Giju et al., 2010). The study introduced useful strategies and a new thinking paradigm for understanding intellectual capital.

Intellectual Capital Implementation Strategies

Ling (2012) and Sveiby (2007) advanced understanding of intellectual capital as it applies to organizational knowledge management. Serenko et al. (2010), along with other prominent researchers of knowledge management, viewed knowledge as comprising the tacit verbalized language such as culture, symbols, and artifacts, and the explicit set of instructional language such as systems, procedures, libraries, and databases. Therefore, a company's intellectual capital offering is a way to produce the tacit and explicit knowledge of the organization (Suppiah & Manjit, 2011).

Many technical solutions for categorizing knowledge exist, but the challenge for managers becomes one of translating the unique dimensions of tacit knowledge into competitive advantage and understanding of the elements of intellectual capital and the required solutions (Michailova & Sidorova, 2011). Companies are implementing programs and promoting the benefits of social interactions to encourage healthy workplaces. These organizations adopt the workplace practices of coaching and mentoring, developing corporate universities, utilizing lunch bag training sessions, and implementing other knowledge-sharing opportunities (Bontis & Serenko, 2009). The benefits of these strategies allow organizations to share tacit knowledge by tapping existing sources of knowledge and promoting new idea generation through tacit channels (Bontis & Serenko, 2009). These strategies become the mechanism for learning by individuals and groups. The difference between tapping existing and promoting new strategies is organizational learning and intellectual capital. Organizational learning is a starting point to understanding the knowledge era. Learning is the process of meeting the

broader organizational objectives of developing knowledge creation ability and generating organizational capacity (Siren, 2012). Organizational learning offers the proficient and contextual use of intellectual capital, and a new management thinking perspective.

New Management Thinking Perspective

Practitioners and managers emphasize team-based and organizational learning theories as a way to approach knowledge-enhancing strategies (van Winkelen, 2010). The management theories and philosophies of intellectual capital build upon prior management periods. Strategies for intellectual capital in the past include concepts from Taylor's theories, scientific management, T-groups, sensitivity training, process reengineering, and the learning organization (Wren, 2011). In today's business environment, the upsurge is in knowledge management thinking. Conjecture about the success or failure of past approaches demonstrates the need to develop and implement new management strategies.

Any resistance by employees to implementing new ideas is because of the employees consider the strategies being fads. Not discounting the benefits of past management thinking, new philosophies build on management thinking offering insights and learning required for the growth and survival of organizations (Siren, 2012). The progress in converting organizational learning to knowledge management is evidence of the evolution of management philosophy built over time into today's management practices. This linkage encourages organizations to enhance existing management practices to ensure the continual growth and survival of the organization. To benefit from

human capital strategies, organizations must contextualize existing management approaches to fit the vision of the organization.

Gaining a competitive advantage in a global economy helps generate successfully predicting by having plans that respond to market, social, political, environmental, and business condition trends (Campbell et al., 2012; Coff & Kryscynski, 2011). Strategies that meet the needs of an organization develop from the implementation of the best arrangement of a company's intellectual assets and will not diminish successful business outcomes. Looking at the traditions of management and the requirement for organizations to use new human asset strategies in achieving competitive advantage, practitioners are making decisions that increase the attention given to intellectual assets in the natural evolution of business (Campbell et al., 2012). However, the value ascribed to intellectual capital components and knowledge management principles happens only through the manner in which the implementation of these strategies occurs. Managers, practitioners, and scholars must understand human and intellectual asset strategies within the contextual requirements of the organization (Iqbal, 2010; Vargas-Hernández & Noruzi, 2010). The business successes gained from new understandings of the potential benefits of human and intellectual capital strategies become realizations only by building upon existing business philosophies and organizational learning. However, the business insights that leaders gain from putting human capital strategies into practice are potentially limitless.

Transition and Summary

Planning the knowledge and skills transfer of workers involves understanding (a) intangible assets, (b) human capital, (c) knowledge management, models, strategies, and (d) related subjects found in the literature review are not easy management undertakings. However, for global organizations to remain competitive, methods and models must be in place that will assist their leaders in conducting effective knowledge and skills transfer planning and strategies.

In my review of the current literature, I determined that gaps in the body of knowledge exist. The majority of the references to phenomenology have not identified a road map for developing the strategy for replacing technical workers' knowledge and skills. This phenomenological study represents emerging research on the preparedness of manufacturing organizations' leaders to plan for addressing technical worker knowledge and skill transfers and the need to understand the contribution to supporting an organization's core competencies. I expect the research study's findings to add to the body of knowledge by understanding the need and process for proper preparation of knowledge and skills transfer to address anticipated skill shortages stemming from skilled labor supply shortages and to recommend some intervention strategies.

Section 2 contains a discussion of the methods of investigating, validating, and understanding observations of the phenomenology of an organization's planning for knowledge and skill losses through the interviewing process using the modified van Kaam method (Moustakas, 1994). The information in Section 2 pertains to (a) the design method, (b) participant selection criteria, (c) data-gathering processes, (d) data analysis

techniques, (e) and the rationale for selecting phenomenology as the research method for this qualitative study. Section 3 contains the presentation of findings and conclusions into qualitative themes about the study's phenomena. Section 3 includes (a) detail the application of the study to professional practice, (b) summarize the implications for change, (d) identify gaps, and (c) provide recommendations that may assist in understanding the business ramifications of organization's preparedness for industrial maintenance technicians' knowledge and skill losses. Section 3 concludes with further recommendations (a) for social change, (b) actions, (c) further studies, (d) reflections, and (e) conclusions.

Section 2: The Project

Section 2 describes the methods of investigating, validating, and understanding observations of the phenomenology of an organization's planning for knowledge and skill losses. Section 2 contains to (a) the design method, (b) participant selection criteria, (c) data-gathering processes, (d) data analysis techniques, (e) and the rationale for selecting phenomenology as the research method for this qualitative study. I used the qualitative interview as the main tool for exploration and data collection.

Conducting audiotape semistructured interviews, I used the modified van Kaam method for analyzing the data from the study. I identified and explored critical accounts of needs, planning, and preparation to understand how the experiences and exposure of managers, supervisors, and engineers may adversely affect worker replacement practices. I interviewed a purposive sample of participants at a rural west Tennessee manufacturing facility to ascertain the differences and similarities between accounts of the lived experiences and influences of managers, supervisors, and engineers.

Exploring the perceptions of the leaders' preparation for replacing the loss of industrial maintenance technicians' knowledge and skills to the organization as gathered from supervisors, managers, and engineers are the basis for the study. The reduction in offshore-outsourced resourcing, and improvements in worker training and development resulting in greater American job security could be the social impact of this study. The study's findings should contribute to the business performance by identifying ways to prepare for the loss of technical knowledge and skills to help protect the knowledge bases of U.S. industrial manufacturers.

Purpose Statement

The purpose of this qualitative phenomenological study was to explore the experiences of a purposeful sample of 20 managers, supervisors, and engineers at a west Tennessee manufacturing facility. To determine how leaders might assess and improve organizational readiness, I explored the experiences of this management group as their experiences related to the preparation for the loss of industrial maintenance technicians' knowledge and skills that support the business' core competencies.

The exploration and analysis of the findings from the study's phenomenological data can assist managers gaining a deeper understanding of knowledge and skill factors essential in building a company's competitive knowledge base. The analysis offers an evaluation of the planning efforts and decisions for replacing, maintaining, and training of industrial maintenance technicians to help prepare for the loss of knowledge and skills through attritions. The social impact of this study for manufacturing business leaders includes (a) improved succession planning, (b) sustaining active learning organizations, (c) collaboration with administrators of technical educational programs for improved training, (d) replacement technologies, and (e) utilization of the global economy for replacement workers. For skilled technical employees, the social impact of this study might assure another generation of craft workers contributing to the prosperity and competitiveness of American industries and provide competitive paying worker jobs and livelihoods to the supportive employers, communities, and institutions.

Role of the Researcher

In phenomenological research, I, as the researcher, and the participants allowed for conscious assimilation of and exploration for new knowledge (Moustakas, 1994). *Epoché* is the process where the researchers attempt to dismiss prejudices and biases to ensure the validity and reliability of their research (Moustakas, 1994). Accounting for a researcher's experience of a topic promotes data collection transparency and helps to verify the study's validity (Moustakas, 1994). I prepared notes about the studied topic and my experiences as part of the self-exploration of the investigated phenomenon.

When conducting qualitative research, I became the research instrument and used proscribed method to improve efficiency and reduce bias for sampling, data collection, and data analysis (Chenail, 2009). The study's focus would be on maximizing the personal perspective of the phenomenon to assure that I gain full benefits from the experiences. Communication should remain the priority regarding the participants as well as with the recipients seeking value from the participants' perspective. Encouraging clarity and completeness in the interview conversation is a means of avoiding influence or bias to answers or outcomes (LeBlanc, 2010). To that extent, my role is to interpret what I see, hear, and understand in the phenomenological design while exploring, discovering, and interpreting the psychological trends (LeBlanc, 2010).

Collected interview data's quality depends upon me as the researcher to use skillfully probing interview techniques. I applied uncritical and non-directive techniques of interviewing to avoid biased information collection. I prompted the participants by asking open-ended questions. The interview information quality depends upon the extent

to which I motivate the participants' interest to be through and truthfully in explaining the different connecting or opposing comparisons of the problem. I remained objective and non-biased in any working relationship with the participants.

Participants

The sample of participants is my selection of volunteering managers, supervisors, and engineers at a rural west Tennessee manufacturing facility. Participants had a minimum of 1-year tenure, and can add value to the study because of the business relationship to the studied phenomena. I knew and had a previous working relationship with a few of the participants. The selected study group was a purposive sample, served the purpose of the research, and was also a convenient sample, conveniently available for the study's purpose (Bowers, House, & Owens, 2011). The selection of the known purposive group of participants is to provide greater participation than may otherwise have occurred if there were no relationship with me. A purposeful sampling technique allowed me to obtain participants with the needed level of experience (Hooper, 2011). Although, for a qualitative study, a sampling of 10 participants is sufficient to derive thematic and lived experiences (Lasch et al., 2010; Mason, 2010), I conducted 20 interviews and obtained evidence of theme saturation prior to the last interview (Mason, 2010). Using the interview questions (listed in Appendix A), I recorded responses for comparing and contrasting with the research questions. My interviewing methodology of contrasting and comparing responses utilized the advantages of categorization of statements by interviewees from the prepared questions. I expected the design

methodology to help improve the relevancy of the findings by using a purposeful and planned sampling of participant meeting the selection requirements.

Research Method and Design

Method

Quantitative and qualitative are the two methods of research. Studies that involve examining and testing hypotheses are of the quantitative types (Moustakas, 1994). Questionnaires and surveys that allow a researcher to collect data in numeric forms are the most common methods of data collection for quantitative studies (Golafshani, 2003). Qualitative studies allow researchers to gather materials originating from previous research work, case studies, review of literature and utilize open-ended questioning to delve into the meaning and theory of the studied phenomena (Neuman, 2006). Although I considered other methods of analysis, I determined that a qualitative method using the modified van Kaam framework for analysis is suitable to facilitate a deep understanding of the underexplored phenomenon and allow me to explore attitudes, beliefs, desires, and experiences of the participants (Neuman, 2006).

I collected the participants' subjective experiences and analyzed those experiences to develop generalized outcomes from the collective questioning. The phenomenological research design required describing and interpreting individual perspectives about a particular phenomenon. Cambra-Fierro and Wilson (2011) and Hooper (2011) noted that findings from a qualitative study highlight the richness of lived results needed for phenomenological research.

Research Design

Phenomenology describes a philosophy, a research design, and supporting processes (Qu & Dumay, 2011). Phenomenology and, *hermeneutics* are interchangeable term that represents an analysis of the written word (Moustakas, 1994). An understanding of phenomenology as a research methodology requires an understanding of phenomenology as a philosophy that frames concepts from theories and philosophies (Qu & Dumay, 2011; Rademaker, 2011). Phenomenologists do not believe that knowledge is quantifiable in terms of statistics (Rademaker, 2011). To capture that certainty, I and others undergoing the experience must place aside anything outside the immediate experience.

Phenomenologists have developed several approaches to understanding peoples' experiences. The complexity of the phenomenological design reflects the reluctance of researchers who use phenomenology to prescribe techniques. Phenomenological researchers prescribe techniques that run contrary to the quantitative philosophy techniques that do not give importance to subjectivity and first-person experiences (Loidolt, 2009). Bracketing a life experience is a key consideration in a phenomenological design because researchers utilizing a phenomenological study can mitigate the effects of biases on the research process (Tufford, 2010).

In terms of research methods, phenomenological research may be empirical evidence based (findings based on research) research or reflective based (findings based on reviewing or reflecting on the experience) research (Frantz & Rowe, 2013). My review of the inquiries available for use required ascertaining the appropriateness of a

quantitative, a qualitative, or a mixture of both to develop a comprehension of the underlying philosophy. Thereafter, I used a qualitative design.

Other possible qualitative research designs for this study include the narrative, grounded theory, ethnographic, and case study methods. Narrative researchers explore the agent as a property of social processes and the interactions between space and the past, present, and future (Garud & Giuliani, 2013). Grounded theory researchers investigate the experience or a general phenomenon not specific to a select group of people (Gambetti et al., 2012). Since my research study is about the preparation for industrial worker attrition by manufacturing facilities, and that can be considered specific to this select group, I did not use the grounded theory method. Ethnographic researchers explore historical-cultural phenomena (Plinio, Young, & Lavery, 2010). Since my research study does not relate to a historical or cultural phenomenon per the definition, I did not use an ethnographic study method. Case study research considers one or more situations to examine within a closed or connected system (Dowlatshahi, 2010). I did not investigate situations within closed or connected systems, therefore I did not using a case study method for this research study.

Considering each of the research designs for possible use, phenomenology was the most appropriate choice for this study due to the subjectivity and inductive nature of the phenomenon studied (Reiners, 2012). The seven steps of the modified van Kaam method of analysis of phenomenological data guided the study. Moustakas' (1994) modified phenomenological method of analysis involves seven main steps. The steps are: (a) listing, (b) preliminary grouping of every relevant expression, (c) reduction, (d)

elimination of the invariant constituents or the expressions that relate to the experience, (e) clustering, (f) thematizing the invariant constituents resulting in the identification of core themes of experience, and (g) identifying the invariant constituents to ensure the invariant constituents and themes are accurate. Phenomenological research allows for the generation of knowledge through understanding of the interactions between the researcher and the participants (Reiners, 2012). Therefore, phenomenological research was the best approach for this study because of the dynamics of the studied phenomenon's subjectivity and the ability to deduce findings via gathered data. I expected the phenomenological design to enable me and the participants to engage in an exploration of lived events not typically explored by the other research methods.

Population and Sampling

The expectation of the interviewed managers, supervisors, and engineers was to provide the assessment of the perceptions of the organization's strategic preparation for replacing industrial maintenance technicians' knowledge and skills. Analyzing the summary of the participants' perceptions of the industrial maintenance technician's role in supporting the manufacturing business was the primary goal of studying this group. The secondary goal of the study was to fill an academic gap with new research and support the knowledge contributions of industrial maintenance technicians' skills in manufacturing organization. The knowledge gained from the study may provide better organizational decision-making about industrial maintenance technicians' skills and better knowledge management of such skills.

I explored the experiences and perceptions of managers, supervisors, and engineers of industrial maintenance technicians' knowledge and skill requirements for phenomenological interviewing. A composite minimum sample of 20 managers, supervisors, and engineers from a rural satellite manufacturing plant participated in one-hour interviews and a follow-up interview if necessary regarding the perceptions on how the organizational leaders are planning for the knowledge and skill losses due to industrial maintenance work attrition. These interviews included the facility plant manager and corporate staff managers. Mason (2010) noted that a sample size of between 10 and 30 participants is suitable for qualitative research.

Purposive, non-random sampling provides the basis for choosing the participants who meet the specific criteria. Using a purposive sampling technique enabled me to reach potential participants with the essential experience (Moustakas, 1994). Neuman (2006) suggested that conducting a qualitative inquiry using purposive sampling is appropriate for this study. Therefore, the purposeful sample consisted of supervisors, managers, and engineers with one or more years' experience at the facility.

Ethical Research

In this study, I met all of the ethical requirements, including an acceptable code of conduct, legal requirements, and social responsibility requirements, to ensure respect, justice, and beneficence of the participants, as recommended by Bauman (2011). There did not appear to be any foreseeable risks or likelihood of harm to the participants. The location of the ethical research consent form is in Appendix B.

Prior to conducting the study, I obtained a Letter of Cooperation from the manufacturing organization where I conducted the research prior to soliciting participants. In the Letter of Cooperation, I assured the IRB that the cooperating entity had provided permission for me to conduct research activities within the facility and promote protection of human research to participants who associate with the cooperating entity. I fully informed each participant in writing, to ensure his or her awareness about the study so that they can make an informed decision about whether to decline or participate in the study. I required signed informed consent forms from all participants. I assured the confidentiality of the participants' responses. I did not ask any questions that could compromise the participants' employment status.

Participants were free to withdraw from the study at any time and decline to answer any questions during the interview process. I gave the participants assurance that the records of this study remain private and confidential and destroyed after 5 years from the date of the study's approval. I did not offer incentives for participation in this study. Walden University's Institutional Review Board (IRB) process ensured that the research meets all ethical standards prior to commencement of the study. Submission of the IRB form was electronic and included descriptions of: (a) the study, (b) data collection tools, (c) participants, (d) community stakeholders and partners, (e) potential risks and benefits, (f) data confidentiality, (g) potential conflicts of interest, (h) informed consent, (i) expedited review criteria, (j) final checklist, and (k) electronic signatures to ensure compliance with the ethical standards of Walden University and U.S. federal regulations. There was no collection of data until the IRB granted study approval (Institutional

Review Board for Ethical Standards in Research, 2010). The Walden Institutional Review Board approval number for this research study is 03-14-14-0165065. The Walden Institutional Review Board approval number for this research study is 03-14-14-0165065.

Confidentiality is a critical element in human research. I explained the confidentiality, informed consent, and research protocols prior to asking potential participants to sign the Informed Consent Agreement. The Walden University Informed Consent Agreement form requirements were for each participant, agreeing to participate in the study, to sign the form. Only individuals willing to volunteer time to participate and share lived experiences participated in this phenomenological study. Recruitment into the phenomenological research study was via face-to-face or telephone solicitation.

Data Collection

Instruments

Thorough interviews were the primary data collection method. Repetitive interviewing is technique to help gather research information (Englander, 2012; Golafshani, 2003). The interview protocol included asking questions and follow-up questions when needed. I obtained the interview information from the minimum selected sample size of 20 that allowed me to gather information that serves to address the study's research question. The experiences from the diverse 20-member participant pool can serve as an objective crosscheck of the study's observations (Bradbury-Jones, Irvine, & Sambrook, 2010; Neuman, 2006).

Completing the study required that I conduct interviews and compare the themes that emerge from each interview. The resulting participants' responses allowed me to

explore for differing views or further explanations from each participant. The qualitative approach involved conducting interviews and exploring the responses for patterns, which can result in emerging themes. The modified van Kaam method included a systematic analysis to derive universal meaning from individual descriptions revealing the underlying theme of experiences. Loidolt (2009) and Moustakas (1994) stated that the phenomenological approach provides a logical, systematic, and coherent resource for carrying out the analysis and synthesis needed to arrive at essential descriptions of experience. Appendix A includes the template of interview questions for collecting data and the questions that served as a script for the interview sessions. I provided each participant with a thorough explanation of the purpose of the study, the time required for each interview, and the reasoning for audiotaped interviews.

Data Collection Technique

I solicited individual participation via a telephone request from a list of eligible participants (managers, supervisor, and engineers) provided by the co-sponsoring manufacturing facility once the IRB granted approval. Respondents that replied to me directly in the telephone solicitations of their interest in being a part of the research were emailed consent forms. Participants returned all completed consent forms via email to me with electronic consent agreeing to participate. After receiving the electronically signed consent forms, I contacted the agreeing participants by telephone and then follow up with an email acknowledgement to schedule the interview session. Appendix B includes only a blank copy of the permission form to protect the privacy and confidentiality of the

participants. I will keep all signed permission forms in a locked file for 5 years from the date of the study's approval and I will then destroy the files.

Few participants knew me from any professional associations or past relationships. All solicitations for participation were formal, and the co-sponsoring manufacturing organization provided to me the list of contacts willing to participate. Since there was no direct contract by me in assembling the participant pool, I mitigated the risk of coercion by me. I provided adequate time for participants to review the study's information and ask questions of me before giving final consent. The timeframe between me seeking participation and me making the telephone contact for a confirmation appointment of the interview time with the participants was the timeframe allotted for questions about the research.

During the data collection process, I identified myself as a doctoral candidate performing human subject research for the development of a study that helped me explore how rural west Tennessee manufacturing business' leaders are planning to address industrial maintenance technicians' knowledge and skills loss. Interview participants included the managers, supervisors, and engineers in their natural settings. I used opened-ended questioning to explore phenomenological meanings and provide a clearer understanding about how plans for replacement knowledge and skills are occurring to support the manufacturing business (Zoltowski et al., 2012). The design of the interview questions in a qualitative research study should generate meaningful details of the participants' experiences, by engaging participants to describe their accounts, and generate reliable data (Schultze & Avital, 2011).

Appendix A contains a list of the opened-ended interview questions. Data collection of information from interviews of managers, supervisors, and engineers was face-to-face or telephone recorded interviews (when face-to-face interviews are not possible) lasting approximately one hour (Qu & Dumay, 2011; van Winkelen & McDermott, 2010). The research implications from the study's findings should be universal to most manufacturing operations.

I did not use a pilot study for my research. The purpose of conducting a pilot study is to examine the feasibility of an approach intended for ultimately use in a larger scale study (Leon, Davis, & Kraemer, 2011). Researchers use pilot studies to assess the feasibility of confirmatory studies to (a) rule out those that they cannot be implemented effectively in practice, (b) to debug the protocols of confirmatory studies by identifying remedies necessary to ensure success for the subsequent confirmatory studies, and (c) to guide the prioritization of resource allocation (Duan, 2013)

The pilot study is a stand-alone study and the researcher must design and evaluate it along with the companion confirmatory study (Duan, 2013; Leon et al., 2011). The researcher conducts the confirmatory study after the pilot study if the findings from the pilot study support the decision to move forward (Duan, 2013). I involved 20 participants at one manufacturing location in my study. Although the testing of the interview questions for understandability and analysis for a more extensive study would have to occur, it was my assumption that the questions for this study are simple and straightforward enough for the purposeful sample of participants to proceed without the need for a pilot study.

Data Organization Techniques

Transcriptions of each participant's interview were verbatim, with the exception of removing any verbiage that would breach confidentiality and, during the coding phase, removing non-pertinent conversation relative to the research study. I conducted a content analysis of interview responses to identify prominent themes related to data analysis procedures, motivating factors, and defining moments that help understand the business planning (Delattre et al., 2009; Qu & Dumay, 2011) for replacing existing industrial maintenance technicians' knowledge and skills. Coding, analyzing, and identifying emerging themes from the interview responses occurred manually using the modified van Kaam method of analysis for the evolved themes (Moustakas, 1994).

Moustakas' (1994) modified phenomenological method of analysis involves seven main steps. The steps are: (a) listing, (b) preliminary grouping of every relevant expression, (c) reduction, (d) elimination of the invariant constituents or the expressions that relate to the experience, (e) clustering, (f) thematizing the invariant constituents resulting in the identification of core themes of experience, and (g) identifying the invariant constituents to ensure the invariant constituents and themes are accurate. After transcribing the interviews, I put the data in the Dedoose software package (Step 1-listing evolving themes). I explored interview data identifying parts of collected experiences and randomly sampling various participant explanations. This allows for removal of vague or overlapping explanations that occurs in the next step. Analysis continues until I cannot identify any new categories of explanations (Step 2-preliminary grouping). Extending the refining process involves removing information not important or relevant to the study

(Steps 3 and 4-reduction and elimination of invariant components), and placing the data into distinct classification of patterns, observations, data items, or features (Step 5-clusterizing). I grouped the experience of the participants on the phenomena into the core themes and recheck the data and process to verify that these are the evolving themes (Step 6-theme development and verification).

Upon completion of validation, I created individual textual descriptions, individual structural descriptions, and textural-structural descriptions for each participant. The descriptions provided insights concerning the phenomenological experience. Compiling these individual descriptions helped to develop a composite description that describes “the meanings and essences of the experience of the group as a whole” (Moustakas, 1994, p. 121). All records of this study will remain private and confidential by keeping the data secure in a locked file cabinet for a period of at least 5 years as required by the university, and destroying the data after 5 years from the date of the study’s approval.

Data Analysis Technique

In the study on how organizational leaders are preparing for technical knowledge and skill losses among industrial maintenance technicians, data analysis methods helped me to focus on the interview data obtained from this phenomenological study. The first step (problem refinement-research phase) is to develop a way to determine the business readiness for the loss of industrial maintenance technicians’ knowledge and skills from the studied group. The design may help explore perceptions that affect the planning and

readiness of existing industrial maintenance technicians in protecting long-term business survival.

The transcribed data came from each participant's verbatim interview. This data analysis provided an objective assessment of the organization planning and readiness as gathered from the interviewed data. I used the modified van Kaam method to analyze the data through: (a) grouping, (b) reducing and eliminating, (c) clustering and thematizing, (d) validating, (e) textural describing, (f) structural describing, (g) and using themes for constructing textual-structural description (Loidolt, 2009). The final planned steps for data analysis (evaluation and summary of the data findings) were to analyze all the findings and develop appropriate summaries and conclusions. By understanding the industrial maintenance technicians' knowledge and skills contributions to support the key business competencies, the expectation is that the findings from the analysis can become valuable to managers for the comprehension, planning, and preparedness of industrial maintenance technicians' attrition. The data analysis methods are adequate for the phenomenological study (Reiners, 2012). The following open-ended questions from interviews of managers, supervisors, and engineers yielded details that helped develop an assessment of the current level of preparedness and identify the needs for future planning to address knowledge deficits that will occur and the loss of industrial maintenance technicians' skills.

1. Tell me about your experiences planning any attrition of industrial maintenance technicians' that would affect the manufacturing business core

competencies? If no plan, what type plan would you develop? How would you implement this plan?

2. Tell me about your experiences that relate to the importance of the contribution of industrial maintenance technicians to supporting the core competencies of the organization in preparation for attrition losses?
3. Tell me about your experiences on the benefit of the organization preparing to address the industrial maintenance technicians' labor attritions that would help the manufacturing facility survive through a period of limited technical labor supply?
4. Tell me your experiences with the specialized skills that industrial maintenance technicians possess which would not available from other organizational employees in preparation for attrition losses?
5. Tell me your experiences about the economic impact that might occur if existing levels of maintenance knowledge and skills are not replaced at sufficient levels due to changes in the supply?
6. Tell me about your experiences with the knowledge and skills that industrial maintenance technicians possess that cannot be automated in preparation for attrition losses?
7. Tell me about your experiences with trends impacting the business that might occur from changes in the supply of industrial maintenance technicians?

8. Tell me about your experiences of measurements that would be useful in understanding the available supply of industrial maintenance technicians' in preparation for attrition losses?
9. Tell me about your experiences with outsourcing, temporary workers, and contract workers might impact the supply of industrial maintenance technicians due to preparation for attrition losses?
10. Tell me about your experiences with the cost of training new industrial maintenance technicians that might impact the organization due to preparation for attrition losses?
11. Tell me about your experiences that help describe new knowledge and skill requirements that will be required to ensure an adequate supply of industrial maintenance technicians?

The software for grouping and coding the interview transcripts into a narrative finding was Dedoose. Dedoose is a web-based quantitative and qualitative data analysis software tool. The use of computer aided qualitative analysis tools helps to manage and integrate the various evolving themes Killooma (2010). Each of the minimum of 20 research participants received an alphanumeric code to provide confidentiality. The findings from the data analysis of a qualitative study need to answer the research question (Delattre et al., 2009). However, an outcome or conclusion not uncovered from the data analysis of a qualitative study could be a statement that a quantitative study would be a better or alternate research approach for a subsequent study (Mason, 2010; Thomas & Magilvy, 2011).

Reliability and Validity

Reliability

Assuring reliability and validity in the study is a positivist viewpoint with a naturalistic approach (Golafshani, 2003). Planning for, and responding to inherent threats to the research design reliability helps to assure consistency and minimizes erratic observations. Reliability accounts for measurement quality through the consistency and repeatability of the research measurements (Ihantola & Kihn, 2011). The qualitative analogue of reliability is dependability (Thomas & Magilvy, 2011). Dependability is the standard for judging qualitative studies for stability or consistency of the inquiry processes used over time (Thomas & Magilvy, 2011). To check the dependability of a qualitative study, researchers must assure there have been no errors in (a) conceptualizing the study, (b) collecting the data, (c) interpreting the findings, and (d) reporting results (Ihantola & Kihn, 2011). Expressing reliability as a repeatability or stability factor is an appropriate dimension of a study's credibility (Md. Ali & Yusof, 2011; Neuman, 2006). Reliability assurances in a study help assure the repeatability of documentary analysis, non-participant observations, interviews, and member checking (Whiteley, 2012). I assured reliability by following the same interview process and the same interview questioning script for all participants. When unsure of the interpretation of an answer, I used member checking or participant feedback to improve the research reliability. The process I used to review or check the data with the participants for perceived accuracy and-or reactions improves the study's accuracy of interpretation (Bradbury-Jones et al., 2010; Moustakas, 1994).

Validity

In conducting the study, I took appropriate steps to ensure that the sample, setting, and context were representative of the population, setting, and context to the generalized results (Bansal & Corley, 2012; Golafshani, 2003; Homburg et al., 2012). Each participant that I selected was a manager, supervisor, or engineer. I addressed the external validity (transferability) of the findings through the variety of participants working in a west Tennessee manufacturing facility. I established credibility by the use of triangulation using the recorded interview, the transcribed interviews for accuracy of comments, and member checking (Whiteley, 2012). Testing the creditability and transferability of a qualitative research study requires analyzing response and identifying themes that help evaluate and answer the research question (Delattre et al., 2009). Creditability of the research consists of ensuring the relevance and the soundness of the results obtained in the study. Transferability comprises the ability to apply the results to in the presences of other variables (generalization) in a different time and place (Delattre et al., 2009).

I used recordings of the interviews for verification of accuracy of my interpretations to establish the validity of the data collected for analysis. Member checking is another validation verification technique. Member checking or participant feedback improves the reliability of qualitative research and is crucial for establishing validity (Bradbury-Jones et al., 2010). Checking data with the participants (member checking) for perceived accuracy and-or reactions is a normal research follow-up verification step in the process (Reiners, 2012). To comply with research protocol for

member checking, I provided recordings of interview data to the participants. Participants' reviewing of interview recordings supported the accuracy of findings from the participants, readers, and researchers' standpoint (Bradbury-Jones et al., 2010; Reiners, 2012). I attempted to establish dependability by recognizing my biases, and through the interview questions design and interviewing technique (using the same script for each interview; Golafshani, 2003; Homburg, Klarmann, Reimann, & Schilke, 2012).

Transition and Summary

Section 2 of the study is a detailed discussion of the project. The related headings provide a reiteration of the purpose statement, along with my role in the research study, and a description of the participants. I expect specific information to complete the research study to develop from the interviews of a purposeful sample of managers, supervisors, and engineers selected to participate. The findings included a: (a) list of the interview questions, (b) description of the interview process, (c) the data collection, (d) validity, reliability, internal consistency strategies addressing possible threats, (e) and concluding with a transition to the next section of the research study.

In Section 3, I described the application of the study to professional practice and summarized the implications for change, identified gaps, and provided recommendations that may assist in understanding the business ramifications of industrial maintenance technicians' knowledge and skill losses. Section 3 includes with further recommendations for social change, actions, further studies, reflections, and conclusions.

Section 3: Application to Professional Practice and Implications for Change

The purpose of this study was an exploration of the lived experiences of a composite purposeful sample of 20 supervisors, managers, and engineers at a west Tennessee manufacturing facility to ascertain their understanding of the impact of industrial maintenance technician's skill losses due to workforce attrition. The findings that I present in this section reflect the exploration into the deficiencies of planning and preparation for organizational knowledge and skill losses from attrition of industrial maintenance technicians. The technical knowledge and skills of industrial maintenance technicians are essential in supporting business core competencies and competitiveness. Organizational leaders risk losing technical employee skills and knowledge to impending labor trends, such as Baby-Boomer retirements.

Overview of Study

I incorporated a qualitative methodology and a phenomenological design in this study to investigate and address the main research question: How are manufacturing leaders preparing for impending knowledge and skills shortage among industrial maintenance technicians? This study, through the illumination of the purposive sample of the business and technical managers' lived experiences of loss of labor knowledge and skill contributions toward business success, helped me to address the need for attrition planning. This study's findings helped me address the implications surrounding gaps found in the literature review regarding the general perceptions of the contributions of intangible assets, such as those of industrial maintenance technicians' knowledge and skills as applied to business competitiveness. Analysis of the participants' lived

experiences focused on identifying how employers are preparing to replace lost technical skills as the Baby-Boomer generation of industrial maintenance technicians leaves the job market. The results of the study showed how leaders can become aware and prepare for the eventuality of attrition losses of the industrial maintenance technicians.

The social constructive worldview of the historical evolution of the foundation of labor theory and knowledge management to current accounting measurements of intangible assets in advanced technologies, communications, and economic systems developed the analytical framework for the study. A social constructive worldview is useful in giving an explanation of the participant's lived experiences (Duan, 2013). I used the historical framework that I formulated in the literature review to help identify commonly held biases or stereotypes about the contributions of American industrial maintenance workers' skills and knowledge.

In my review of existing literature, I indicated that there are a myriad of practices existing for the management of knowledge-based assets. My findings from the literature review also showed that scholars see a shift in perception as new findings evolve surrounding intellectual capital and its importance in the global economy. This shift results from the increasing need to transfer knowledge and skills among in-house workers, to contract workers, to outsourcing jobs, or work functions to other sources; or by eliminating the job functions entirely through improved technology. Finally, this section provides an overview of the qualitative-phenomenological research design I used to explore the main research question. I have described the (a) phenomenological research phase, (b) presentation of findings, (c) analysis of qualitative data and themes,

(d) applications to professional practice, (e) implication to social change, (f) current scholarly works, (g) gaps in the research about the perception of intangible skills valuation, (h) recommendation for future studies, reflections, (i) and the conclusion in this section. The Walden Institutional Review Board approval number for this research study is 03-14-14-0165065.

Presentation of the Findings

The analysis of qualitative data from the study followed the established guidelines set by van Kaam's method and as modified by Moustakas (1994). Verbatim audiotaped transcription of each participant's interview helped eliminate redundant information from each participant's response. Dedoose (www.dedoose.com) and Excel software were instrumental in the cultivation of data into evolving themes as expressed by the participants and were useful in generating summary graphs for analysis of the study's interview results. I sought to assure reliability in this study by utilizing the same procedure and interview script for interviewing participants to get a consistent picture of the studied phenomenon (Moustakas, 1994).

Reviewing exact interview data from the recorded interviews allowed me to ensure accuracy of interpretation. I assured privacy of data and confidentiality in conducting the study by assigning the following participant designations to protect the identity of the participants. I used the coding E1-E7 for the engineering participants, M1-M7 for the management participants, and S1-S6 for the supervision participants. I assured participants that I would not use either their name or any other identifying information in the study.

I identified 26 codes that I combined and narrowed into six major themes: (a) attrition/succession planning, (b) skills technology support, (c) training requirements, (d) economic benefits, (e) support to the organization’s efficient operation (downtime, projects, PM, repairs, production, logistics, technology, equipment, machinery, and processes reliability), and (f) skills replacement alternative sources. Figure 1 contains the summary of transcriptional analysis and theme alignment.

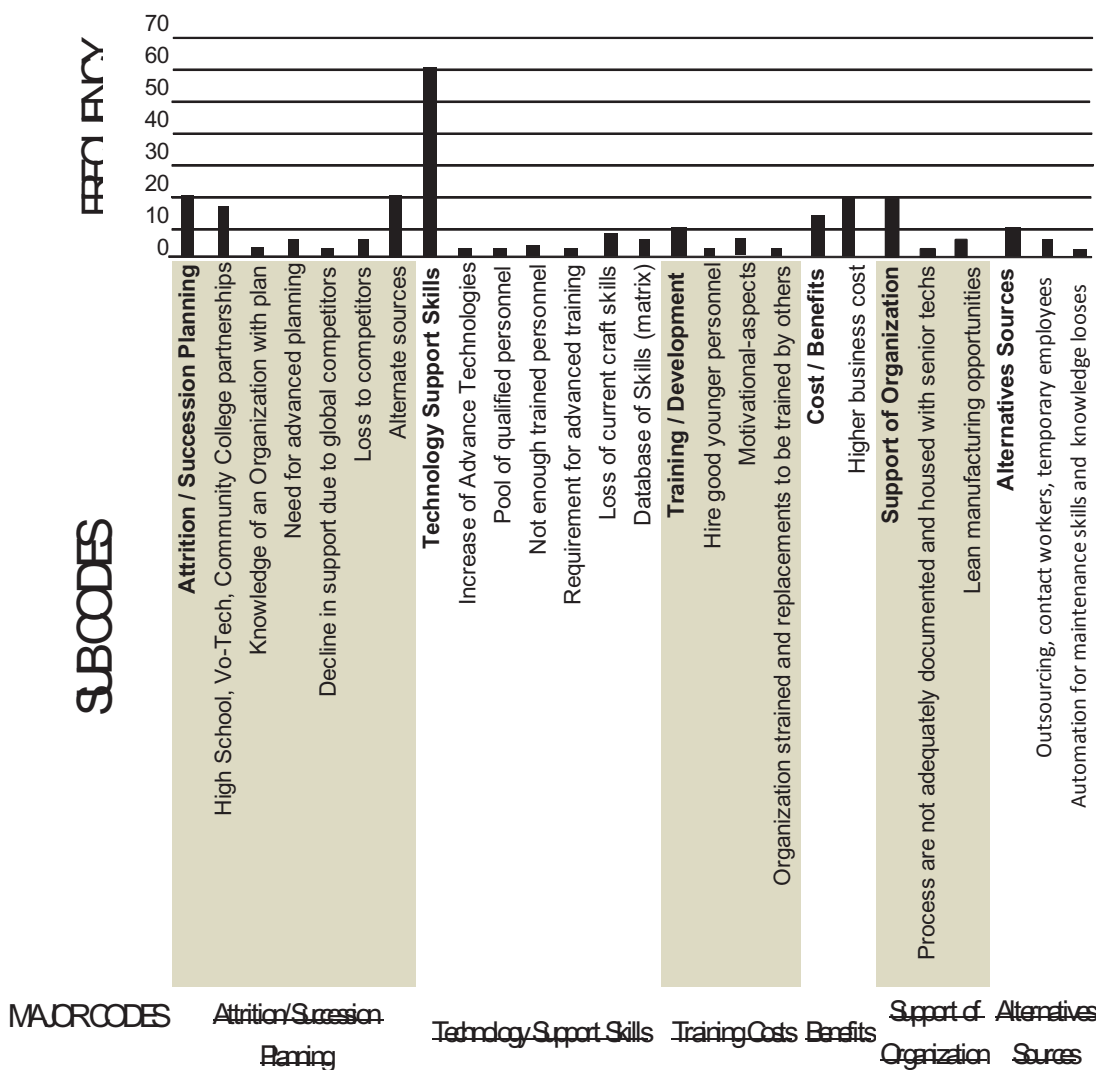


Figure 1 . Theme response frequency graph.

Identified Themes and Supporting Statements

I segmented the study's findings into six major groups and associated subgroups (Figure 1). There were 220 opportunities for responses to the 11 interview questions. However, participants could use keywords for theme and pattern development throughout the interview process. Two hundred and two (202) of the participants' responses showed qualified knowledge or experience that allowed answering the questions, while 18 of the participant's responses showed that there was no qualified experience or exposure to attrition planning. The participants responded to the major themes listed below with the following representative responses summaries:

- attrition/succession planning (68-responses)
- skills needed to support technology (86-responses)
- in-house development/cross-training/transfer knowledge through supervision (16-responses)
- cost/economic benefits/losses (36-responses)
- support to the organizations efficient operation, such as downtime, project, PM, repairs, production, logistics, technology, equipment, and machinery and processes reliability (24-responses)
- skills replacement alternative sources (19-responses)

Theme 1: Attrition/success planning. The first thematic label identified from analysis of participants' responses was attrition/succession planning wherein the participants from the company (organization) had limited formalized-communicated plans and preparations to transfer the successful knowledge and skills possessed by

industrial maintenance technicians. Of the 20 interview respondents, 13 of the respondents (65%) conveyed having no formal knowledge or communications of any attrition planning at the facility. Of the total cumulative responses, 202 out 220 (92%) responses indicated qualified knowledge or experience that allowed answering the 11 interview and follow-up questions. The remaining responses (8%) indicated only marginal knowledge of preliminary plans for attrition planning for maintenance technicians. The knowledge of attrition planning mostly involved knowledge of the program with the local community college and limited involvement with the local high schools and the area vocational technical school. Representative responses that support the above summaries are:

Participant M5 responded:

We are really are just in the beginning stages of trying to plan for it (attrition planning). One of the things that we as a location are doing is participating with (school name) Community College in a pilot program which is being set up to more specially train high school graduates in the field of maintenance technology. We are one of the founding members of this advanced maintenance technician's consortium, so we are developing the program in hopes of being able to start planning for that attrition and being able to start building a pool of trained maintenance technicians. (M5, personal communications, March, 2014)

Participant E2 responded:

You must have enough trained people to fill slots that are available and there must a trained pool of technicians to pull from. We do have a database where we do a

profile once a year where we tell what our education and job experience are and what we see as our next available step with the company. (E2, personal communications, March, 2014)

Participant M2 responded:

One of things that I'm looking to is our vocational technical education facilities to spit out young people who are interested in the field. I try to seek those out and hire a few of them... One of the other avenues that I keep an eye on is the young people in my workforce with technical aptitude or a high sense of mechanical aptitude, and I try to encourage them to bid into entry-level technical positions where they can grow those skills, to promote from within. (M2, personal communications, March, 2014)

Participant E4 responded:

I don't have a lot of insight on that, I know we have partnered with (college name) or another school in the past for job fairs to try to find people as they are exiting the programs to be ready to hire in at (company name). I really don't have a lot of insight into that. (E4, personal communications, March, 2014)

Participant S5 responded: Since I don't deal with that day to day in my current position, I am limited to answering that question. (S5, personal communications, March, 2014)

Participant M7 responded:

The only thing that I am aware of from this company and previous company here in the local area is that we have continued to work with the local junior college

from a technical standpoint to let them know our needs and to try put specific emphasis on the exact areas we need help in. They are working trying to help us fill these gaps, but there is still a major gap. As soon as they get them (maintenance technicians) trained we lose them to higher bidders. (M7, personal communications, March, 2014)

Participant M6 responded:

We just really started this program in the last 6-8 months, and we have reached out to one of the local junior colleges (college name) and are working with them on some classes for industrial maintenance. (M6, personal communication, March, 2014)

Participant M7 responded:

The only thing that we can do at this point in time is that we can continue to reach out to the educational departments locally to make sure they understand the need to get the technical people trained in those roles. There are definitely jobs out there for them in today's environment. It probably can be extended more statewide and nationwide at a bigger scope and benefit all North American manufacturers. (M7, personal communication, March, 2014)

Participant E5 responded:

A company that is putting this out front, laying out plans, and this is more than just saying we are going to do this, we have to put forth the effort and (have the) determination of seeing the plans put together. We are participating in a very much of a global market where competition is getting greater and greater. This is

a key, how do you differentiate yourself is to have a well-trained maintenance force, but not only that you have to have a succession plan built as these Baby-Boomers retire. It's very important that they plan for the attrition and develop a succession plan in order to keep the position filled with knowledgeable and experienced people because they do play an important role our manufacturing capabilities. (E5, personal communication, March, 2014)

Theme 2: supporting the organization's efficient operation. The second theme was the importance of the industrial maintenance technician's knowledge and skills for organizational success by supporting the organization's efficient operation. This theme and associated subcategories received 24-responses. The largest sub-category with 20-responses or 83% of the category reflected a need to develop or maintain the skills that would be necessary to support the business core competencies. The participants' qualified experiences included downtime; (a) project support; (b) equipment preventative maintenance PM programs; (c) equipment repairs; (d) production support; (e) logistics support; (f) advanced technology support; and (g) equipment, machinery, and process reliability. The remaining two subcategories represented only 17% of this category with a total of 4-responses.

The largest of remaining subcategory, with 3-responses, related to *lean manufacturing*. These three participants came to the current manufacturing from previous employers who utilized lean management practices and production system. Per statement from participants, lean systems were successful at their previous employers, and if implemented to a greater extent at the current organization, should enhance

competitiveness. The participants' responses aligned closely to the theme and supported the importance of maintenance skills or systems to the organization's competitiveness. All participants were able to provide qualified experience and knowledge into this category. Representative responses were:

Participant E6 responded:

It's very, very important, (and) you've got to have good qualified trained maintenance technicians. What does it take to get a plant from 7-o'clock one morning to 7am the next morning? It takes several people, but it takes a person with maintenance technicians' skill level to be very high and competent in what he's doing. If he's not, you are going to experience downtime and addition downtime and more importantly the possibility of damaging your capital asset or plant assets. (E6, personal communication, March, 2014)

Participant M7 responded:

Our current company here is running every machine with state-of-the-art PLC controls and without that core competent industrial person that can come in and troubleshoot and work on them it will be the demise of this facility and many other North American facilities will continue to lose business offshore. (M7, personal communication, March, 2014)

Participant E2 responded: Technicians are key to keeping the plant running and operating with less equipment downtime. (E2, personal communication, March, 2014)

Participant S6 responded: (Maintenance technicians) it's very important to keeping the facility running efficiently and safely. (S6, personal communication, March, 2014)

Participant M3 responded: The technologies always drive the production processes and are important. The reliability and troubleshooting downtime will have a major impact if not handled proactively. (M3, personal conversation, March, 2014)

Theme 3: technology support skills. The third theme was the organization's internal housing (possessing the skills in-house) of the knowledge and skills that support (or needed to support) the organization's core competencies. I described this category as *Technology Support Skills*. This theme and associated subcategories received 86-responses. The largest sub-category with 60-responses or 75% of the category reflected a need to develop or maintain the skills that would be necessary to support the business core competencies. The remaining 26-responses represented 25% of this category with the next highest subcategory receiving 10-responses and related to concern of loss of existing technician skills needed to support the organization's core competencies. The remaining participants' responses aligned closely to the theme and supported the importance of maintenance skills or systems to the organization's competitiveness. All participants were able to provide enlightened experience into this category.

Representative responses are below:

Participant M6 responded:

Having had the opportunity to work with some great maintenance guys over the years, I have seen the value in some of the maintenance folks that I've worked

with have been in industry for many years and as technology was growing in the late 1980, with the implementation of PLC in industry, at that time companies were still spending money on educating maintenance techs and getting them up to speed on new technology. Over a period of time when those folks got that knowledge and training, and they held this knowledge to themselves without teaching others that they work with day-to-day, work with the maintenance function in general. A lot of that training was in those specific areas were held to a few certain people. A lot of companies just allowed this to happen and that why companies today, and we one of them, whenever they have some issues with certain equipment where there are only a couple of people you can call to get it repaired. Unless we implement strategies to elevate that we will continue to see those issues and overall decline in then technical resources. (M6, personal communication, March, 2014)

Participant M2 responded: Wrench turning and the intellectual piece of the maintenance where you have to do the troubleshooting and understanding the tracing it cannot be automated. (M2, personal communication, March, 2014)

Participant M1 responded:

The competencies are critical. I will say it takes a lot of time to get somebody that you've hired, maybe not from this industry, up to the levels that you need. One of the essentials or one of the things that I see in maintenance that's difficult is that maintenance is usually your highest tier levels, so there is not a lot of infusion of younger people into the program. So what you generally end up with is that 60%

of your maintenance staff is at retirement at the same time. (M1, personal communication, March, 2014)

Participant E6 responded:

There is a movement out there for precision maintenance that is to install equipment correctly. As we lose these skills from our experienced maintenance technicians there are very few companies that are teaching this skill levels that are needed. It gives a company a competitive edge in the global market. (E6, personal communication, March, 2014)

Participant E1 responded: There aren't maintenance technicians out there. It's becoming more and more of an issue. He's got to be trained and trained properly, we are putting ourselves at risk. (E1, personal communication, March, 2014)

Theme 4: cost/benefit. The fourth theme was the *Cost/Benefits* of training that affected competitive fronts and global competition (economic benefits). This category had two subcategories with 36 responses. The subcategory with the most responses (26-responses or 73%) was concern of participants for the higher cost to the business if the retiring technician were not replaced at sufficient levels and with competent skills. The other category was the concern of participants of the cost of the loss in relationship to other competitors (10-responses or 27%). The responses of participants' qualified experiences indicate that funding for training and development in preparation for attrition planning would provide the organization greater economic benefits in competitiveness than the cost. Representative responses are below:

Participant E1 responded:

Although you can't put a number on it, it would be a large economic impact. Equipment in a plant cannot run by itself. It must have someone to design build and install. Failure happens randomly, the more we can do on the front end, the better off we are. That economic impact will go up exponentially. (E1, personal communication, March, 2014)

Participant M1 responded:

On the financial impact, you can completely lose the facility. If you were to lose your boiler operators and don't have certified people to go in their spot, you could have a catastrophic failure that would be several millions of dollars. The cost of training in my opinion is something that essential. I think the cost is a lot less than the negatives of losing people through attrition and not having someone that's qualified or trained to do this position. I can't put a dollar figure to it. If you don't invest in the training of the associates, then the flip side of not having the trained people when you need them is dramatically going to be more expensive to the organization. (M1, personal communication, March, 2014)

Participant E7 responded: Without the processes running and without the people able to maintain the equipment and process, it would be difficult to maintain profitability and quality of production or anything like that. (E7, personal communication, March, 2014)

Participant S5 responded:

I think the trends is certainly more PLC controlled type equipment, how we are managing data and collecting data from our pieces of equipment, wireless

technology that we are utilizing now with our communications between our equipment and software that help with tracking and determining, things such as downtime measurements, etc., will need PLC wireless and those type logic control and system are something definitely that we are finding that we are having trouble filling. (S5, personal communication, March, 2014)

Participant M7 responded: The North American manufacturer is continuing to see its operation moved outside the United States, and that will continue if we don't get the resources need to be successful. (M7, personal communication, March, 2014)

Theme 5: training requirements. The fifth theme was *Training Requirements* and development for industrial maintenance technicians. This category complemented and aligned with the category of *Technical Support Skills* and represented in-house (a) development, (b) cross-training, transfer knowledge through supervision, (c) hiring, and (d) apprentice programs with a total of 16-responses. The largest subcategory with 10-responses (63%) was the participants' concerns with the cost of technical training and development in the listed subcategories for training new technicians that would allow the leaders to help the organization stay competitive as a result of attrition losses. The next subcategory with 4-responses (25%) was motivational aspects of technical training and development for replacement workers. The remaining two subcategories, hiring and internal training and development, were 6% each. Representative responses are below: Participant M6 responded:

I have seen a general decline in skills in that part of the segment of maintenance and engineering for that matter. While we have some good programs and good

technical schools in the area, I do feel that companies in general are trying to work so lean that they fail to invest in their workforces the way they should. This is a systemic problem that has been occurring over the past at least 15-years or so. A large part of it is again that we have working the globally economy now is that we have to compete with countries whose labor rates are extremely cheap compared to ours. Over all to hold cost down, we tend sacrifice long-term viability due to having that short sightedness on the bottom line. A lot of times those bottom line, short term, and that kind of thinking leads to not investing in your employees and suffering downtime on equipment because we have not kept it up to date and things of that nature. With High School graduates being directed into 4-year college programs, they are directed away from the traditional technical career routes. (M6, personal communications, March, 2014)

Participant M4 responded:

We always included that (training) in our annual budget. We look at that as a critical resource in our operation in order to maintain our equipment and avoid any interruption in our production operations. So that's all capture in our annual budgeting process. (M4, personal communications, March, 2014)

Participant E6 responded:

I am not involved in that standpoint. In my position at (company name omitted), in the past we have tried to provide training through outside service to improve the skill level of existing people. Unfortunately, because of the apprentice programs going away, the tube of maintenance related personnel is getting

slimmer and slimmer by the day. The Baby-Boomers are retiring, and there are limited resources to fill the positions. (E6, personal communication, March, 2014)

Participant M6 responded: There is a trend due to global competition not to fund technical training as much as would be desired. (M6, personal communication, March, 2014)

Participant E1 responded:

We actually have agreed to participate in one of their programs for industrial maintenance where we will take some of their students as basically interns and work them with our regular maintenance on the production floor. We have also looked at the skill levels in our particular jobs, and we have just recently sent a welder to (college name) for 8-month training course for becoming a certified welder. So, we are doing some things on individual levels and then we are also looking at trying to participate with the colleges to start to get some experience and training for people getting ready to graduate. (E1, personal communication, March, 2014)

Participant S5 responded:

I have some experience with setting up TPM programs that do affect the maintenance group... We try to have training matrixes that help align skill level assessment and skill level banks of knowledge that would allow us to see where our gaps are... In our current organization, we are not following those like we should. (S5, personal communication, March, 2014)

Theme 6: skills replacement alternative sources. The sixth theme was the organization having the *Skills Replacement Alternative Sources* for replacing the knowledge and skills lost from industrial maintenance attrition. This theme had three subcategories of responses (a) the general awareness of alternative replacements (13-responses or 68%), (b) outsourcing and temporary workers (4-responses or 11%), and (c) automation of the processes to eliminate certain technical skills (2-response or 11%). The responses from participants varied from effective use of temporary and contract workers to having bad experiences with the use of temporary and contract worker; the competitive need for alternative source of replacement workers, and stating that the organization's managers should never send out maintenance work. Advanced automation, lean manufacturing, and state-of-the art PM were among the replacement, alternative, or improved systems that the participants mentioned from qualified experience during the interview process. There were no responses from participants about immigrant replacement workers for technicians' skill replacement jobs. Representative responses are below:

Participant M4 responded:

I didn't see a lot of outsourcing involving the trade maintenance. It's a function that I don't see how you would outsource it... You pay more for outsourcing outside those functions to get the skills trades that you need. You have to pay the wage and eventually you going be paying the benefits through the overhead premium that are billed by the contractors. We have found that it is more economical to hire as it is to contract. You are not going to get a workforce

dedicated to your operation. They will be diversity but not to your equipment.

(M4, personal conversation, March, 2014)

Participant M3 responded: The utilization of contract labor is one of the contingencies that you would deal with. (M3, personal communication, March, 2014)

Participant S2 responded: I partner with some temporary agencies that can help. We don't have a lot of skilled positions. I'm mostly responsible for some professional position and we do have a pool of applicants...and that's about the extent in my department. (S2, personal communications, March, 2014)

Participant E6 responded:

Automated maintenance process can smell, hear, or touch like a good maintenance technician. Walking around the equipment and listening to it can't be replaced. A good technician knows. That can't be automated and is a trait of good maintenance technician. (E6, personal communication, March, 2014)

Participant E1 responded:

There are some companies, (name of company) is one that we use that you can reach out and get journeyman maintenance. At the cost of this associate versus the cost you have in them as a regular employee, I don't see this as being a viable option for a long-term solution. (E1, personal communication, March, 2014)

Participant M1 responded: I have had some instance where I had to send people away that did not perform to expectation. At the best, they are average to my maintenance workforce that I have in the plant. (M1, personal communication, March, 2014)

Participant S5 responded:

In my previous job, a Japanese auto manufacturer, we did use some temporary maintenance technicians in our workforce to assess some of their abilities to see if they fit in our culture. We used them as a pool so as when we had attrition in our maintenance group we looked at them to see if they could fit in on a permanent basis...they weren't quite up to speed with our maintenance, but the thing we looked at are the basic skills level and we have to teach the more specific skills.

(S5, personal communication, March, 2014)

Participant S6 responded:

Contract work is more common than it used to be... You rely more heavily on the suppliers of the certain kinds of equipment as a mean of maintaining them or troubleshoot it and is a trend... Now we rely more heavily on those who supplying it (equipment) for troubleshooting and maintenance of it. (S6, personal communication, March, 2014)

Conclusions Drawn From the Study

I drew the following conclusions from the themes identified from the single rural manufacturing facility concerning knowledge and skills potential losses primarily due to the Baby-Boomer generation retirement. Manufacturers' unpreparedness could cause significant *ripples* in the supply and demands for replacement skills. The cost of the maintenance technician's position being the highest tier-paying job could increase and force more offshore alternatives that could contribute to the *brain drain* of migrating industrial maintenance technicians to the domestic labor supply market. A consensus of

answers from the interviewees' experiences reflected only slightly different wording. I used the answers that best represented the responses or provided a diversity of thinking for each category of questioning in assembling the presentation of findings. However, some participants gave answers that overlapped and could address others thematic category questions.

Major themes or data saturation (repeating themes) appeared as early as the fifth interview. With the saturation of themes happening prior to interviewing the total planned 20-participant pool, there was no need to interview beyond this point to seek additional information (Kerr, Nixon, & Wild, 2010; Mason, 2010). The research findings show that attrition planning within the organization does not formally exist, and if it did exist, management does not adequately communicate the plans throughout the organization. Analyses of interviews show that advanced systems or advanced automation are inadequate to replace the industrial maintenance knowledge and skill requirements to support the manufacturing operations. The (a) inspection, (b) diagnostics, (c) troubleshooting, and (d) repair functions will mostly require human intervention of certain skill levels for final resolutions. Contract workers and temporary agencies, from the experience of the interviewed group; do not have the long-term commitment to the organization as do in-house employees. An overarching agreement in participants' answers was that some specialized manufacturing processes cannot be offshored or contracted externally due to the specialized skills required and equipment used.

The local educational system and the post high school training administrators must do a better job working with the local manufacturers to develop skills in workers

needed to support highly technical workforce requirements. The educational process should include identifying and directing students (future workers) early in their career development of the possibilities and potentials of industrial maintenance positions. Manufacturing leaders and educational administrators need better collaborative planning to help identify the areas of skill deficiencies in the manufacturing realms. There were limited findings indicating that manufacturing leaders and educational administrators had adequate collaborative plans to meet the skill requirements of the manufacturing business.

A higher awareness of what *lean* means in regards to training has to occur from my analysis of participants' statements. Three participants, S1, S4, and M6 mentioned lean manufacturing, impact of lean or lean development-processes during the interview process (15% of those interviewed). Lean in training does not arbitrarily mean cutting the budget or not investing in your workforce, specifically the technical workers. Rather, lean means an investment made today that will save the company money in the long-term by having the required skills to the production equipment running efficiently, with minimal breakdowns, and running safely.

Skills and knowledge are among the most valuable resources that a business entity possesses. Transfer theory presents skills and knowledge in one way and Accounting theory presents skills and knowledge in another way. Comparing the results of this study to the conceptual foundation of transfer theory and accounting theory shows a need for the theories to converge on common ground.

Transfer theory presents labor skills and knowledge as the lifeblood of organizations. These skills and knowledge are into the organization or developed within the organizational structure. As part of the internal development, the superior skill supporting the core business competencies must be transferred to other and-or captured in mean that other organization players can perform at competitive levels. This short study showed how the dynamics and concerns surrounding an event like Baby Boomer retirement of the specific needs to transfer skills. Without a magnified look from the event the contribution of organizational skills and knowledge to support core competencies may not be a formal part of the strategic planning. Accounting for human capital and intangible skills must evolve to help show decision makers this strategic need in tangible financial terms

This study helped me to understand the accounting fundamentals that intangible values are difficult to capture or measure. In a technological, information, and fast-paced global economy, new systems to show decision makers the strategic and economic importance of intangibles need to be developed. Historically, strength of business entities is typical determined by the value of its capital assets. Current accounting systems are good for this determination. Accounting systems need development for competing in the new competitive economy for intangible assets. The chief among the needed measurement is a means to valuate the skills and knowledge of the people resource contributing to competitiveness. In this study, I was able to shows that a lack of these measurements to direct decision makers is crucial to survival even at a basic manufacturing facility.

Applications to Professional Practice

A goal for the study was to ensure that the conclusions possess academic rigor while offering applied value for manufacturing industries preparing for technical knowledge and skills losses due to workforce attrition. One of the central challenges of transitioning research to an application is the ability to communicate effectively the conclusions into concise implications for business applications. Therefore, it is essential that the presentation of the data be clear, concise, and obvious for practical applications. This sub-section helps present arguments in detail about why and how the findings are relevant to improve business practices.

A company's intellectual assets are the life-blood of today's organization. Organizational leaders make major investments in human capital assets. These leaders should attempt to retain workers' knowledge and skills before these workers leave the organization. Findings and recommendations from this study can help business leaders in the representative manufacturing facility recognize that only minimal attrition planning or preparation was part of the organization's long-term survival strategy. The company leaders had not communicated the succession planning strategy to 65% of the interviewed group. The remaining portion of the interviewed group had cursory and limited only understanding of any succession planning. Succession planning as part of a learning organization is essential for global competitiveness.

The need should become apparent from the study's findings to train, transfer, and retain the technical life-blood of the organization. The research findings confirmed that the employer had an unclear perception of the contribution of intellectual capital to

competitiveness and, therefore, had not adequately planned for the knowledge and skills losses. The findings also showed that the organization's leaders' perceive industrial maintenance technicians' contribution to the organization at a higher value than other hourly employees as the value is indicative of technical trade jobs being the highest tier pay category.

Findings from Section 1's literature review indicated the critical perceptions of employers regarding workforce movement. Exploring the factors experienced by managers and the implications about an organizational awareness of the value of knowledge and skills preparedness, demonstrated significant change opportunities for organization leaders to competing globally. Identifying and communicating the findings can begin the dialogue to help address potential problems of knowledge and skills losses from attrition of the industrial maintenance technicians.

Finding from this study offer an opportunity for manufacturing decision makers to undertake the dialogue and prepare methods and processes that will address depletion of organizational knowledge and skills. Being that leaders in the United States compete in a global economy, leaders could find the solution to the loss of industrial maintenance technician knowledge and skills through global solutions such as importation of industrial maintenance technician from other countries.

Implications for Social Change

The purpose of this study was an exploration of the experiences of a composite purposeful sample of 20 managers, supervisors, and engineers to explore the impact industrial maintenance technician's knowledge and skills loss. This knowledge and skills

that help support the organization's core competencies and competitiveness, and the preparedness of the organization to address attrition trends was a strategic component of the organization's competitiveness. The implications for social change includes (a) improved succession business planning, (b) sustained active learning organizations, (c) collaboration with administrators of technical educational programs for improved training, (d) replacing technologies, and (e) understanding the global market for available replacement workers. For skilled technical employees, the social impact of this study might assure another generation of craft workers being available to promote the prosperity and competitiveness of American industries, and to provide competitive paying worker jobs and livelihoods to the supportive employers, communities, and institutions.

Recommendations for Action

Posturing for global competitiveness is an ultimate goal of corporate strategy. Utilizing the organizational assets and the skills, knowledge, and learning with new global management understanding and awareness are necessary for a winning strategy. Intangible asset theories, management practices, and knowledge management provided the foundation for actions in this study and, therefore, provided the thematic approach such that leaders of organizations can move forward in attrition planning for global competition. Management of cultural change such as becoming a learning organization for competitiveness is a top-down driven process. The senior management team substantially influences how effectively organizational members embrace culture that bridges the gaps among (a) employees, (b) shareholders, (c) customers, and (d) suppliers.

Mishra and Suar (2010) posited that management should direct attention and resources toward proactive strategies rather than a reactive or defensive approach. This study is a presentation to encourage leaders to think about and plan for changes in the workforce that proactively addresses needs of all stakeholders.

The following recommendations for action became evident: (a) employers' human resources efforts need adjustments to increase the cross functional training and development of knowledge sharing strategies and systems from existing knowledge bases; (b) since migrant networks and immigration are a global fact of life, success strategies need development for the best utilization of this highly skilled pool of technical workers as an alternative supply of technical workers; (c) understanding the true cost of the alternate outsourcing options as the low-cost labor options may not be the best alternative for all technical support requirements; and (d) fully developing the learning cultures within organizations.

Organizational decision makers need to develop learning cultures for catalyzing the optimization of available labor pools, understanding existing knowledge to support the competitive business environment, and allocating benefits from increased sales revenue and profits to training and development (Lockwood, 2010). To disseminate these results to business journals and institutions for action is a worthy goal of the research. Conclusions from this study provide leaders with alternatives for confronting the complex challenge associated with the planning and preparation for existing industrial maintenance technicians from the workforce.

To assist administrators of educational institution, company leaders can provide assessment tools or skills matrices to show current skill levels and areas of deficiency or risk. Manufacturing leaders, working with the local educational institution administrators on workforce skill deficiencies, could develop programs for training and recruiting students into technical programs with the promise of competitive paying jobs. Technical training and development programs for the employees and potential employees of the studied facility have already started with the community's training schools.

In-house assessments to identify gaps in knowledge and skills should occur to convey the training goals necessary for funding of budgets for institutional development. Employers' investments allocated to skill development programs should repay the investment cost through higher production supported by a competent generation of skilled technical workers. These programs can help employers promote the prosperity and competitiveness of American industries and provide high paying jobs to the supportive employers, communities, and institutions. Regardless of the solution, greater planning, preparation, and funding by decision makers must begin now.

Recommendations for Further Study

This study had a limited sample group, and the study's implementation took place at one local manufacturing facility that provided a distinctive outlook of the individual experiences from management, supervision, and supporting groups on organizational preparedness for employee attrition. An expanded study including additional manufacturing facilities would allow further functional viability for analyzing richer qualitative data from a broader sampling in different locales. An expanded study would

provide a comprehensive understanding of how ideas are interrelated. A phenomenological research design permitted the exploration and the composition of interviewed groups' solutions for attrition planning...

Researchers could use a phenomenological design to explore business experiences of worker viability in a global environment. The researchers could compare the findings to determine if experiences are similar or dissimilar to the results from this research. Contrasts among the studies would help produce synergistic variation of results and recommendations to organizational leaders and practitioners. A phenomenological design could also help researcher in studying employees at different locations to explore their experiences about replacement skilled workers. The possibilities for using a phenomenological design to identify the experiences conveyed by varying populations are vast. Researchers could use quantitative studies to conduct similar studies on all of the aforementioned recommended research studies. The quantitative research could permit the examination of the climate for trend changes and informed actions toward specific populations. Because the trend seems to have changed in the recruitment and hiring process, future researchers could focus on the causes of the trend changes.

The findings of this study could contribute in various ways to professional literature within the field of business and industrial organizational psychology, where little theory or research exists for explaining the perceptions of discrimination toward the industrial technician. I would like to see research findings on the non-technical production workers to see if similar preparation for succession planning is taking place for those employees. Although I cannot classify the knowledge and skills that production

workers possess precisely as technical skills; the production workers do represent a substantial amount of the organization knowledge due to the number of workers as compared to the number of technical workers. The ratio of production workers to technical workers at the studied facility is 7:1. Again, this ratio represents a significant amount of the organizational knowledge and organizational leaders should have systems with metrics in place to manage this organizational knowledge.

Reflections

I explored and described the lived experiences of 20 managers, supervisors, and engineers. Throughout this study, with the knowledge of the current trend for greater labor outsourcing, I bracketed my personal analysis to disregard presuppositions and biases to understand the scope of the participants' experience. To avoid unjustified altering any of the interview data, I carefully reviewed the recording of the participants' experiences. I made every attempt in interviewing to question for clarity and understanding without biasing the participants' responses. I followed the prescribed research process as outlined in Appendix C as closely as possible. The thoroughness of the interview information from the participants was enlightening to me. The major themes represented an exploration of the effectiveness of workforce labor preparations. As previously expressed, the purpose of this research study could expand to include a larger populace. A larger study could provide substantial recommendations and strategies for overcoming barriers to planning for workforce attrition. The migration of the populous away from the technical fields could also stem from the social influences such as (a) the makeup of the heads of home, (b) work ethics of the generations after the Baby-

Boomers, and (c) to the stigma to become a college graduated professional. The social influences could be substantial.

In my exploration at the researched organization, (a) goal alignment, (b) kaizen, lean manufacturing, (c) total productive maintenance (TPM), (d) skill matrix/bank, (e) sustainability planning, (f) benchmarking, (g) customer focus, (h) data management, (i) plant profitability, and (j) global competitiveness were some of the additional subjects that the participants raised to convey their experiences about attrition planning. This level of manufacturing knowledge demonstrates a broad foundation for a successful manufacturing organization.

Summary and Study Conclusions

I examined the preparedness of manufacturing organizations' leaders to address labor challenges for technical and core competency organizational knowledge and skills through one labor group of the intangible asset of relationship capital. The challenge to today practitioners is to allocate tangible financial resources with the goal of strengthening currently intangible organizational relationships. However, these investments ranging from worker recruitment to worker training should help guide subjective management intuitions that presently have no measurable links to organizational contributions or values. Consequently, one goal of this study was to provide manufacturing managers with an understanding of the impact of not preparing for changes in the supply of technically trained labor pool in meeting competitive requirements.

Another goal for this study was to start a dialogue on some type value measurement for intangible assets such as human capital knowledge and skills. A synthesis of the findings from diverse methodologies and from a broad range of disciplines can help business leaders in developing a holistic understanding of the impact of knowledge management. Findings from this study offer a comprehensive approach for analyzing the dynamic and complex relationships among employer perception, knowledge and skill workers, and competitive value creation. In conclusion, the findings of this study could provide a significant contribution to understanding the intrinsic value of intangible worker knowledge and skills to organizations' leaders. Specifically, the study's findings allowed me to develop the means for suggesting to the plant's management that their better understanding of the relationships between employees' knowledge and skills and the value creation process is paramount for managing human capital. In this regard, the study may raise more questions than answers. Below is a summary of some questions that remain:

1. Is it possible to isolate and measure the available supply of maintenance technical labor supply?
2. What is the economic relationship in this study between labor supply and economic value contribution?
3. What are the relationships between tangible and intangible assets and how do the relationships need to be managed for the global competitiveness?
4. What accounting metrics should analysts develop to enable the measurement of intangible assets for measuring a company's wealth and-or value?

To help accomplish the understanding and answers to the above questions, future researchers can explore and/or examine multiple manufacturing locations. Findings and conclusions from these studies could provide researchers with the ability to compare and contrast context-specific differences among various manufacturing and /or service environments.

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Appendix A: Interview Questions

The following open-ended questions were asked during the one-on-one or telephone interviews. These questions revolve around a phenomenological research study to explore the experiences and perceptions of manufacturing leaders on the organizational readiness to address the knowledge and skill losses that will occur with industrial maintenance technicians. Section 3 (Presentation of Findings) incorporates the analysis of the results of these open-ended interview questions.

Interview Questions

1. Tell me about your experiences planning any attrition of industrial maintenance technicians' that would affect the manufacturing business core competencies? If no plan, what type plan would you develop? How would you implement this plan?
2. Tell me about your experiences that relate to the importance of the contribution of industrial maintenance technicians to supporting the core competencies of the organization in preparation for attrition losses?
3. Tell me about your experiences on the benefit of the organization preparing to address the industrial maintenance technicians' labor attritions that would help the manufacturing facility survive through a period of limited technical labor supply?
4. Tell me your experiences with the specialized skills that industrial maintenance technicians possess which would not available from other organizational employees in preparation for attrition losses?

5. Tell me your experiences about the economic impact that might occur if existing levels of maintenance knowledge and skills are not replaced at sufficient levels due to changes in the supply?
6. Tell me about your experiences with the knowledge and skills that industrial maintenance technicians possess that cannot be automated in preparation for attrition losses?
7. Tell me about your experiences with trends impacting the business that might occur from changes in the supply of industrial maintenance technicians?
8. Tell me about your experiences of measurements that would be useful in understanding the available supply of industrial maintenance technicians' in preparation for attrition losses?
9. Tell me about your experiences with outsourcing, temporary workers, and contract workers might impact the supply of industrial maintenance technicians due to preparation for attrition losses?
10. Tell me about your experiences with the cost of training new industrial maintenance technicians that might impact the organization due to preparation for attrition losses?
11. Tell me about your experiences that help describe new knowledge and skill requirements that will be required to ensure an adequate supply of industrial maintenance technicians?

Appendix B: Study Participant Consent Agreement

Dear _____,

You are invited to participate in a research study examining how business leaders are preparing for the impending knowledge and skill shortage among industrial maintenance technicians. I am inviting managers, supervisors, and engineers who are employed by your organization and who represent the production and technical management of the manufacturing facility with at least one year of experience, to be in my study. This form is part of a process called *informed consent* to allow you to understand this study before deciding whether to participate.

This study is being conducted by Kenneth Wayne Moten, who is a doctoral student at Walden University. You may already know me as a former colleague, professional associate, a friend, or may not be acquainted with me at all, but this study is separate from any previous association or role.

Background Information:

The purpose of this study is to explore the preparedness of manufacturing decision makers in addressing the knowledge and skills loss of industrial maintenance technicians as examined from the lived experiences of supervisors, managers, and engineers.

Procedures:

If you agree to be in this study, you will be asked to consent to a sixty-minute audiotaped telephone interview. A short follow up interview may be requested of the participant to clarify answers from the initial interview.

Voluntary Nature of the Study:

This study is voluntary. I as the researcher will respect your decision about whether or not you choose to participate in the study. No one at any organization or me will treat you differently if you decide not to participate in the study. If you decide to join the study now, you can still change your mind later. You may withdraw from participation at any time.

Risks and Benefits of Being in the Study:

Being in this type of study does not involve any risk of discomfort other than those associated with the discussion of a challenging and thought-provoking topic. However, you will be contributing to the body of knowledge used to help leaders better assess his or her preparedness for the loss of industrial maintenance technicians and the impact that this loss may have both toward business and social benefits.

Payment:

There is no payment associated with your participation.

Privacy:

Any information you provide will be kept confidential. I will not use your personal information for any purposes outside of this research project. Also, I will not include your name or information that could identify you or your organization in the study reports. Data will be kept secure in a lock file cabinet. Electronic recordings of

participant's interviews will be stored on my password-protected home computer and on a password-protected hard drive. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:

You may ask any questions you have now. Or if you have questions later, you may contact me via cell phone at XXX/XXX.XXXX or via email at xxxxxxx.xxxxx@xxxxxxx.xxx. If you would like to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. Dr. Endicott is the Walden University representative who can discuss concerns with you. Dr. Endicott's phone number is X-XX-XXX-XXXX, extension XXXXXXXX. Walden University's approval number for this study is 03-14-14-0165065 which will expire on March 13, 2015.

You may print and keep a copy of this consent form for your record.

Statement of Consent:

I have read the above information and I feel that I understand the study well enough to make a decision about my involvement. By replying to this email with the words, "I consent", I understand that I am agreeing to the terms described above.

Printed Name of Participant and Email Address

Researcher's Signature

Appendix C: Interview Protocol

Phone interviews with participants will focus on the exploration of the impact of industrial maintenance technician skill losses at a West Tennessee manufacturer, emphasizing the perspectives of the participants, and will assess during the interview if there are new themes or patterns not specified in the interview questions. Remind the participant that interview will be recorded and the researcher will not include your name or anything else that could identify you in any reports for the study. You may skip any questions that you feel are too personal or stop the interview at any time.

Date of Interview: _____ Study Participant: _____

Duration of Interview: _____ Interview #: _____

Interview Questions (see Appendix A)

1. Tell me about your experiences planning any attrition of industrial maintenance technicians' that would affect the manufacturing business core competencies? If no plan, what type plan would you develop? How would you implement this plan?
2. Tell me about your experiences that relate to the importance of the contribution of industrial maintenance technicians to supporting the core competencies of the organization in preparation for attrition losses?

3. Tell me about your experiences on the benefit of the organization preparing to address the industrial maintenance technicians' labor attritions that would help the manufacturing facility survive through a period of limited technical labor supply?
4. Tell me your experiences with the specialized skills that industrial maintenance technicians possess which would not available from other organizational employees in preparation for attrition losses?
5. Tell me your experiences about the economic impact that might occur if existing levels of maintenance knowledge and skills are not replaced at sufficient levels due to changes in the supply?
6. Tell me about your experiences with the knowledge and skills that industrial maintenance technicians possess that cannot be automated in preparation for attrition losses?
7. Tell me about your experiences with trends impacting the business that might occur from changes in the supply of industrial maintenance technicians?
8. Tell me about your experiences of measurements that would be useful in understanding the available supply of industrial maintenance technicians' in preparation for attrition losses?
9. Tell me about your experiences with outsourcing, temporary workers, and contract workers might impact the supply of industrial maintenance technicians due to preparation for attrition losses?

10. Tell me about your experiences with the cost of training new industrial maintenance technicians that might impact the organization due to preparation for attrition losses?
11. Tell me about your experiences that help describe new knowledge and skill requirements that will be required to ensure an adequate supply of industrial maintenance technicians?

Curriculum Vitae

*Kenneth Wayne Moten**Résumé of Qualifications***EDUCATION:**

University of Memphis, Memphis, Tennessee -- B.S. in Electrical Engineering
Technology

University of Memphis, Memphis, Tennessee -- M.B.A. in Management

Walden University – ABD in Leadership Walden University

EXPERIENCE HIGHLIGHTS:

Manufacturing management experience combines many years of direct “hands-on” support to continuous fabrication and assembly processes in the aluminum, automotive, motor, rubber, food and paper industries as an electrical, project, manufacturing, plant engineer and manager.

Leroy Somer Company, Lexington, TN (2011 to 2012)

Maintenance/Facility Manager- Maintenance manager/Facility engineer for a major generator manufacturer supervising approximately 25 maintenance technicians and maintaining over 1000 pieces of equipment at 750,000 sq-ft facility producing approximately \$500-million dollars in annual sales.

Goodyear Tire and Rubber Company, Union City, TN (2006 to 2011)

Technical Manager/Support-Maintenance manager, technical planner and equipment engineer for tire manufacturing plant responsible for producing 30,000 to 50,000 tires daily on a 24-hour 7-day-a-week operation. Responsibility included supervising, maintenance planning and equipment support activities for 10-Banbury Rubber Machines, 9-Tread Extruding Lines that supply base materials and tire component parts for just-in-time manufacturing of required tire production of 3500 employee unionized plant. Successful certification and re-certifications for all ISO and Internal Audit requirements in assignment areas (maintenance and environmental).

MTD (Cub Cadet) Products - Brownsville, TN (2004 to 2005)

Maintenance Team Leader- Maintenance manager for plant responsible for production of lawn mowers. Responsibility included supervising maintenance activity for 15 Stamping Presses, 15 Robotic Welding Cells and 5-Assembly Lines. Lead TPM requirements of Lean Improvements.

Hutchinson Sealing Incorporation - Church Hill, TN (2002 to 2004)

Maintenance/Facility Manager- Maintenance/Facility manager for a major automotive company supervising approximately 40 maintenance technicians and 5 salaried staff members producing approximately \$140-million dollars in annual sales. Reported to Plant manager for daily maintenance activities and to Vice President of Operations for capital project activities. Maintenance responsibilities include managing the support staff responsible for 7-Rubber Extrusion lines, 30- Major

Extrusion presses, 25- Secondary Extrusion presses and numerous other pieces of secondary support equipment (Cutters/Notchers, Benders, Saws) and Quality audit gages. Responsible for setting up Computerized Preventive Maintenance procedures and spare parts for all new and existing production equipment necessary in meeting just-in-time delivery to all three major American Automotive Manufacturers. Also responsible for the maintenance and upkeep of utilities (chilled water, compressed air, fire protection, building heating and cooling, grounds and janitorial services). Capital responsibilities included preparing budgets, appropriation requests, installation and start-up new lines and equipment/processes and executing projects to improve and maintain physical facilities and productive capacities. Active member of the Management team, Safety Committee and Lean Manufacturing team.

Fluor Daniel Corporation/P&G Manufacturing - Jackson, TN (2000 to 2002)

Capital Cost/Project Engineer- Engineer responsible for capital project estimating for funding from conception, appropriation submittal, final funding and to execution of multi-million dollar projects. In addition to cost detailing, this position worked directly with contractors, crafts workers and production workers in all aspects of project execution.

Emerson Motor Company - Humboldt, TN (1998 to 2000)

Facility and Maintenance Manager- Coordinated all facility/building maintenance, upkeep and improvements. Directed all manufacturing equipment maintenance functions required for daily production (stamping presses, die casters, ovens, motor winding/assembly line). Facility responsibilities included HVAC, roofing, lawn-care, lighting, floor resurfacing, electrical power distribution, environmental waste streams, property insurance management, sprinkler system, lift-truck fleet, utilities, etc. Maintenance responsibilities included directing two maintenance shift supervisors that covered three production shifts and a continuous shift operation in a die-cast, press, motor winding and annealing furnace operation with approximately 30 maintenance technicians. Also coordinated all outside contractor work.

Alumax, Engineered Metal Processes -- Jackson, TN (1995 to 1998)

Sr. Plant Engineer/Acting Engineering Manager - Directed and monitored the activities of plant designers and other engineers including the total management of large engineering projects as related to the start-up of a new manufacturing facility. This work responsibilities included conceptual design, project cost estimation, capital funding request, written equipment and contract specifications, installation of equipment, equipment/personnel safety requirements, monitoring/controlling project costs and training of plant personnel. Additionally, directed and supported the maintenance activities of plant equipment and facilities (scheduling of equipment outages, development of preventive and predictive maintenance procedures, investigation of chronic-production problems, failure analysis, and development/improvement of craft skills).

Kimberly Clark Corporation -- Memphis Mill, Memphis, TN (1991 to 1994)

Sr. Electrical & Maintenance Engineer- Responsible for supporting and providing leadership in the maintenance availability, operation, and technical support of manufacturing equipment and assets valued up to \$10 million. Work responsibility included providing technical expertise, problem-solving techniques, human resource development and effective leadership for requirements of operations, engineering and sector management for production requirements.

A.O. Smith Automotive Products -- Milan, TN (1987 To 1991)

Sr. Manufacturing Engineer - Responsible for electrical designs, equipment specifications, project coordination, equipment maintenance, process performance and customer interface for General Motors, Chrysler Motors and other products lines. Experience includes welding lines, stamping presses, assembly lines, robot cells and paint line.

Project Management Experience

Project management experience involves numerous installations and startup of equipment in both industrial and medical facilities. Projects were implemented with contract manpower and in-house work force and projects managed have exceeded several million dollars. Also have experience in new facility construction and start-up.

Environmental/Safety Experience

Additional responsibilities of positions have been those of Safety and Environmental Engineer. These positions required ensuring compliance with environmental regulation and to recommend corrective actions for non-compliance concerning manufacturing processes and plant-waste streams. Ensured compliance with all safety regulations for all existing and projected processes. In addition, responsibilities included filing the required paperwork and quarterly reports to the appropriate regulatory agency and providing OSHA required training to facilities' employees.

Specialized Skills and Training

Project Cost Estimation, D.C. drives; process controls; environmental regulations; programmable controllers; high performance work teams; 5-S and Lean management; statistical process control; diagnostic and preventive equipment maintenance; hydraulic controls; robotics; project management; power distribution; Press Controls and MS DOS computer systems hardware and software.