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Strategies for Hiring Managers in Science, Technology, Engineering, and Mathematics Fields

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Walden University

College of Management and Technology

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Elizabeth Williams

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Walden University
2018

Abstract

Strategies for Hiring Managers in Science, Technology, Engineering, and Mathematics Fields

by

Elizabeth D. Williams

MBA, University of Phoenix, 2009

MA, Queens College, 2004

BBA, Bernard M. Baruch College, 1998

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

April 2018

Abstract

One-third of science, technology, engineering, and mathematics (STEM) jobs are unfilled, resulting in less revenue for companies. The purpose of this qualitative single case study, grounded in the human capital theory, was to explore strategies that 2 hiring managers used to recruit STEM professionals in an organization in central Virginia. Data were collected from semistructured interviews, member checking, and company documents on STEM recruitment. The 4 themes that emerged from the data, analyzed using Yin's 5-step process, were as follows: partnerships with state government and local colleges, leadership and employee development programs used as recruitment incentives, competitive compensation package and work-life balance to entice new hires, and meticulous investigation, evaluation, and trial periods. The findings of this study could provide hiring managers with strategies to improve recruitment of skilled STEM professionals. The implications for positive social change could include a reduction in employee turnover, a decrease in employee recruiting costs, an increase in employee retention, more motivated and engaged employees, and an increase in employee production, all of which could increase profits and positively influence the company and the health of the community.

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Dedication

I dedicate this degree to my Lord and Savior Jesus Christ. Give thanks to the Lord (Psalm 138). To my mother, Dorsey, thank for your unconditional love, never-ending support, staying up late to keep me company while I worked on my study. You have always been there for me, my mom, my friend, my rock, words can not express my gratitude for your love and sacrifices. To my loving and gifted daughter Courtney, thank you for your love, support, sense of humor, sacrifices, and encouragement. Live your passion and dream big and always remember there are no limits to what you can achieve. To my brother, Januarie, thanks for being positive and making me laugh when there were days I wanted to cry. Thank you for your love and encouragement. To my entire family and friends, thanks for the love, prayers, and support. I am forever grateful to each of you for helping me achieve my dream of completing this journey. I dedicate this degree to all the scholars trying to complete a degree program. It is not easy, but it is worth it, so push harder and keep swimming, you can make it. Lastly, I dedicate this work to the memory of my father, Theodore for stressing the importance of education and Ernestine Rouse aka Mama Tine for stressing the importance of faith and the power of prayers. These lessons I hold dear and will cherish forever.

Acknowledgments

I acknowledge my chair, Dr. Lisa Kangas. I consider myself extremely blessed to have Dr. Kangas as my chair. You are heaven sent. Your vision, guidance, commitment, encouragement made it possible for me to complete this study. I am forever grateful and indebted to you. I would not be at this stage without your never-ending support. I would also like to thank Dr. Corey and Dr. Dereshiwsky for their guidance and feedback to aid in the completion of the research study. I want to thank Dr. Cheryl Founchious Brown for your support and your willingness to help your peers accomplish their goals. You are an inspiration. I am so proud of you and glad we are friends. I want to acknowledge my doctoral family, Dr. Toliver, Dr. Martin, Dr. Smith, Ms. Seydi and Ms. Jackson for their willingness to help each other complete this journey.

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Section 1: Foundation of the Study

One traditional role of hiring managers is to secure skilled employees the company needs (Cappelli, 2015). Hiring the right employees is challenging (Reigle, 2014) because the talent pools are limited as companies compete ("How Firms," 2016). The lack of skilled employees in the U.S. labor force is a rising concern, and companies are experiencing challenges filling vacancies (Cappelli, 2015). In this qualitative single case study, I explored strategies that hiring managers use to recruit qualified science, technology, engineering, and mathematics (STEM) employees.

Background of the Problem

Skilled workers are essential to drive innovation, creativity, imagination, and the economy (Hausman & Johnston, 2014). However, Abraham (2015) noted that the Great Recession still affects the labor market, and employers face challenges to fill positions because of a mismatch of skills. Abraham attributed the slow recovery to skill shortages.

Businesses will battle over the human capital as shortages create high employee turnover (Sinha, 2012). Business leaders have difficulties hiring for positions in engineering, information technology, machining, and other technical occupations due to continued labor market constrictions (Gordon, 2014). Employers struggle to find workers with certain skills, and baby boomer retirements compound the problem (Gordon, 2014). U.S. firms have increasingly turned to importing STEM workers to ensure the nation's tech-based economy continues to operate (Gordon, 2009a). Organizations use STEM workers as input for innovation and productivity growth. Economists have recognized the importance of STEM innovation and the impact on economic growth (Peri, Shih, &

Sparber, 2015). Policymakers and industry leaders believe the U.S. faces a high-tech talent crisis (Salzman, 2013). As Augustine (2005) noted in a 2005 report, the U.S. had lost its advantage in science and engineering. By 2018, it is projected that the U.S. will have a shortfall of 3 million individuals to fill jobs in STEM (Elkins, Bell, Hartgrove, & Pardue, 2016). The STEM workforce shortage is well documented and business leaders face challenges filling vacant STEM professional positions.

Problem Statement

STEM workforce sustainability is at risk because there are not enough STEM workers in the workforce (Iammartino, Bischoff, Willy, & Shapiro, 2016). To meet the workforce demands, one million more STEM professionals are needed (Peterson, Bornemann, & Lydon, 2015). The general business problem was that some hiring managers in the STEM field lack the ability to recruit qualified STEM professionals, which may result in loss of profitability for the business. The specific business problem was that some hiring managers lack strategies to recruit qualified STEM professionals (Brodock, Brodock, Massam, & Massam, 2016).

Purpose Statement

The purpose of this qualitative single case study was to explore successful strategies that hiring managers used to recruit qualified STEM professionals. The target population consisted of hiring managers located in the state of Virginia who used strategies to recruit STEM professionals for their organizations. This research study may contribute to social change by helping hiring managers develop strategies to attract skilled STEM professionals and hiring managers who lack strategies for hiring qualified

STEM professionals. The implications for positive social change included the potential to help businesses expand by helping hiring managers recruit qualified STEM professionals, thereby increasing innovation and profits. This study may also inspire more partnerships between business leaders and the community to develop more programs aimed at building a skilled workforce to meet the needs of companies in the STEM field.

Nature of the Study

I used a qualitative methodology for this study. Qualitative methodology is a form of inquiry researchers used to collect detailed information and understand human behavior (Oun & Bach, 2014). Qualitative research focuses on individuals, groups, process, or organizations (Marshall & Rossman, 2014). Researchers use a quantitative research method to test theories and examine relationships among variables (Rubin & Rubin, 2012). I did not select a quantitative method because I did not test theories or examine relationships among variables to determine recruitment strategies. Mixed method is a combination of both quantitative and qualitative research methods (Molina-Azorin, 2011). I selected a qualitative research method for the research study because I wanted to collect in-depth data on strategies that hiring managers used to recruit qualified STEM professionals.

I used a case study design in this study. The case study design consists of an in-depth inquiry into a specific and complex phenomenon set within its real-world context (Yin, 2015). Williams (2007) noted that researchers might use an ethnographic research design to retrieve data by studying the entire group that shares a common culture to observe their behavior and then interprets the culture or social group and systems. I did

not select an ethnographic design for my study because I did not want to observe the behavior of the group of people with the same culture. Mayoh and Onwuegbuzie (2015) stated that researchers might use a phenomenological research design to focus on human experience as lived by the experiencer in a way that may be used as a source of qualitative evidence. I did not select a phenomenological design because I did not explore the lived experiences of participants. Instead, I selected a case study design because a single case study helps researchers facilitate in-depth inquiry of a single case within set boundaries (see Yin, 2015). Shekhar (2014) reported that researchers might use a case study to answer the *how* and *why* questions being asked and to focus on the phenomenon within a real-life context.

Research Question

The research question I developed for this study was the following: What successful strategies do hiring managers use to recruit qualified STEM professionals?

Interview Questions

To answer the primary research question, I asked participants the following interview questions:

1. What strategies do you use to recruit qualified STEM professionals?
2. What strategies do you use to determine which skills are important to your organization?
3. What strategies do you use to determine the qualities that are essential when hiring qualified STEM professionals?

4. What strategies do you use to determine if the candidate will be successful in the position?
5. What competitive compensation strategies do you use to recruit qualified STEM professionals?
6. What strategies do you use to test the skills of STEM professionals?
7. What strategies do you use to overcome challenges when recruiting STEM professionals?
8. Are there any other strategies for recruiting STEM professionals that we did not discuss and that you wish to share?

Conceptual Framework

Becker (1964) developed the human capital theory on the premise that education and experience lead to higher levels of firm productivity as cited in Ștefănescu-Mihăilă, 2015. I used Becker's human capital theory in my study to explore strategies hiring managers to use to recruit qualified STEM professionals to their companies. Becker's work on human capital started around 1960, spurred by a motivation to raise interest in economic growth (Weiss, 2014, 2015). Weiss (2015) noted that, according to Becker, human capital is the collection of production skills embodied in a person used to generate earnings in the labor market and to augment a household's consumption options.

Schultz also contributed to the human capital concept (Ștefănescu-Mihăilă, 2015). Schultz (1961) believed that skills and knowledge are forms of capital, and capital is an investment. He noted that skills and knowledge have economic value because labor contributes to output and the productive capacity of human beings is larger than all other

forms of wealth taken together (Schultz, 2016). Human capital is a general term for workers who contribute to knowledge, technology, innovative concepts, and management methods (Jia, 2016). Mahoney and Kor (2015) stated that organizational investment in human capital could be a pathway to building and enhancing a firm's competencies. I used the human capital theory for this study because this theory indicated the importance of human capital and the strategies hiring managers use to recruit qualified STEM professionals for their company.

Operational Definitions

Throughout this study, I used these operational definitions of the following terms:

Human capital: The term human capital came from the idea of labor power as a form of capital (Hodgson, 2014).

STEM: An abbreviation for science, technology, engineering, and mathematics (Gregg et al., 2016).

STEM professional: A term to describe a professional who works as a scientist, technology or in a STEM major (Carrino & Gerace, 2016).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions of a study are patterns of thought researchers take for granted when conducting research (Hibbert, Sillince, Diefenbach, & Cunliffe, 2014). I assumed that hiring managers would respond to interview questions honestly. Another assumption was that the participants were excited to partake in the research study. Finally, I assumed that data collection would produce themes regarding strategies for improving hiring practices.

Limitations

Limitations are things that are out of the researchers' control (Connelly, 2013). One limitation of this study could be hiring managers' unwillingness to share pertinent information regarding recruitment strategies. A second limitation could be the truthfulness of participants. A third limitation could be time constraints of the participants and conducting interviews around the participants' schedules to accommodate them.

Delimitations

Delimitations are boundaries set by the researcher to limit the study (Marshall & Rossman, 2014). One delimitation of this study was my purposeful selection of participants. A second delimitation was the geographical location of Virginia, and a third delimitation was my selection of one company for the case study.

Significance of the Study

My collection of information about hiring managers' strategies to recruit STEM professionals may enhance hiring practices for organizations. This study may positively affect business practices by providing strategies that hiring managers can use to recruit qualified STEM professionals.

Contribution to Business Practice

This study may help businesses reduce costs associated with recruitment. This study could also play a role in minimizing the existing and future shortage of STEM professionals, streamline recruitment process, and help hiring managers to recruit qualified STEM professionals. Analysts have found that STEM occupations are the fastest-growing occupations (Stephens & Richey, 2011). The growing need to fill these

positions with qualified candidates is a challenge in the retirement of the STEM-educated workforce (Stephens & Richey, 2011). Stephens and Richey (2011) noted that there exists a lack of understanding of the challenges for preserving a strong pipeline from elementary school to the STEM workforce. Gupta (2016) recommended that companies create new human resource strategies to remain competitive in a global business environment. He also stated that the Internet is widely used to find candidates, but some hiring managers reported that it takes too much time to review resumes to discover that there are too many unqualified applicants applying for the position (Gupta, 2016). Rosoiu and Popescu (2016) stated that the recruitment and selection processes are critical functions of human resources, and these processes require structure and planning to function efficiently and reduce costs.

Implications for Social Change

The implications for positive social change include the potential to build a stronger STEM workforce, thereby improving the national economy and the competitive edge of the United States in STEM fields. In addition, the findings from the study may inspire hiring managers to find ways to streamline the hiring process by providing valuable insight into ways to make traditional and online recruitment processes more efficient and less costly. Rincon and George (2016) noted that 60% of jobs in the STEM field would require at least a bachelor's degree by 2018. The development of programs that facilitate college access and affordability is beneficial for all stakeholders to develop skilled employees and establish a stronger economy. Stephens and Richey (2011) have argued that the United States will have to develop creative and intelligent people to

maintain the country's competitive edge in the global economy. This study may provide STEM organizations with information that could enhance the success of STEM professionals, reduce recruitment costs, and streamline the recruitment process. These potential outcomes may help hiring managers to find the STEM talent needed to help businesses profit and remain competitive in a global economy, reduce recruitment costs, streamline the recruitment process, reduce the existing shortage, and prevent future shortages in the STEM workforce.

A Review of the Professional and Academic Literature

I conducted a review of the literature using a variety of sources, including academic writings, scholarly articles, books, official publications, and professional journals. I used the Walden University library to search various databases, including Google Scholar, ProQuest, Science Direct, and Business Source. I also used other sources including government documents, and websites. To select appropriate sources for this literature review, I focused on collecting peer-reviewed articles. In my searches, I used the following keywords and phrases: *STEM innovations, improved STEM workforce, workforce shortage, human capital, STEM initiatives, foreign STEM workforce, STEM workforce shortage, hiring managers, globalization,* and *reshoring*. The purpose of this qualitative, single case study was to explore the strategies hiring managers used to recruit qualified STEM professionals. The literature review includes a comprehensive overview of the trends in the STEM industries. I address human resources and the importance of human capital to organizations. I also include a review of the human capital theory.

Human capital is a part of competitiveness and economic growth for companies (Čadil, Petkovová, & Blatná, 2014). Human capital consists of knowledge and skills (Horner, 2015) and is comprised of people involved in an activity that generates goods and services (Dumitrescu, 2015). Pobst (2014) noted that the shortages of knowledge workers are well documented and worsening in many nations. Human resource organization development professionals need to address this shortage of key knowledge workers because baby boomers are retiring and there is a smaller pool of talent to replace them (Pobst, 2014). The numbers of workers in STEM fields are critical to the future of the U.S. economy, but there are not enough U.S. citizens studying in the STEM fields to maintain economic competitiveness and innovation (Orrenius & Zavodny, 2013). Hossain and Robinson (2012) found that the U.S. STEM workforce is not prepared to meet the nation's needs because students lack motivation and leave the STEM track in college. As a result, the United States is largely dependent on a foreign-born STEM workforce (Hossain & Robinson, 2012). In some cases, U.S. companies are moving to other countries to take advantage of cost breaks (Geronime, Brown, Lauder, & Ashton, 2012) and because the United States faces shortages of STEM professionals (Strawn & Livelybrooks, 2012). However, companies and institutions should take the initiative to have employees create awareness of STEM opportunities in social settings (Sjaastad, 2012).

Human Capital Theory

Talent management has become one of the fastest-growing areas of academic work in the management field (Collings, Scullion, & Vaiman, 2015). A primary predictor

of Becker's (1964) human capital theory is that the increases in human capital translate into high pay through increased job performance (Hayek, Thomas, Novicevic, & Montalvo, 2016). Čadil et al. (2014) stated that human capital is a factor in competitiveness and economic growth, and Collings, Scullion, and Vaiman (2015) mentioned that practitioners should integrate the works on human capital with those on talent management to make more information accessible. Becker posited that employees with superior human capital, such as higher levels of education and experience, achieve outcomes that are more desirable by being more productive.

Becker's motivation for developing human capital theory was the rising interest in economic growth (Weiss, 2015). The origin of Becker's study can be traced to the finding that a substantial growth in income in the United States remains after the growth of physical capital and labor has been accounted for (Weiss, 2015). Harpan and Draghici (2014) noted that there are two perspectives of human capital. The first perspective includes the use of humans as capital that adds value to other production factors such as finance, land, machinery, and labor hours (Harpan & Draghici, 2014). In the second perspective, the human labor force is the target of investment through education and training (Harpan & Draghici, 2014). Human capital production generates benefit to organizations (Harpan & Draghici, 2014). Harpan and Draghici described human capital as knowledge and skill accumulated by employees' work experiences and education. Collewaert and Manigart (2015) stated that human capital develops from experience and education, but individuals can assimilate new knowledge faster in meaningful ways. People attain education because it is a human capital investment, which increases their

knowledge and provides them with skills, making them more productive in the labor force (Winters, 2014).

The success of businesses depends on people who have a high level of competencies and expertise, who add value to companies, and who are assets to organizations (Harpan & Draghici, 2014). Todericiu, Lucia, and Stăniţ (2014) mentioned that human resources are the most significant strategic resources organizations can use because human resources represent the intellectual capital of organizations. Todericui et al. also noted that organizations have to motivate employees to fulfill tasks they were hired for and to stay with the organizations. Motivating workers should go beyond making people work, to making people work well, in order for organizations to benefit from individuals' physical and intellectual resources (Todericiu et al., 2014). Only motivated human resources will support the organization's objectives (Todericiu et al., 2014).

The Importance of Human Capital

Human capital development is a field in scientific research (Vaitkevičius, Čiutienė, Meilienė, & Savanevičienė, 2015). Winters (2015) noted that the key element of human capital is creativity because it encourages innovation that fuels technological growth. New ideas generate new products and more efficient production processes (Winters, 2015). Human capital consists of knowledge, individual skills, learning, attitudes, the capacity of innovation, and the experiences of members of organizations (Bchini, 2015).

For organizations, intellectual capital is critical to the success of organizations (Ibidunni, Osibanjo, Adeniji, Salau, & Falola, 2015). Phillips and Phillips (2016) noted that organizations have the opportunity to be in the global market. Science and engineering contribute to technical innovation, technical engineering, and global economic competitiveness (Veenstra & Walters, 2013). Hiring managers can help organizations reach goals by attracting, recruiting, and selecting talented employees whose skill sets best match the organizations' objectives (Phillips & Phillips, 2016). Phillips and Phillips (2016) stated that human resource functions typically involve the culture and employee performance. Phillips and Phillips asserted that human resources could help drive innovation because innovation is critical for sustaining high performance. Phillips and Phillips also believed that organizations that did not adapt would fail. Innovation, more creative processes, solutions, and products will drive companies forward (Phillips & Phillips, 2016). Phillips and Phillips claimed that human resource departments should not manage operations day to day but instead should plan for the future.

Human capital strategies go beyond hiring, training, and benefits. Boudreau (2014) believed that leaders realize the strategic challenges organizations face and the changing role of human resource professionals. Boudreau noted human resource professionals' responsibilities had not changed much. Human resource professionals have the responsibility to attract, develop, and retain employees to achieve the strategic objective of organizations (Wahyunity, 2015). It is critical for companies to manage talent to achieve competitive advantage (Wahyunity, 2015). Human resource

professionals' roles are to aid in creating successful organizations that deliver strategies that build winning organizations (Ulrich, 2014). Individuals, capabilities, and leadership can characterize successful organizations (Ulrich, 2014). Shaw, Park, and Kim (2013) noted human capital accumulations are challenging because it is hard to identify the precise aspect of the advantage and replicate it.

Shaw et al. (2013) implied that high human capital accumulation results in companies' ability to profit from the business skills and knowledge, and the ability to maintain a competitive advantage. Loshali and Krishnan (2013) agreed with Shaw et al. that organizations could have a competitive edge by placing an emphasis on people. Managers must develop strategies to maximize knowledge, information, and innovation (Rastgoo, 2016). Loshali and Krishnan noted that human resource professionals should focus on assessing their talent pool often to determine if the talent is not present in organizations, and on ways the business can acquire the necessary skills. The key to success is to understand human capital (Walker & Forbes, 2014). Engaged teams within companies share the vision, which leads to business growth and sustainability (Walker & Forbes, 2014).

Intellectual Capital

Intellectual capital is a key asset for organizations and is described as persons or a group of people who possess certain knowledge (Fischer & Marsh, 2014). Studies on intellectual capital have increased in the last 10 years and have taken place in different countries, economies, and industries (Bchini 2015). Fischer and Marsh (2014) stated that intellectual capital is the knowledge held by the workforce. Bchini (2015) stated that

companies are overwhelmed with competition because of globalization, new information, and communication technologies. To stand out from their competition, companies' resources, both tangible and intangible, have to be different from the competitors (Bchini, 2015). Companies are viewing intangible assets as more important than tangible assets (Tamošiūnienė & Survilaitė, 2016). Intellectual capital is vital to the knowledge economy, and it plays a role in innovation, productivity growth, and the performance and competitiveness of companies (Bchini, 2015). Bchini stated that companies should recruit individuals with the knowledge, skills, and ability to adapt to new technologies necessary for companies' operation and development. In a knowledge economy, investing in intangible assets is a strategic element for growth, profitability, and competitiveness of companies (Bchini, 2015). Companies that find effective, educated employees and retain these employees can add value to companies (Tamošiūnienė & Survilaitė, 2016).

STEM Initiatives

Firms compete for the top talent not only to stay competitive but also to minimize the advantage of rivals (Garavan, 2012). Sant (2016) noted that hiring managers face challenges with hiring the right candidates. Sant further noted that organizations could gain a competitive advantage by understanding the effects of human resources on the talent pool of organizations and the effect on strategic and organization effectiveness. Kim, Williams, Rothwell, and Penaloza (2014) and Stahl, Farndale, Morris, Paauwe, and Stiles (2012) mentioned that organizations face challenges in building and sustaining a talent pipeline by managing human assets. Kim et al. stated that organizations recruit talent to offer internships to evaluate and hire new talent. Another initiative for STEM is

to promote the community college transfer option as a pathway for obtaining a STEM baccalaureate degree (Allen, 2016). Whitney and Ames (2014) inferred that top companies are expanding their STEM talent pool of workers by encouraging a diverse workforce of STEM professionals. Whitney and Ames stated companies are interested in recruitment, retention, and advance of women working in technology. These articles are relevant to my research study because these articles show the efforts companies are taking to gain a competitive edge in the STEM workforce.

Another new research project initiative supported by President Obama is the challenge to create 1000 new STEM focused schools over the next decade (Lynch, Behrend, Burton, & Means, 2013). Lavrakas (2012) mentioned that a school called P-Tech in Brooklyn partners with New York Public Schools, the City University of New York, and IBM to prepare students for careers in STEM industries. Lavrakas stated that the Aerospace Industries Association is an organization working to build a competitive economic workforce because the interest in STEM subject remains below the levels required to supporting a strong, innovative 21st Century economy. The core initiative of the Aerospace Industries Association was to identify and characterize both immediate and future workforce needs (Lavrakas, 2012).

The U.S. education system and the technology industry are investigating different avenues to increase student's interest in the fields of math and science, thereby decreasing the U.S. global need for STEM workers among other countries (Lavrakes, 2012). Researchers at the Bayer Corporation released a study that strongly encourages the nation to develop new scientists and engineers from underrepresented minority groups

since these Americans are the fastest growing segment of the U.S. population (Hrabowski, 2012). Hrabowski (2012) stated that American companies need to utilize the talent from a broad pool of citizens if the nation is to continue to have a strong STEM workforce and compete globally. The Meyerhoff Programs have been successful in helping minority groups to complete their bachelor's degree and continue to complete PhDs in the natural sciences and engineering fields (Hrabowski, 2012). President Obama's Educate to Innovate is another STEM initiative to improve the country's participation in STEM careers and education to develop a path for underrepresented workers in STEM (Byars-Winston, 2014). The Educate to Innovate program expands STEM learning opportunities to grow the STEM workforce (Byars-Winston, 2014). These articles are noteworthy for my research because I showed the initiatives for STEM undertaken by various organizations to help people succeed in the STEM field, thus building a stronger STEM workforce in the United States.

Foreign STEM Opportunities

Franzoni, Scellanto, and Stephan (2012) mentioned 41.6% of employees with doctorates working in science and engineering occupation in 2009 were born outside of the United States. In addition, 60% of all postdoctoral employees working in the United States are on a temporary visa. Ciriaci and Muscio (2014) noted several countries focus on a skilled workforce through education and training. Several countries realized the link between economic growth, human capital, productivity, and innovations. Indian's information technology enabled services industry generated over $100 billion with four

models (Bhattacharjee & Chakrabarti, 2015). Bhattacharje and Chakrabarti (2015) stated the last model promoted an offshore framework to organizations.

Roberts (2012) noted China and India are STEM leaders in producing engineers and technicians. Dobbs et al. (2012) declared China and India contributed more than a third of global labor force growth. Dobbs et al. reported China and India account for 67% of new workers with science and engineering degrees. Roberts stated China generated 500,000 engineers and India 200,000 in 2008. The United States generates 70,000 engineers to the workforce (Roberts, 2012). Based on these numbers, large gaps exist in generating engineers from the United States. Han, Stocking, Gebbie, and Appelbaum (2015) implied many STEM students are returning to their birth countries with the offset the brain drain problem is decreasing for other countries. This problem may influence the United States innovation capacity.

Reversed migration occurs when countries encourage the return of immigrants with value skill sets to return to their native country, and the country benefits from the experience gained from western countries. Another trend is foreign-born graduates with advanced degrees in the STEM field who have to wait for years to attain permanent residency in the United States or return abroad (Carr, 2012). Carr (2012) declared the world's best and brightest is not pleading to come into the United States anymore. These articles about foreign STEM opportunities are significant to my research because I show the new trends of American corporations facing challenges to fill STEM positions with workers aboard and the trend of the foreign workforce returning to their native country. Carr noted the United States' edge to keep STEM graduates in the U.S. workforce is

shrinking because of the uncertainty of immigration policies and other employment opportunities elsewhere. China and India, the top contributors of STEM graduates, will not be able to generate enough qualified graduates to fulfill the world demand (Gordon, 2009a).

The United States STEM Workforce

Roberts (2012) insisted that innovation and invention are driving forces that affect the economy. An inadequate STEM workforce will pose challenges for businesses. Roberts mentioned the United States ranked 18th out of 24 industrialized nations in graduation rates, and the numbers are declining. Miller and Kimmel (2012) reported the inadequate number of Americans adults seeking scientific or engineering profession remains a national concern. Winters (2014) stated the ability to produce, recruit, and retain STEM graduates are linked to nation's economic wealth. Winters claimed individuals gain education because of the human capital investment that increases their knowledge and skills will make them more productive in the labor force and give them higher earnings. As a result, business leaders seek other alternatives to the labor shortage. Hiring managers have to produce qualified workforce proficient in mathematics and the sciences to be competitive in a global market. Chitrao (2015) claimed Human Resource Practitioners streamlined the new workplace to sustain the business. Chitrao noted a primary goal for human resources was to manage human resources to have a competitive advantage. Chitrao declared the human resources staff role was to improve organizations' profits by retaining good employees.

Boyles (2012) poised existing companies hired employees with higher-level skills to compete, but recent studies indicated college graduates are not at the levels employers expected. Ledbetter (2012) noted public school systems could not attract skilled teachers educated in STEM. Hewins-Maroney (2013) noted 60% of new jobs in the United States required skills that 20% of the workforce possesses. Hewins-Maroney recommended replacing youth workers with retiring baby boomers, but the youth workers lacked technological skills possessed by the workforce. These articles pertaining to the U.S. STEM workforce were relevant to the research because Hewins-Maroney presented the U.S. education system as it failed to prepare students to enter in STEM fields. As a result, the United States depended on foreign talent for growth in the technology fields.

STEM Workforce Shortage

Hagedorn and Purnamasari (2012) declared job shortages in the STEM field would have a catastrophic impact on the economy. Tung (2016) noted the cause for the escalating struggles for talent is the aging workforce, the reduction in immigration and emigration, the upgrading in the educational levels and technical skills of their indigenous population. Employers recognized an engaged and motivated workforce was the key to a competitive advantage and growth. However, Gallardo and Thunnissen (2016) noted academic research in the field of talent management does not provide much support or solutions (Gallardo & Thunnissen, 2016). STEM fields such as engineering was a national priority with a goal to produce one million STEM graduates in the next decade (Allen, 2016). The demand for STEM workers is expected to increase 13% between 2012 and 2022 (Allen, 2016). Tankwanchi, Vermund, and Perkins (2015) noted

the United States does not produce enough skilled health professionals and depends on other countries for skilled health professionals, causing a brain drain of the qualified health professionals from low-income to middle-income countries. Many organizational leaders hire international medical graduates into the U.S. physician workforce from countries with critical shortages. The STEM workers' shortage affected other countries (Panizzon, Corrigan, Forgasz & Hopkins, 2014). These articles are relevant to the research because I illustrated the economic impact of the U.S. economy and the shortage of STEM workers.

Gordon (2009a) noted countries around the world face a global job and talent uproar because of the talent shortage. Subsequently, the demographic trends in the United States, Europe, Russia, and Japan indicated a large reduction of workers because of low birth rates and an influx of retirement (Gordon, 2009a). Gordon (2009a) noted China's and India's education system would not produce enough qualified graduates for their country. Gordon's study illustrated the workforce shortage influences the United States as well as other countries.

An article entitled the identification of effective recruiting strategies from non-traditional engineers: A recruiter's perspective study examined enhanced efforts of the technology industry in attracting non-traditional engineers in their effort to address the technology workforce shortage (Hickman, 2006). The study included ten interviewees in various industries (Hickman, 2006). The interns recruited were in college (Hickman, 2006). The article was relevant to my research because it explains how corporations work with colleges to better prepares students for STEM careers.

In addition, the workforce shortage increased globalization and yielded more foreign-born academic staff to U.S. institutions (Webber, 2013). Globalization created a mobile workforce both within and between countries (Hackling, 2016). Globalization evolved over the last 50 years, and multinational organizations competed across the world (Cascio & Boudreau, 2016). Luo (2016) declared the business world search the global market for talent, business, and increase integration of talent management within a globally coordinated human resource system. The National Study of Postsecondary Faculty noted more foreign-born individuals became academic staff at US institutions in 2004 compared to 1993 (Webber, 2013). Webber (2013) stated one-quarter of the college-educated science and engineering workers was foreign born. Kerr, Kerr, and Lincoln (2014) noted high-tech executives argue H-1Bs are essential for high-skill immigration to ensure competitiveness, growth, and innovation of their firms. These articles were relevant to my research because U.S. institutions seek highly skilled foreign workers to fill positions because of the unskilled American workforce. As a result, the United States may depend on foreign workers.

STEM Industry

Salzman (2016) believed the United State STEM workforce is deteriorating because of policies and guest worker programs. Firms and industries groups continue to utilize guest workers' programs even though the United States has enough qualified STEM workers (Salzman, 2016). Over the years, companies have laid off their IT workforce and replaced their workers with guest workers at a lower cost (Salzman, 2016). Salzman noted some companies claim finding qualified STEM workers due to the

shortages is questionable. The STEM industry is one of the most profitable industries on the plant (Salzman, 2016). The industry fires more people in a year than hires from the federally provided H-1B guest work labor pool (Salzman, 2016). Salzman mentioned companies had spent billions to settle conspiracy against its employees' lawsuits. The Department of Justice launched an antitrust investigation in 2011 because workers claimed collusion that kept employees' wages suppressed (Salzman, 2016). Firms settled a $415 million payment after the United Stated District Judge found evidence in which Silicon Valley was involved in a conspiracy against its employees (Salzman, 2016).

Han (2016) believed the shortage of STEM workers has occurred because native-born students are choosing other career paths such as law, medicine, and business. In many cases, skilled immigrated who obtain their degree in the United States fill STEM vacancies (Han, 2016). Han noted there is an effort to recruit and retain native STEM students in the science pipeline. These efforts are not significant compared to the recruitment and retained immigration of STEM students (Han, 2016). Since there is a high demand for STEM workers, the United States government established preferential immigration and school admission policies to recruit foreign students thus causing barriers in these fields smaller then in Non-STEM fields (Han, 2016).

The state of Nebraska developed the NE STEM 4U to build the STEM pipeline (Cutucache, Luhr, Nelson, Grandgenett, & Tapprich, 2016). This program is a student-run faculty-led program that facilitates problem-based learning session in STEM for disadvantage students for K-16 and improves the STEM pipeline. Cutucache et al. (2016) noted Nebraska had developed a program to address the STEM deficit. By implementing

a STEM program where STEM undergraduate students work with K-8 students to learn about STEM activities that may benefit both student populations. The program NE STEM 4U program improves the competitive STEM pipeline for undergraduates.

Öner and Capraro (2016) noted the STEM education is gaining attention due to the increasing need for technology and engineering knowledge. STEM academies all over the world have the responsibility to improve young adults' knowledge in STEM mainly in the United States (Öner & Capraro, 2016). Many interventions linked to secondary matriculation into STEM (Öner & Capraro, 2016). Öner and Capraro noted as the demand for STEM professions increases so should the need to generate the need for STEM education. There are concerns that the United States does not have sufficient numbers of students prepared in STEM field to remain competitive (Öner & Capraro, 2016). The state of Texas has the highest number of STEM schools to improve STEM initiative across the state for students entering into STEM careers (Öner & Capraro, 2016). STEM schools improve students' mathematics and science skills to better prepare students interested in STEM fields and careers (Öner & Capraro, 2016).

Texas has outreach recruitment and retention programs aimed at helping students interested in STEM (Öner & Capraro, 2016). These programs improve diversity in the STEM workforce by attracting the interest of minority students at an early age mainly for economically disadvantaged minority students. Graham, Frederick, Byars-Winston, Hunter, and Handelsman (2013) claimed it is important for all stakeholders to contribute to increasing students' persistence in STEM majors to help meet the workforce needs.

Many academic leaders have not responded to the workforce needs to increase implementation of ways to improve retention amongst students (Graham et al., 2013).

Yarbrough (2016) noted science and technical knowledge and skills are in demand. Companies want to employ graduates with STEM degrees who have a broad global approach to problem solving (Yarbrough, 2016). STEM students that participated in international internships and work programs may gain future jobs and careers in the STEM fields. According to Starr (2016), graduates need to contribute to demanding careers in STEM by having problem solving ability, professional confidence, and intercultural communications skills. Some companies have stated college graduates may be equipped for entry-level jobs but lack the skills to move up in companies (Starr, 2016). Students have to seek types of experience beyond the classroom to be competitive in the global workplace and take opportunities that will allow them to put their disciplines into practice in the real work setting. The College of Science at Purdue University allows and encourages students' experiential learning opportunities (Starr, 2016). Starr believed certain high-impact practices develop effective and constructive STEM professionals and citizens. Starr noted students also benefit from the collegial relationships with mentors and peers to increase their confidence and their professional skills. By linking co-curricular life and curricular experience, may better equip students for the world (Starr, 2016).

The Reshoring of United States Companies

Tate (2014) noted companies are changing their manufacturing footprint due to global competitive conditions. Reshoring is a new trend of the relocation of

manufacturing facilities from traditional offshore location to their home countries (Tate, 2014). Fratocchi, Ancarani, Barbieri, Mauro, Nassimbeni, Sartor and Zanoni (2016) stated offshoring production to low-cost location had influenced economic and social concerns in western countries due to the loss of jobs and the depletion of manufacturing skills. Research on reshoring is in an early stage (Fratocchi et al., 2016).

Globalization created sharp competition between companies and their expectation to increase their value chain (Uluskan, Joines, & Godfrey, 2016). Manufacturers and service providers are increasing and reshoring the procurement of material components and services back to the United States because the United States has become a competitive site for manufacturing and an attractive staging ground for export (Kenyon, Meixell, & Westfall, 2016). Ellram, Tate, and Petersen (2013) mentioned manufacturers are moving back to the US for cost savings and the delivery of value to their customers. Offshoring has been a trend of many industries sectors for the last 50 years to reduce cost and enter into foreign markets (Moradlou & Backhouse, 2016). Offshoring strategies no longer provide benefits to organizations manufacturing activities (Moradlou & Backhouse, 2016).

The concept of reshoring was studied but under different titles such as de-internationalization and international divestment (Moradlou & Backhouse, 2016). Moradlou and Backhouse (2016) mentioned companies could sustain reshoring strategies by a fundamental transformation of current industrial production called reinvented manufacturing. Offshoring resulted in high labor and energy costs (Moradlon & Backhouse, 2016). Moradlou and Backhouse suggested a new generation of

manufacturing activities necessary to adopt modern technologies to ensure a competitive position in the market. The concept of reinvented manufacturing allows personalization of products is moving from mass production toward mass customization to meet customer expectations and keep the volume low. For some businesses, outsourcing strategies for cheap labor are no longer a top priority (Uluskan et al., 2016). Reshoring is gaining momentum in the United States (Moradlou & Backhouse, 2016; Uluskan et al., 2016). Companies are taking into consideration the global economic risks, the political environment in foreign countries and security issues leading companies to consider reshoring as an alternative (Uluskan et al., 2016).

Reshoring is a major topic for several countries moving parts of the value chain back to their home economies (Bailey & De Propris, 2014). Grappi, Romani, and Bagozzi (2015) noted companies realize the cost savings associated with wages, transportation, and hidden cost in foreign countries makes reshoring attractive. As a result, of increasing labor cost in China, high supply, and logistic costs caused high-profile manufacturing work to return to the United States (Shih, 2014). Companies face challenges with hiring enough people with the right skills (Shih, 2014).

The Economic Impacts of the Declining STEM Workforce

Mazzucato and Parris (2014) stated investment in innovation has resulted in higher growth for companies. A major force for economic growth at the company level and the economy is innovation. Technology, innovation, and knowledge have been the core of worldwide economy evolution and international business growth for the last 50 years (Andersson, Dasí, Mudambi, & Pedersen 2016). Andersson et al. (2016) described

knowledge as the understanding of something such as facts, information, or skills. Andersson et al. mentioned innovation was a new idea or process and technology consists of tools or machines used to solve real-world problems. Instead of the global financial crisis, senior managers view talent management as a critical concern (Skuza, Scullion, & McDonnell, 2013). Nicholson et al. (2013) stated the nation could not afford to take small steps to address the STEM professional shortage because the United States cannot remain competitive in the global economy. Lawrence and Joliff (2013) stated the United States skills in STEM fields affect the United States economic competitiveness and the United States' ability to sustain world leadership. Lawrence and Joliff noted future generations of Americans are at risk of being non-competitive in global technology fields. Gilmore (2013) noted the United States might remain a leader among nations if the United States produces a generation of scientists, technologists, engineers, and mathematicians who create new ideas, new products, and new industries in the 21st century. Humphreys (2012) stated President Obama's goal was to increase the numbers of college graduates by 2020 to have the highest proportion of college graduates in the world. The initiative is the completion agenda that focuses tight linage between educational attainment and success in the global economy. These articles are relevant to my research because I show the importance of how human capital influences the STEM industry and the economy.

Partnership Framework

Johnson (2012) noted business partnerships focus on improving STEM partnerships by promoting economic development and community relations. Many nations face the challenge of developing a STEM workforce capable of creativity and

increasing production to remain competitive (Allen-Ramdial & Campbell, 2014). Allen-Ramdial and Campbell (2014) recommended strategies for building the scientific community by addressing these four areas: (a) aligning institutional culture and climate, (b) building institutional partnerships, (c) building and sustaining critical mass and (d) ensuring, rewarding, and maximizing faculty involvement.

Denning and Gordon (2015) claimed organizations are not investing enough to ensure a vital workforce. Denning and Gordon recommended the implementation of programs such as the Regional Talent Innovation Network (RETAINs). The RETAINs program linked standard education, community colleges and work-place-based training (Denning & Gordon, 2015). The goal of this program was to develop a well-educated STEM talent workforce to support the technology-driven economy.

Corporations, community groups, and educations institutions faced the challenge of preparing the next generation of STEM professionals (Davis & Veenstra, 2014). Davis and Veenstra (2014) viewed the challenges as an opportunity for all stakeholders to work collectively. However, Davis and Veenstra said the industry should have more involvement and support community stakeholders, and institutions. Davis and Veenstra noted business leaders realized the growing need for STEM professional and, as a result, business leaders developed community partnership between industries and educational institutions to help meet this demand. Bayer, General Motors, and 3M are a few corporations engaged in the STEM agenda (Davis & Veenstra, 2014).

Johnson (2012) noted federal, state, and local government investment in STEM education policy soared. There exists' a federal budget of 3.7 billion for STEM education

policy and 4.3 billion for Race to the Top Fund to support President Barack Obama's priority for the United States *Educate to Innovate Campaign*. The *Educate to Innovate* program increases the nation's focus on improving STEM education in the United States to strengthen the STEM pipeline to maintain competitive in the global economy (Melguizo & Wolniak, 2011). The National Action Council for Minorities in Engineering suggested the solution to American's competitiveness problem was to activate the hidden workforce of young men and women traditionally underrepresented in STEM careers (Melguizo & Wolniak, 2011). The Gate Foundation and Battelle are organizations committed to STEM partnerships (Johnson, 2012). These articles are relevant to my research because I explain how corporations, community stakeholders, and intuitions work together to ensure a corporation has talent to recruit STEM professionals.

Employee Turnover

The act of resigning employees is a major event for employees. Resigning employees' affects employees both personally, and professionally (Klotz & Bolino, 2016). Klotz and Bolino (2016) noted employees resign using more negative resignation styles, which may indicate an abusive supervisor or unfair treatment in the workplace. Turnover contagion may influence coworkers to resign or question why they remain with organizations (Klotz & Bolino, 2016).

Employees who resign with a grateful attitude may cause other employees to become more committed to their jobs after hearing employees express their gratitude (Klotz & Bolino, 2016). Employees expressing their work experience as a dreadful place to work may cause more turnover contagion (Klotz & Bolino, 2016). Employee

resignations may have a negative or positive impact on current and future employees (Klotz & Bolino, 2016). Terminations, layoffs, and employee-initiated resignations are factors that lead to many of the job changes (Klotz & Bolino, 2016). Employees' mobility, job availabilities, and voluntary resignations are expected to increase as the global economy improves (Klotz & Bolino, 2016). Human resources personnel can assist managers in ways to deal with employees' resignation in a professional manner (Klotz & Bolino, 2016). Firm rely on dedicated and motivated employees to achieve optimum effectiveness and efficiency, and not financial resources or the newest technology (Hosain, 2016).

Business leaders invest heavily in employee development programs to help firms succeed (Hosain, 2016). When high-performing, employees leave, it creates a gap in the existing knowledge and skills of the organizations (Shukla & Kumar, 2016). Hosain (2016) noted firms depend on valuable services employees provide. Employees' job satisfaction helps establish employees' retention (Hosain, 2016). Fergson (2016) noted companies that offer employees growth opportunities, empowerment, and flexibility are more likely to keep employees engaged and committed to the organizations. Shukla and Kumar (2016) noted it is vital that organizations retain and nurture that talent in the organizations. Hosain stated satisfied employees equate to better quality product or services, which help, reduce the turnover cost. People are living resources that affect the utilization of resources (Hosain, 2016).

The Cost of New Hires

The costs to replace employees are two to three times their annual salaries Lamberth (2015). Blatter, Muehlemann, Schenker, and Wolter (2015) mentioned companies' expenditure for hiring skilled workers consists of non-wage labor costs. Bressler (2014) recommended employers hire employees to help companies achieve their mission statement. Bressler claimed poor hiring decision could negatively affect companies financially and bring down employees' morale thus resulting in more damaging hiring decisions. Turnover is costly (Alkahani, 2015). The visible costs associated with turnover cost are recruitment costs, reference checks, security clearance, temporary worker costs, relocation costs, formal training costs, and induction expense (Alkahani, 2015). The invisible costs involved are human resources and payroll administration, loss of productivity and informal training (Alkahtani, 2015). Another impact of turnover may be losing employees and customer relationships (Alkahtani, 2015).

Businesses can suffer intangible costs, which includes the lost sales, lost customers, lower-quality products, and reduced production (Bressler, 2014). Craig (2015) claimed both recruiting and retention could be used to increase organizations overall competitive status. Hiring managers that spend extra money, time and energy recruiting employees who do not fit the skill requirements of organizations, results in turnover, lower productive and wasted resources. Hiring managers will post vacancies, screen resumes, and conduct interviews to find candidates. Blatter, Muehlemann, Schenker, and Wolter (2015) claimed hiring from an external labor market is expensive if companies

have to hire a large number of workers in a particular period. Kogan, Hellyer, Stewart, and Dowers (2015) noted veterinary practice managers and owners face one of the most important and challenging decisions hiring new employees. Kogan et al. stated more employers are electing to screen potential employees by interviews, background checks, personality assessment, and online research including social and professional networking websites. Kogan et al. claimed professionals could benefit from learning how to use a broader range of hiring and recruitment techniques.

Hannan (2016) noted companies could reduce risk and avoid surprise by gaining a clear understanding of what to expect from potential hires and ensure the potential hires has the right skill to execute all aspects of the job in an effective, safe way. Biga, Spott, and Spott (2015) recommended organizations find cost-effective ways to hire people. Companies go through the process of advertising, reviewing job applications, interviewing applicants and checking references to find the best-qualified person.

Companies have to take into consideration federal, state, client or union hiring practices and other controlling hiring requirements (Hannan, 2016). It is important for organizations not to ignore the social welfare legislation on the federal and state level because it can result in expensive legal problems (Biga et al., 2015). Employers should ask open-ended questions' during the interview to void violating federal, states laws, and ask the right questions (Biga et al., 2015). Interviews do not always reveal the entire story (Hannan, 2016), but interviews provide ways to get to know potential new employees (Biga et al., 2015).

Business leaders' poor choices can create damages, which cost companies money because of lost time, increased insurance premiums, reduced production levels and slowed or delayed schedules (Hannan, 2016). Companies' safety losses can create negative publicity and threaten the sustainability of companies (Hannan, 2016). Firl and Kosch (2016) suggested rewarding employees for following safety mandates and encourage others. Hiring managers are responsible for new hires training and safely preforming tasks (Hannan, 2016). Firl and Kosch (2016) recommended on-site training exercises or demonstrations of potential hazards along with practical solutions to prevent accidents. Companies provide standards to keep employees safe and free from injury (Hannan, 2016). Employee absenteeism is another cost to businesses (Kocakulah, Kelley, Mitchell, & Ruggieri, 2016). Kocakulah et al. (2016) noted only 35% of unscheduled absences were due to personal illnesses.

Companies that create a positive work environment may combat absenteeism and create a positive company culture, thus improving job satisfaction (Kocakulah et al., 2016). Hannan (2016) noted it would be great if companies could know when new hires made poor decisions. Rudman, Hart-Hester, and Richey (2016) stated one-half of new hires fall short of expectations due to lack of technical competence. A person's habits may indicate their tendencies and offer prediction (Hannan, 2016). A 2013 personality traits study conducted by Talent Click revealed the correlation between five personality traits and employee behavior (Hanna, 2016). Hiring managers used Talent Click prehire personality survey to learn about five personality traits (Hannan, 2016). Hiring managers used the survey to examine the following five traits: (a) resistant, (b) anxious, (c)

irritable, (d) easily distracted and (e) impulsive (Hannan, 2016). The employer may obtain a picture of how that person may behave (Hannan, 2016). Some employers check driving records if employees have to use company vehicles or drive for an extensive period while working for the company (Hannan, 2016). Companies check for criminal background and substance abuse (Hannan, 2016). Hannan noted some companies provide tests that demonstrate potential hires' capabilities. Companies that incorporate more steps before offering a job may reduce liabilities and risks posed by potential new hires (Hannan, 2016).

Finding the right people for the job can be challenging because new hires often fail to meet employers' requirements (Rudman et al., 2016). Talent acquisition is costly and complex because it involves decision from both the employers and potential employees (Phillips-Wren, Doran, & Merrill, 2016). Business leaders need to develop strategies for workforce succession since the youngest baby boomers are thinking about retirement (Fergusion, 2016). A survey conducted by a Washington-based research firm claimed an estimation of 46 % of 20,000 new hires fail within the first 18 months of employment (Rudman et al., 2016). The costs of hiring unsuitable employees may cost 50 to 200 % of the first-year salary (Rudman et al., 2016). Rudman et al. (2016) believed failure to succeed can be linked to soft skills such as (1) coach ability (26%), (2) emotional intelligence (23%), (3) motivation problems (15%), (4) temperament issues (17%), and the (5) lack of technical or professional competence (11%). Rudman et al. (2016) mentioned hiring a person who is a good fit for the culture and environment of organizations. Employers indicated successful hires have these qualities: (1)

dependability, (2) have integrity, (3) people skills, (4) team players, (5) respectful, (6) applied knowledge skills and (7) problem-solving and decision-making skills (Rudman et al., 2016).

The Importance of Hiring Managers

People are the companies' most value assets (Anbuoli, Thepandian, & Sakthivel, 2016). All forms of labor are important to innovation, the production of products and services, and the recommendation of new employees and provide positive or negative images of the images of organizations (Schiemann, 2014). The human resource department is an entity of businesses that influence the entire enterprise, and the division is an integrated part of organizations (Anbuoli et al., 2016). Organizations need to balance talent acquisition, performance, development, and retention strategies to maximize the outcome of the talent investment (Schiemann, 2014). Hiring managers are responsible for recruitment, management, employees, compensation, hiring, training, organization development, organizations' communication, and safety (Anbuoli et al., 2016). Organizations have to remain competitive by attracting, hiring, developing and retaining talent (Oladapo, 2014). Mazzei, Flynn, and Haynie (2016) stated organizations should encourage creativity, innovation, and actively engagement employees to produce outcomes. The strategic use of human resources is to grow today's knowledge-based economy and support growth in the company innovation (Mazzei, Flynn, & Haynie, 2016). Hiring managers face challenges to attract, retain, and to nurture talented employees (Anbuoli et al., 2016). Hiring managers face challenges with market volatility, layoffs, talent shortages and rapid changes in technology (Anbuoli et al., 2016). Hiring

managers are responsible for hiring individuals who will create value for their organizations (Anbuoli et al., 2016).

Cohen (2015) noted human resource functions existed since there were employers and employees. Overall, human resource functions are critical to the success of organizations (Cohen, 2015). Over decades, human resources roles and functions have evolved. Ilanloo (2015) categorized the role of human resource management as a division that no longer operates at an administrative level but as a strategic business partner within an organization because the roles have changed. Ilanloo stated human resource managers are responsible for developing top-level management. Sahy (2015) said talent acquisitionists are concerned if the right person with the right skills will be the right fit for organizations. In short, Sahy claimed employers and employees' relationships are complex, but employers have to find ways to acquire talent.

Succession planning and performance management are a part of strategic recruitment operations (Sahay, 2015). Sahay (2015) noted talent acquired creates new products, services, and innovative ways of doing business. Chitrao (2015) noted human resource professionals have a critical role in developing a workforce that can deal with the challenges of the 21st century. Chitrao's viewpoint of the human resource department role and policies for the 21st century is to help human resource managers generate revenue for organizations by way of helping staff be more productive in output thus operative more efficiently. Santhanamani and Panchanatham (2013) stated the function of Human Resources is critical to the business to attract, develop, and retain talented employees. Human resources managers have the challenge of becoming the employer of

choice where people want to work and stay (Anbuoli et al., 2016). Ferguson and Morton-Huddleston (2016) study identified pay and benefits, work-life balance and growth opportunities as three characteristics that will attract millennials to their organizations. Human Resource executives realize they can motivate employees by non-financial techniques (Anbuoli et al., 2016). Levanon, Cheng, and Paterra (2014) noted a tight labor market and broad labor shortage could affect businesses. Businesses may have challenges hiring qualified workers, a decrease in retention rates (Levanon et al., 2014). Levanon et al. surmise businesses' compensation growth is likely to accelerate, which will put downhill strains on corporate profits.

Hiring managers play a vital role in the success of businesses. Highly professional and competitive employees are the strategic assets of businesses (Asmat, Ramzan, & Chaudhry, 2015). Organizations need to develop and implement compliant hiring and recruitment systems to help the human resource manage people to recruit and hire talented employees (Asmat et al., 2015). Sivabalan, Yazdanifard and Ismail (2014) asserted recruitment was the process of generating a pool of capable people for employment for organizations. Recruitment is one key process of any business (Sivabalan et al., 2014). However, recruiting top talent was a challenge because of the supply of qualified talent and avoiding the costs related to hiring unqualified applicants (Sivabalan et al., 2014). Kuhn (2015) noted staffing choices at policy level and individual candidates were difficult because there are many factors to take into consideration. Hiring managers have considered the potential gains and compare these potential gains to potential losses, to weight the positive and negative information about the candidate. The goal of hiring

managers is to avoid bad workers and recruit good workers (Kuhn, 2015). These articles are relevant to my research because I illustrate the importance of human resource professionals, how the roles changed to impact organizations and the impact human resource professional's decisions have on the success of companies.

The Future STEM Workforce

Benbow (2012) noted 110 business executives called for states to adopt tougher standards for math and science tests to aid with readiness of a skilled workforce. Benbow stated STEM employment in the United States grew three times the rate of non-STEM jobs. Brown, Thoman, Smith, and Dickman (2015) claimed by 2018, the United States and other countries would need one million people working in the STEM field in other to remain competitive. Rincon and George-Jackson (2016) noted 60% of jobs in the STEM field would require at least a bachelor's degree by 2018. These articles pertaining to the future STEM workforce are relevant to my research because I depicted business leaders' concerns regarding shortages of the skilled workforce. The labor shortages may affect the American workforce because of an influx of retirements and due to millions of unskilled workers, thus creating further dependency on a foreign workforce.

Benedict, McClough and Hoag (2012) noted the US Census Bureau data reported the number of workers in science and engineering occupations grew by an estimate of 800% between 1950 and 2000. The STEM growth rate was more than three times that of the labor force during the 1990s. Dorrer (2014) believed a workforce with exceptional skills was the key to economic growth and innovation. Dorrer noted the investment in skilled human capital might yield private and social returns. Hausman and Johnston

(2014) noted innovation contributes to a strong economy with economic growth by way of job growth, consumer spending and taxes paid. Workforce development is vital to the element of economic development at the global levels down to the regional level (Elkins et al., 2016). These articles pertaining to economic growth are relevant to my research because I showed the high propriety the Obama Administration would place on educating the youth in STEM studies and expanding wireless broadband technology throughout the country for every resident.

Gordon (2014) noted employers were struggling to find workers. Gordon stated an estimation of 10,000 baby boomers retire daily. Between 2010 and 2020, 70 million workers retired and employers sought certain skill levels like the retiring baby boomers. These challenges affect hiring and recruiting managers, thus having a direct impact on the success of a business. Oladapo (2014) noted American businesses face the challenge of replacing 70 million experienced and talented workers over the coming decades as baby boomers retire. These articles are relevant to my research because I illustrate how the STEM skill shortages influence hiring and recruiting managers and businesses overall.

Recruiting Strategies

Asmat (2015) noted an efficient and compliant hiring system is critical for organizations to stay in the business community, resolve employment challenges, and contribute to strengthening organizational culture. Gholston (2015) said businesses and the communities in which they operated could benefit from developing effective strategic hiring practices. Employers use employer branding as a tool to attract employees (Elving,

Westhoff, Meeusen, & Schoonderbeek, 2013). Jain and Bhatt (2015) recommended organizations want employers to recognize the organization as a terrific place to work.

Employers are developing a whole-life approach to career development and a way to attract employers (Litano & Major, 2015). Employers have found ways to create work-life balance by allowing employers to work from home to sustain careers work and the family (Litano & Major, 2015). Employers elected implementation of flexible working arrangements that appeal to Millennials and Generation X, which enabled a better work-life balance, attracted, and retained talented staff (Earl & Taylor, 2015). Some employers offered employees restructured workload for part-time, teleworking, or using regional offices close to their employees' homes or school and even going to the lengths of offering onsite children's rooms. Since the labor market was competitive to hire desirable talent, employers build brand value to attract the best talent.

Some organizations have challenges recruiting technicians, scientists, and engineers even after the recovery of the worldwide recession (Veenstrat & Walters, 2013). Rastgoo (2016) mentioned the lack of talent is the biggest obstacle facing growing organizations. Schiemann (2014) described talent as intrinsic gifts, skills, knowledge, experience, intelligence, judgement, attitude, character, and drive. Rastgoo recommended that organizations treat all employees like their managers and partners to retain talent. People want to be treated well by organizations regardless of their title, and it is important for human resource managers to help to create a corporate culture where people want to work (Anbuoli et al., 2016). Anbuoli et al. (2016) noted the importance for organizations to have rules, guidelines, benchmarks, and flexibility when people are

involved, to attract top prospects for employment. Rastgoo noted companies are concerned about losing talented employees.

Houlihan and Harvey (2015) stated a study from Accenture revealed 60% of 2015 graduates would take a pay cut to work for a company with a positive social atmosphere. Companies have implemented fun into operations to make work enjoyable for employees and changed the company's culture to attract millennials (Houlihan & Harvey, 2015). Millennials make up an estimated population of 76 million people in the United States (Ferguson & Morton-Huddleston, 2016). Millennials are attracted to companies with a meaningful contribution to their mission (Ferguson & Morton-Huddleston, 2016). Elving et al. (2013) mentioned finding skilled employees poses challenges for organizations in the war for talent. Building a succession pipeline is necessary for replacing talent when baby boomers retire from the workforce (Ferguson & Morton-Huddleston, 2016). By implementing recruitment communication strategies, organizational leaders will attract employees (Elving et al., 2013). Some management practitioners made intuition-based hiring decisions, which produced indicator of performance, personality and person-environment fit (Miles & Sadler-Smith, 2014). Miles and Sadler-Smith (2014) noted some participants in his study used intuitions concert with more structured non-intuition-based approaches to selecting employees.

Coad, Daunfeldt, Johansson, and Wennberg (2014) suggested high-growth firms benefited from hiring skilled employees that already had jobs because these employees had prior business and industry experience which influenced new company in a positive way. Allal-Chérif (2014) shared organizations use games as a recruiting tool.

Organizational leaders that use games to recruit, integrate employees, enhance training, benchmark, and share the corporate values. Games have proven to be successful from recruitment purposes by testing candidates' analytical abilities to make the right decision in a short amount of time (Allal-Chérif, 2014).

Human resource professionals use social networking websites as a tool to recruit (Nikolaou, 2014). Melanthiou, Pavlou, and Constantinou (2015) noted companies use social media as a recruiting process to attract applicants, create company awareness, save time, and reduce hiring costs associated with recruitment. Social networking sites are hot topics for scholars and businesses in the last ten years (Jin, Sangmeng, Yenfeng, Zhongquan, & Yacheng, 2016). Two-thirds of organization found new hires by way of social media the past year (Jin et al., 2016). Jin et al. (2016) stated companies could benefit by collecting large amounts of information about applicants more quickly and with less total cost. Social recruiting has become a necessity rather than a trend (Jin et al., 2016). Jin et al. claimed only 45 of recruiters are not utilizing social media in recruiting efforts, and 72% of recruiters say data analysis is important in their hiring process. Recruiters find their best candidates using social and professional and professional networks (Jin et al., 2016). Jin et al. recommended human resources staff use social media sites to build talent and employer brands. Organizations across industries and the globe use this method to recruit workers. However, there are risks that could create legal ramifications such as lawsuits for potential misuse of applicants' private information. LinkedIn, popular social network webs site utilized to advertise job vacancies and to obtain information about the job seeker (Nikolaou, 2014). Alfaro and Watson-Manheim

(2015) noted Indeed.com was one of the most comprehensive job-positing websites in the United State.

Neill (2015) also mentioned social media is a research device that human resource professionals use to attract potential employees to the organization. Nikolaou (2014) said this tool screens and helps with recruitment and background checks but has drawbacks due to the chance of misuse and infringing on job candidates' privacy and unfair discriminations based on the information provided (Nikolaou, 2014). Fitzsimons and Reinbeck (2015) recommended collaboration between managers and faculty can enhance recruitment and retention. Healthcare facilities are thinking of using college faculty to participate in the initial planning stage to implementation and evaluation of outcomes. Managers utilized faculty members to help with the selection process (Fitzsimons & Reinbeck, 2015). Deery and Jago (2015) mentioned work-life-balance is another variable that may attract and improve the retention of employees. Having work-life-balance may entice the best talent, increase employees' job satisfaction, and improve employees' attitudes and organizational commitments (Deery & Jago, 2015). These articles are relevant to my research because I showed recruiting strategies used by management practitioners.

Transition

The purpose of this qualitative single case study was to explore strategies that hiring managers use to recruit qualified STEM professionals in their company. Understanding common and shared experiences of hiring managers may lead to alternative ways hiring managers attract and hire talented STEM professionals for

businesses in the STEM fields. The literature review might foster support and insight to aid hiring managers in recruiting qualified STEM professionals. Section 2 provides a description of (a) the role of the researcher, (b) participants, (c) the research method and design, (d) ethical research, (e) data collection, (f) data analysis technique, and (g) reliability and validity. Section 3 provides a description of (a) present findings, (b) application to professional practice, (c) implications for social change, (d) recommendations for action, (e) recommendations for further research, (f) reflections, and (g) a conclusion.

Section 2: The Project

The STEM workforce is facing a shortage of STEM workers. Hiring managers lack strategies to improve the hiring of STEM professionals. This single case study was about successful strategies that hiring managers used to recruit STEM professionals. Section 2 includes the purpose of this study, my role as the researcher, a description of the participants, the research method and design, sampling and population, data collection, data analyses, ethical research to protect participants, and the validity and reliability of this study.

Purpose Statement

The purpose of this qualitative single case study was to explore strategies that hiring managers used to recruit qualified STEM professionals. The target population consisted of hiring managers located in the state of Virginia who used successful strategies to recruit STEM professionals for their organization. This research study may contribute to social change by helping hiring managers develop strategies for attracting skilled STEM professionals and appeal to hiring managers who lack strategies for hiring qualified STEM professionals. The implications for positive social change include the potential to help businesses expand by helping hiring managers recruit qualified STEM professionals, thereby increasing innovation and profits. This study may also inspire more partnerships between business leaders and the community to develop additional programs aimed at building a skilled workforce to meet the needs of companies in the STEM field.

Role of the Researcher

A primary role of the researcher in a qualitative study is data collection, data organization, and data analysis (Collins & Cooper, 2014). My role as a researcher is to serve as the main instrument for data collection. I conveyed the purpose of the study to the participants, conducted interviews, collected data from interviews, and completed the data analysis process. Davidson and Delbridge (2012) noted the research process should include (a) key findings, (b) well-defined research questions, (c) the method and design of the study, (d) a brief introduction to the topic, and (e) an adequate background and literature. DuBois et al. (2012) noted Walden's University ethical guidelines and the Belmont report protocol serves as a reminder of adherence to ethical principles and protect research participants from harm when developing this study. I followed the interview protocol to avoid bias.

I have worked in accounting departments in various industries for the past 20 years. I became interested in the STEM fields and the shortage of STEM skilled professionals when I experienced problems with computer applications and worked with STEM professionals to make system improvements. I do not have experience in STEM and do not have relationships with any of the participants. Since I do not have relationships with the participants and I am not familiar with STEM, this helps mitigate bias from my study. Butler, Hall, and Copnell (2016) recommended that the researcher's review process be well developed and preplanned to reduce research bias and eliminate irrelevant information or produce a low quality study. Bias is difficult to avoid, but a well-designed study may assist in reducing research bias (Malone, Nicholl, & Tracey,

2014). Malone et al. (2014) recommended that researchers be aware of potential bias in the research process to ensure that systematic bias is reduced to a minimum. I mitigated bias by using an interview protocol, member checking, and data saturation in my data collection process.

An important role of the researcher is directing questions and keeping the conversation on the specific topic (Manzano, 2016). Heid (2016) stated that an interview protocol is used to structure the order of questions. Researchers use an interview protocol to maintain a consistent and neutral role with participants (Huss, Sela, & Eastep, 2015). I mitigated bias by using the interview process, which included an interview protocol to ensure that I stayed focused, avoided bias, and conducted the interview in the proper order. I followed the recommendations of Roberts (2012), Malone et al. (2014), and Butler et al. (2016) to avoid bias in my qualitative research case study. I informed the participants of how the meeting would proceed, asked the interview questions, addressed any concerns, and concluded the interview.

Participants

The participants for this study included hiring managers from the central regions of Virginia. The eligibility criteria for participating in this research study were that participants had to be hiring managers who have used successful strategies to recruit individuals in the STEM field. In addition, in order to participate in this study, participants must volunteer, work in central Virginia, and be responsible for recruiting employees.

I contacted several companies in the STEM field by emails and telephone calls. I prepared an email to introduce myself and the purpose of my study. Once I selected and obtained one company for the single case study, I forwarded a letter of cooperation to the authoritative leader to review and sign it in accordance with Walden University's research guidelines to meet compliance requirements. Once I received the letter of cooperation back, I built a relationship with the authoritative leader and contacted volunteers.

Research Method and Design

Research Method

I used a qualitative method for this study to discover strategies for hiring managers to hire STEM professionals. There are three common research methods that researchers may consider for their research study: qualitative, quantitative, and mixed methods. Harrison (2013) noted that mixed methods research includes both qualitative and quantitative data. Rosenthal (2016) noted that a researcher might use a qualitative research method to gain insight into why people may behave in a certain manner. Rosenthal mentioned it is also important for researchers to consider the data collection method that will provide the researcher with the best information to answer the research question under investigation. Makrakis and Kostoulas-Makrakis (2016) stated that qualitative conceptualization of research implies emphasis on processes and meanings that are defined or not measured under controlled conditions.

Quantitative research methods entail systematic collection, organization, description, and interpretation of textual, verbal, or visual data (Hammarberg, Kirkman,

& de Lacey, 2015). Makrakis and Kostoulas-Makrakis (2016) noted that quantitative conceptualization of research implies an emphasis on measurement, testing of hypotheses, analysis of causal relationships between variables, and generalization. Researchers might use quantitative research to focus on numbers to claim objectivity, and researchers may use the qualitative research method to generate theories (Kaur, 2016).

Researchers use a mixed method or a quantitative research method to assess the magnitude of the problem, and researchers can use a qualitative research method to explore meaning and understanding of the construct and the context (Kaur, 2016). Kaur's (2016) mixed method is a combination of both quantitative and qualitative research method, thus drawing on both methods to answer real-life research questions. Ghosh (2016) argued that if a researcher perceives qualitative research to be different from quantitative research, then it is difficult to see how the paradigmatic assumption can be reconciled to justify mixing the two approaches in one study. Researchers may use a mixed method, which is both a quantitative method and qualitative method to substantiate theoretical constructs and bolster evidence indicating patterns and themes leading to robust theory-building research (Ghosh, 2016).

Researchers may use a quantitative method or a mixed method to test theories and analyze statistical data (Bernard, 2013). I did not select a quantitative research method or a mixed research method because I did not test a theory or analyze statistical data. A qualitative research method was suitable for my research study because I wanted to collect in-depth data on strategies for hiring managers to use to recruit qualified STEM professionals. The research method I used for this study was a qualitative method to

explore strategies hiring managers used to recruit qualified STEM professionals in their company.

Research Design

There are many types of designs for qualitative research methods (Arino, LeBaron, & Milliken, 2016). Arino et al. (2016) noted some designs such as ethnographic and phenomenological design. Researchers use the design that will fit their research questions (Arino et al., 2016). An ethnographic design focuses on a distinct issue or shared experience in cultures or subcultures in a specific setting (Cruz & Higginbottom, 2013). Ethnography is a research process of learning about people by learning from them (Cruz & Higginbottom, 2013). I did not select an ethnographic design because my study was not about the cultures of people in a restricted environment. Arino et al. stated that a researcher might use a phenomenological design to understand individuals' lived experiences. I did not use a phenomenological design or an ethnography design because I did not want to learn about the participants' lived experiences or focus on cultures but instead learn of hiring strategies from the participants. A classic case study evolves an in-depth inquiry into a specific and complex phenomenon (Yin, 2013). I used a single case design study to investigate the phenomenon of successful strategies used to help human resource professionals recruit qualified STEM workers.

Researchers may achieve data saturation by following interview protocols (Chimonas, DeVito, & Rothman, 2017). Araújo, Jarrin, Leanza, Vallières, and Morin (2017) noted that data saturation might be achieved when no new concepts are generated from data collection. Easley et al. (2017) stated that recruitment of participants could stop

once themes are recognized. For my qualitative study, I ensured data saturation by collecting data through reviewing company documents, and conducting interviews by using a protocol, followed by member checking with each participant, until I did not collect any new information and themes were evident.

Population and Sampling

The population for this study included two hiring managers of a company within Central Virginia who have implemented successful strategies to recruit STEM professionals. The number of participants depends on the reason for the research and the desired analytic level (Tran, Porcher, Falissard, & Ravaud, 2016). Researchers may use purposeful sampling to gain in-depth data from potentially information-rich participants (Sampson, 2012). I utilized purposeful sampling in my study. The sample size consisted of two hiring managers working in one company in the STEM industry who have recruited STEM professionals. I used purposeful sampling to select these participants. A purposeful sample is a qualitative approach to case selection (Patton, 2015). Patton (2015) noted purposeful sampling is information-rich for an in-depth case study. Roy, Zvonkovic, Goldberg, Sharp and LaRossa (2015) noted sampling is a decision not only about sample size but also about the integrity of the project's goals, composition and depth of data and ensuring the data fit with the theory. Moon, Wolf, Baker, Carman, Clark, Henderson, and Zavotsky (2013) noted qualitative studies sample sizes are significantly smaller than quantitative studies sample size because qualitative studies provide in-depth focus on details and context.

Fusch and Ness (2015) have noted researchers should select a sample size that provides the best opportunity for the researcher to reach data saturation. I ensured data saturation by using two data collection techniques, which were interviews, and reviewing documentation to achieve data saturation. I followed a protocol and asked the participants the same questions. I conducted member checking with participants to ensure I interpreted their responses accurately. I continued collecting data and interviewing participants beyond two participants, if necessary, until no new data emerged and I achieved data saturation. The researchers organize and provide interpretation of textual material gathered from their conversations with participants (Grossoehme, 2014). Risk (2013) stated qualitative research might involve presenting data collected from a single person, as in a case study.

It is important for researchers to make participants feel comfortable by being aware of their time and selecting a quiet, private place to conduct the interviews (Jacob & Furgerson, 2012). Bolderston (2012) recommended the setting for an interview should be free of interruption. The human resource director agreed and granted me access to a private meeting room to conduct the interviews for the convenience of the participants.

Ethical Research

The most important aspect of conducting research with participants is not to cause them harm (Katopal, 2015). Abbas, Babikir, Mirghani, and Kabbashi (2012) stated researchers should take into consideration (a) respect human privacy, dignity, and independence, (b) maximize benefits, (c) minimize harm and risks, (d) take precautions with vulnerable (helpless) populations, (e) strive to share the benefits and burden of

research, and (f) report any unfavorable human research when conducting research relating to human subjects. The participants for this study signed an informed consent form. The participants were volunteers and could withdraw at any stage of the study. Participants did not receive incentives for participation. I collected data from an audio recording and later transcribed the data using NVivo11. I will keep both the recorded and transcribed data in a secured locked file cabinet for 5 years and destroy data after 5 years to protect the identities of the participants, thus keeping the data confidential. The participants' names were classified because a coding system was used to safeguard the privacy of the participants. I followed IRB procedures to ensure I complied with ethical standards before starting my research.

Data Collection Instruments

I was the primary data collection instrument for the study and used semistructured interviews for data collection. The secondary data collection instrument was semistructured interviews. Semistructured interviews involved asking the same set of questions of each research participant (Wilson, 2014). Semistructured interviews allowed more flexibility, and help kept the interview on track (Wilson, 2014). Rubin and Rubin (2012) mentioned interviews are exchanges between interviewers and interviewees to research the subject matter. Rubin and Rubin implied that interviews could provide researchers with detail of the experiences, motives, and opinions of others and learn to view the world from a perspective other than their own. O'keeffe, Buytaert, and Mijic (2016) noted semistructured interviews are organized, and the topics help guide the conversation in a standardized manner to allow relevant issues to emerge. I used an

interview protocol that included interview questions to help aid in unbiased interviews with the participants.

For this study, each interview consisted of eight open-ended questions. The semistructured interviews took approximately 1 hour to complete and were completed in the allotted period. The interview protocol included the interview questions and the steps for conducting the interviews. The steps were to introduce myself, ask for permission to record the interview, collect the informed consent form before the interview, ask a series of eight questions, and thank the interviewee for their participation. I used semistructured interviews to gather data from the participants and explored the strategies that hiring managers used to hire STEM professionals**.** Before each interview, I collected the letters of consent. Next, I reminded the participants about the purpose of the study, and the process of keeping data confidential and protected. Finally, I asked for permission to record the interview. Once the participant granted me permission to record the interview, I started recording the semistructured interviews and took notes. I asked the interview questions in the same order to avoid bias. After I completed the interview, I asked the participant for company documents pertaining to recruiting practices. I reviewed company recruitment documents, which included job postings, job applications, and job interview scripts.

Harvey (2015) mentioned member checking is a process in which the final interpretations of the interviews were reviewed with the participants to ensure the data were correctly interpreted. Birt, Scott, Cavers, Campbell, and Walter (2016) noted member checking is participants' validation that the researcher has interpreted the data

accurately. Lincoln and Guba (1985) stated that member checking enhances credibility of the study and the accurate interpretation of participants' responses. I followed up with participants to schedule a second meeting for member checking, which took 30 minutes. I enhanced reliability and validity of the data collection by member checking.

Data Collection Techniques

Methodological triangulation combines different types of data collection (Ruiz & Bravo, 2016). Joslin and Müller (2016) stated that methodological triangulation is classified as within-method triangulation and between-method or across-method triangulation (Joslin & Müller, 2016). Researchers may use the within-method triangulation by using at least two data collection procedures, and the same design approach (Hussein, 2015). Researchers may use the between-method triangulation to combines both qualitative and quantitative methods (Hussein, 2015). Wilson (2014) stated triangulation refers to using more than one approach when conducting research to gain a richer, fuller data to help confirm the findings of the research. Triangulation consists of multiple methods of data collection to gain an articulate comprehensive view of the phenomenon (Joslin & Müller, 2016). I used methodological triangulation in my study, which consisted of two different data collection techniques.

The human resource director for my case study was eager to have her organization participate in the study, so obtaining participants from this organization was not an issue. The company's human resource director signed the Letter of Cooperation, and the human resource director agreed to grant access to participants and company documents. The human resource director allowed me to schedule interviews with

different interviewees if one or more of the interviewees withdrew from the study. I used two data collection techniques, which were interviews and documents, to provide data to answer the research question.

The first data collection technique that I used in my study was collecting and reviewing documents. I reviewed company documents, which included job postings, job application, and job interview scripts. I asked for permission to review job positions, interview questions, employment applications, tests, and any other documents relevant to employment practices. Review of these documents revealed some of the organization's best practices for recruiting applicants.

My second data collection method was interviews. I followed the interview protocol (see Appendix A) to ensure reliability and validity of my study. I started the interview process by having each participant sign the consent form. I conducted face-to-face interviews with the participants at the company in a private conference room. I asked for permission to record the interview and recorded the interview with a Jensen portable cassette player/recording device. I took notes with an echo smartpen. I recorded the interview upon consent from each participant. I scheduled 60 minutes or longer to interview each participant to ensure all interview questions were answered. After the interviews, I asked for permission to review documents pertaining to recruiting practices. I reviewed the documents after I conducted all of the interviews.

Researchers should conduct an interview in a quiet setting free from background noise to ensure the recording device works properly (Jacob & Furgerson, 2012). Interviews should be conducted at a location that is comfortable and convenient for the

participants (Bolderston, 2012). Rowley (2014) noted if participants are willing to give their time, the researcher should consider a convenient time and suitable location for the interviewees. For this study, I met participants at a convenient, quiet location at their place of business in a private conference room.

Researchers meet with participants to conduct member checking to ensure accurate interpretation of the participants' responses (Birt et al., 2016). Member checking entails interpreting the participants responses and reviewing the responses with the originally participants to ensure accuracy and validity (Reilly, 2013). The second meeting I had with participants entailed member checking, which allowed participants the opportunity to review my interpretation of their responses to the interview questions. Member checking interviews with the participants lasted 30 minutes. I scheduled the member checking meeting a week after the first meeting. I used member checking to guarantee I accurately interpreted the interviewees' responses.

Researchers demonstrate credibility by describing their experiences as a researcher and verifying the research findings of the participants (Cope, 2014). Researchers can ensure credibility when conducting a qualitative study by describing the interview process, methods used, and creating an audit trail. The collection of data used in the research process is an audit trail (Cope, 2014). I used an audit trail in my study, which included a collection of materials and notes. Some examples of materials used in my study included transcribed interview responses, raw data, and process notes and drafts of the final report.

Data Organization Technique

I kept track of my data by recording notes in a journal when conducting interviews and the collection of documents. I tracked participants by denoting the participants by P1 and P2 and I labeled participants as P1 and P2 to ensure names were confidential. Brakewood and Poldrack (2013) stated researchers are responsible for ensuring the protection of participants. The principles of respect for people, justice, and beneficence will help ensure no harm to participants (Brakewood & Poldrack, 2013). Other ways researchers can ensure the protection of participants are to apply the Belmont principles by obtaining informed consent, balancing risks and benefits and by selecting appropriate participants (Brakewood & Poldrack, 2013). Elo et al. (2014) noted it is important to scrutinize the trustworthiness of each stage of the analysis process from the preparation, organization, and reporting results.

I took notes and recorded the interviews. I reviewed and collected company recruitment documents, which included job postings, job applications, job interview scripts, and any other documents pertaining to the recruitment process after I completed all interviews. I asked participants a series of questions within the allotted period of 60 minutes until all interview questions were answered and until I reached data saturation. Data saturation is achieved when enough information is replicated and no more new information is found (Fusch & Ness, 2015). All raw data were backed up on a portable hard drive and disks. I will store the data for 5 years in a locked cabinet. After 5 years, I will destroy the data by shredding the documents to keep content confidential and to comply with proper ethical guidelines.

Data Analysis

Researchers may use methodological triangulation method to use more than one method to collect data for a phenomenon (Bekhet & Zauszniewki, 2012, Spadafino et al., 2016). Adams et al. (2016) noted researchers might use a minimum of two methodological approaches to collect data. Bekhet and Zauszniewski (2012) noted more comprehensive data improved validity and the understanding of studied phenomena. Two types of methodological triangulation methods exist, which are across-method and within-method (Joslin & Müller, 2016). Researchers might use across-method to combine quantitative and qualitative data collection techniques, and researchers might use within-method, which uses two or more data collection techniques using either quantitative method or qualitative method but not both (Bekhet & Zauszniewski, 2012). I used the within-method triangulation for this research study because I have two data collection methods, which were interviews and documents. I used NVivo 11 software to help confirm the validity of my findings. For this study, I used methodological triangulation by collecting data from the interviews and company document review relating to hiring managers successful recruitment strategies.

I transcribed the responses from the interviews, reviewed them with participants to ensure my interpretation was correct for member checking. After the participants confirmed I interpreted their responses correctly, I started the data analysis process. After data collection of the interviews and the company documents, I analyzed the data. Lewis (2015) and Tuapawa (2017) noted data analysis involves preparing and organizing data, reducing the data into themes and interpreting the results. According to Yin, there are five

phases to the data analysis process, which are (a) compiling, (b) disassembling, (c) reassembling, (d) interpreting, and (e) concluding. In my study, I used the five phases to analyze my data. I compiled all of the data from the interviews, conducted member checking, assembled documents from the hiring managers in a logical order, and reassembled the data to gain more understanding of the phenomena. I interpreted data to discover themes. I used Nvivo11 software to aid with compiling data into a logical order. After I compiled data, I disassembled data into smaller sets. I used a coding to reassemble closely related data into categories. I interpreted the data using a thematic analysis, which involved an abstraction and synthesis of themes. Upon determining the finding for key themes, I provided supporting literature and my conceptual framework to correlate to the findings. Findings from the data analysis could provide successful strategies that hiring managers use to recruit STEM professionals.

Reliability and Validity

Reliability

Dependability is concerned with the reproducibility of the findings by ensuring a clear and transparent process that includes limitations of the study as well as anticipated contributions (Van Resburg, 2014). Connelly (2016) noted a maintained audit trial process helps ensure dependability. I ensured dependability by creating and maintaining an audit trail of the process. I maintained research notes and followed the order of the study using an interview protocol. A researcher should demonstrate the same outcome by repeating the same data collection procedure to achieve reliability (Baskarada, 2014). I ensured the reliability of the study by conducting member checking with participants,

following an interview protocol with each participant and conducting interviews until I achieved data saturation. Rubin and Rubin (2012) noted a researcher should be accurate and transparent while documenting the interview and the analysis. Rubin and Rubin recommended that a researcher double-check what they have written in addition to taking notes to help clarify any passages when transcribing data. A member validation adds to the accuracy of the initial findings (Van Rensburg & Ukpere, 2014). The process of member validation entails a process where participants verify the accuracy of the initial findings (Van Rensburg & Ukpere, 2014). Yazan (2015) noted a case study should consist of multiple sources of evidence. Bengtsson (2016), and Richards and Morse (2012) noted validity means the results truly reflect the phenomena studied, and reliability requires the results can be achieved if the study was duplicated. Quality research consists of validity and reliability, the use of Yin's suggested six tools, and each part of the research process for triangulation, which influences validity (Yazan, 2015). I ensured reliability and validity of the study by using Lincoln and Guba's criteria for reliability. Lincoln and Guba's criteria for validity include credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985).

Validity

Van Rensburg and Ukpere (2014) mentioned researchers could take traditional strategies to ensure the data is trustworthy. The factors to establish trustworthiness are credibility, transferability, dependability (Van Rensburg & Ukpere, 2014). Bengstsson (2016) and Richards and Morse (2012) noted validity means the results honestly reflect the phenomena studied, and reliability requires the same result could be achieved if the

study was duplicated. Researchers should also demonstrate the validity of their analysis and conclusions using qualitative methods (Hammarberg, Kirkman, & de Lacey, 2015). Lodhi (2016) stated methodological triangulation could reinforce the validity and the credibility of a research study because of the cross-verification, which would provide more credibility through cross verification of using two or more methods. I used methodological triangulation in my study to ensure validity and credibility.

Member checking is an opportunity for researchers to take back their interpretation of the responses to the interviewees and have the interviewees confirm if the researcher accurately reported their responses to the interviews (Koelsch, 2013). I used member checking to establish credibility and to ensure my interpretation of participants' responses was accurate by scheduling 30 minutes with each participant to review their responses to the eight open-ended questions.

Credibility involves the approval of findings by either interviewees or peers and using data to confirm the findings and verify the accuracy of the initial findings (Van Resburg, 2014). Researchers can ensure credibility using a chain of logic and how the study will be conducted (Bengtsson, 2016).

Transferability refers to other researchers' ability to transfer the findings of the study to new contexts in their studies by using the study as a framework for reflection (Van Resburg, 2014). The results of this qualitative case study may offer readers transferability of learning new hiring strategies for other professionals in addition to the STEM fields. Readers of my study may discover other benefits beyond learning hiring strategies. Readers may learn and apply new strategies to various areas of human

resources functions for their businesses such as employee retention and employee development. Readers' interpretation of the study allows transferability to discover more ways the study can be applied to their research. Researchers can achieve authenticity by reporting the participants' quotes (Cope, 2014).

Confirmability occurs when researchers describe the conclusions and interpretations of participants' responses (Cope, 2014). He stated trustworthiness in qualitative research is achieved using credibility, dependability, confirmability, and transferability. Nine years later, Guba and Lincoln (1994) added authenticity. I asked participants questions to learn strategies for recruiting STEM professionals. I followed the interview protocol, recorded the interviews, continued interviewing participants, and collected documentation until I reached data saturation. I documented responses from participants and reviewed notes to verify the accuracy of participants' responses by conducting member checking with participants. I ensured data saturation by interviewing participants, conducting member checking, and reviewing company documents.

Transition and Summary

Section 2 contained a description of the research project. This section included the following subsections: (a) purpose statement, (b) the role of the researcher, (c) participants, (d) research method, (e) research design, (f) population and sampling, (g) ethical research, (h) data collection instruments, (i) data collection techniques, (j) data analysis, (k) reliability and validity, and (l) transition and summary. Once I conducted the first interviews, I scheduled second interviews for member checking to ensure that I interpreted the data correctly. Next, I transcribed and thematically analyzed the data and

then inputted the data into the NVivo 11 software analysis package to confirm validity of my findings. Section 3 contains the following content: (a) the study findings, (b) application to professional practice, (c) implications for social change to contribute positive social change, (d) recommendations for action, (e) recommendations for further research, (f) reflections, and (g) a conclusion.

Section 3: Application to Professional Practice and Implications for Change

The findings of this qualitative single case study revealed successful strategies hiring managers used to recruit qualified STEM professionals. Section 3 contains several keys themes that emerged through data analysis from participant responses during the interviews and review of documents. Hiring managers can use these successful strategies to recruit qualified STEM professionals for their organizations. The organization involved in this single case study formed 105 years ago, and the leadership of hiring managers has contributed to the success of the organization. Hiring managers aided in their organization's growth because their primary focus has been to hire qualified STEM professionals.

Introduction

The purpose of this qualitative single case study was to explore successful strategies that hiring managers used to recruit qualified STEM professionals. I selected hiring managers located in the state of Virginia who used successful strategies to recruit STEM professionals for their organization.

I collected and analyzed the data, which revealed numerous findings on successful strategies used by hiring managers to recruit STEM professionals. The first finding revealed the importance of partnerships to help find skilled talent in the STEM field. The second finding revealed the importance of developing employees for future leadership positions and promoting growth within the organization to keep new hires motivated, satisfied, and engaged in the company's goals by offering opportunities to grow. The third finding revealed the significance of offering competitive compensation packages

and work-life balance to new hires to attract talented individuals, retain them, and avoid losing them to competitors. The fourth finding revealed how meticulous investigation and trial periods could be used to check the background of the new hires and monitor the new hires' progress to ensure that the new hires will succeed in the new position.

Presentation of the Findings

The overarching research question of this study was as follows: What successful strategies do hiring managers use to recruit qualified STEM professionals? Several recurring themes emerged from the participant responses about successful strategies hiring managers used to recruit qualified STEM professionals. The findings revealed the following themes: (a) form partnerships with state government and local colleges, (b) use leadership programs and employee developmental programs used as recruitment incentives, (c) use competitive compensation packages and offer work-life balance as recruitment incentives, (d) conduct meticulous investigations of potential new hires and offer trial periods. The participants also stressed the importance of understanding all of the intricacies of a position to help fill positions. The participants' stated positions are evaluated to better understand what types of skill sets are needed and how to find these skills sets. Participants also mentioned the importance of interviewing employees who were leaving their positions to learn about the tasks required for the position.

Form Partnerships with State Government Agencies and Local Colleges

The first theme that emerged from analyzed data was the importance of forming partnerships with state government agencies and local colleges to hire STEM professionals. According to Johnson (2012), business partnership focuses on improving

STEM partnership by promoting economic development and community relations. Allen-Ramdial and Campbell (2014) mentioned the challenge of developing a STEM workforce capable of creativity and increasing production remains competitive. Makarius and Srinivasan (2017) noted that organizations continue to face challenges in finding skilled employees due to lack of skilled talent. Organizations are creating partnerships with education institutions, also known as talent suppliers (Markarius & Srinivasan, 2017). Forming business partnerships may benefit all stakeholders.

Markarius and Srinivasan (2017) recommended managing the skill mismatch. The skill mismatch occurs when employers are unable to determine what characteristics and skills are needed from the potential employees (Markarius &Srinivasan, 2017). One best practice is to develop and maintain relationships between organizations and education institutions and ensure that talent suppliers are providing training and skilled based on the demands driven by businesses (Markarius & Srinivasan, 2017).

Organizations can provide apprenticeships and internships to gain early buy-ins or help design programs, which offer specialized skills relevant to the organization needs (Makarius & Srinivasan, 2017). All participants stated the importance of forming partnerships with colleges and the State Employment Commission to hire STEM professionals.

The participants' organization has been successful in working with colleges because the potential candidates possess the STEM skills required for the position. The organization forms and utilizes partnerships with local colleges and technical colleges to recruit STEM professionals because these candidates have the skill sets. The organization

formed an apprenticeship program with the state and colleges. By working with government agencies and local colleges the company can save on recruiting costs, which could range from $20,000 to $60,000, thus contingent on the pay range of that employee. Participant 1 (P1) noted she would prefer to use the resources for other purposes. The participants also emphasized that these partnerships are vital because they can find talent with less costs.

I also analyzed documents pertaining to the hiring process, such as job postings, applications, interview questions, the benefits package, and company website highlighting the benefits of joining the organization. I used the information from these documents and incorporated the content in answering the questions. All job postings included the primary responsibilities, the required qualifications, the salary range, the comprehensive benefit package, a description of the culture, and the assertion that it is a great place to work. Even the company website provided positive testimonies from employees in addition to the planned fun activities each month.

The hiring managers use a two-page application to retrieve in-depth information about the applicants' capabilities with an emphasis on the capability levels ranging from *beginner* to *advanced* for each skill category. Hiring managers use the application evaluation documents to ask applicants a series of questions to gather more information of their capabilities. These documents revealed that hiring managers use applications to retrieve as much information as possible about applicants before conducting interviews to learn if the applicants have the necessary STEM skill sets. I also reviewed various company positions. Most of the positions required technical and analytical skills,

associate degree in network administration or information technology, the ability to demonstrate knowledge of desktop products, and other STEM skills. In some cases, the hiring managers may test the applicants. Hiring managers verify the credentials to ensure the applicants have STEM work experience and STEM education. Table 1 provides a summary of the word frequencies related to the first theme that emerged during data analysis.

Table 1

Form Partnerships with State Government and Local Colleges

Theme 1	Sources	References
Partnerships	2	7
Hire	2	17
Workforce	2	56
Total References		80

Leadership and Employee Development Programs Used as Recruitment Incentives

The second theme that emerged was the importance of leadership and employee development programs used as recruitment incentives. Schiemann (2014) noted that the organization should balance talent acquisition, performance, development, and retention strategies to maximize the outcome of their talent investment. Ilanloo (2015) mentioned that human resource managers are responsible for developing top-level management. Sahy (2015) noted the importance of hiring the right person with the right skills for the organization. Morton-Huddleston (2017) mentioned that organizations should offer growth opportunities because that will attract millennials to their organization. Khandelwal and Rajotia (2017) recommended that organizations plan for employee

development and succession planning. Organizational leaders have to develop the skills their employees need (Kane et al., 2016). Moreover, employees are seeking employers, which will allow them to develop skills needed to succeed (Kane et al., 2016). Leadership and employee development programs used as recruitment incentives to attract new hires will not only benefit new hires but also the organization will gain employees that are more valuable.

Allied Talent LLC, a Silicon-Valley consulting company, recommended moving employees to new projects within the organization every 2 to 4 years to support the corporate mission and employees' career goals (Kane et al., 2016). Kane et al., (2016) stated that organizations could achieve this goal by providing training and, hands-on experience, creating career paths for employees, and continuing to train and develop employees. Similarly, P1 noted that organizational leaders offer robust internal training programs and all employees learn Six Sigma to gain a better understating of product flow. P1 also noted that they not only train and develop employees but also hire STEM professionals who have skill sets to aid in improving processes and promote these STEM professionals for future roles and opportunities within the organization. P1 and Participant 2 (P2) mentioned that the organization promotes from within and grooms employees for management or other leadership roles by providing tuition reimbursement, cross training, and mentorship programs. The organization's interdepartmental teams are formed to ensure employees engage with each other, work well together, and improve processes, as stated by P1. In addition, P1 mentioned the buddy system as another tool to help develop and train new hires. This system pairs new hires with seasoned employees

who are experts in a field. P1 and P2 stated that the organization increases new hires' pay when the new hires achieve certain milestones with the training matrix, thus encouraging new hires to continue learning and developing. Both participants are committed to the success and growth of new hires and committed to their success.

Table 2 provides a summary of the word frequencies related to the second theme that emerged during data analysis.

Table 2

Leadership and Employee Development Program

Themes 2	Sources	References
Leadership & employee development program	2	15
Technology	2	20
Skills	2	46
STEM	2	134
Total References		215

Competitive Compensation Package and Work-Life Balance to Entice New Hires

The third theme that emerged from analyzed data was the importance of offering employees a competitive compensation package. Hiring managers are responsible for employees' compensation (Anbuoli et al., 2016). Ferguson and Morton-Huddleston's (2016) study revealed Millennials are attracted to organizations that offer pay, benefits, work-life balance, and growth opportunities. The lack of talent is universal (Lyria, Namusonge, and Karanja, 2017). Employees are one of the greatest asset to organizations (Wadhwa & Madan, 2017). Organizations around the globe are competing from the same talent pool (Lyria, Namusonge, and Karanja, 2017). Organizations are able to gain a

competitive advantage due to a stable and committed workforce (Wadhwa, & Madan, 2017).

It is important for employers to provide a good work culture and environment that rewards good performers, provides opportunities for growth and advancement, and empowers and respects employees (Wadhwa, & Madan, 2017). Lyria, Namusonge, and Karangja (2017) mentioned talent retention consists of flexible working hours, training opportunities, career growth, and effective performance satisfied and motivated employees, competitive compensation and attractive non-monetary rewards. Organizations that offer employees a good compensation package consisting of benefits, which include life insurance, disability insurance, and flexible hours (Lyria, Namusonge, and Karanja, 2017). Both participants stressed the importance of a competitive compensation system to attract and retain their skilled staff. P1 and P2 stated their organization look at the entire compensation package because they believe it is not sensible to pay high salaries and the employees are left to pay the high cost for their health care benefits. The organization conducts a full market study every 2 years because the results of the market study will help dictate how it prices specific jobs. The hiring managers use Mercers, Towers, and Combaters to focus on the local market to obtain salaries information. They use information collected from Mercer, Glassdoor, and other professional sites to get a glimpse of the labor market. P1 excluded salary.com because they found their salary information ranged 15% to 20% higher compared to other sites.

P1 also mentioned a market analysis requires a lot of work to determine if their organization were competitive but necessary to know where their organization stood

compared to other organizations. P1 and P2 stated their organization could not compete with leading companies that offer higher salaries. The hiring managers could not compete with big salaries, but the hiring managers wants to make sure the entire package is attractive to new hires. Both participants mentioned it is not all about the dollars in a paycheck, but instead the entire benefit package. Participants would not compromise on the compensation package. At present, their organization pays 75% of the benefits for employees, their families, and the employees pay 25% of the benefits. The organization provide medical, dental, insurance, and vision programs, 401K, profit sharing, 100% tuition reimbursement, life insurance, short-term and long-term disability, coworker assistance program, paid time off, nine paid holidays and free checking through BB&T and Virginia Credit Union. P1 and P2 noted their organization is faced with financial constraints and its leaders have used other benefits and perks to entice and retain talented employees. The organization offers in-house leadership training programs. New hires can develop communications skills, IT project planning skills, and developmental programs to enhance their skill sets.

Employers implement creative ways to offer employees work-life balance (Litano & Major, 2015). Deery and Jago (2015) mentioned having work-life balance might entice the best talent, as well as improve employee job satisfaction and employees' attitudes and their commitment to the organization. Earl and Taylor (2015) noted some employers offer flexible work schedules, which appeal to Millennials and Generation X to enable employers to attract and retain talented staff. Kane et al. (2016) recommended organizations create work environments that people want to be associated with for a long

time by strengthening employee engagement and providing more than a paycheck. Pandita and Singhal (2017) mentioned a positive workplace contributes to employee engagement and Generation Y wants work-life balance. Organizational leaders have to identify ways to increase employees' engagement and help employee balance their personal life by offering flexibility (Pandita, & Singhal, 2017). The organization offers employees flexible work schedules to attend college classes and may offer more flexible work schedules to provide more work-life balance. P1 and company leaders have looked into providing more flexibility that will offer 30-hour workweeks or hire two employees to work 20-hour workweeks. Another option is to begin the workday at 10 a.m. instead of 8 a.m. The organization is flexible enough to offer employees time to leave early to attend classes. The organization is limited to offering new hires moderate salaries compared to some competitors that offer higher salaries. P2 noted many of the competitors have gone out of business because they could not pay employees what they wanted. P2 mentioned competitors in New York have a different set of rules where employees have higher salaries but not benefits. Both participants noted new hires value work-life balance, and their organization would provide employees flexibility and work-life balance to compensate for the lack of higher wages. The organization engages employees in fun activities each month to boost employee morale and create a better work environment. Table 3 provides a summary of the word frequencies related to the third theme that emerged during data analysis.

Table 3

Competitive Compensation Package and Work-Life Balance to Entice New Hires

Theme 3	Sources	References
Market study	2	9
Compensation	2	9
Competitive	2	2
Work-life	2	2
Flexibility	2	4
Reduced hours	2	5
Total Reference		31

Meticulous Investigation, Evaluations, and Trial Periods

The last theme that emerged from analyzed data was the importance of meticulous investigation, evaluations, and trial periods. The costs to replace employees are two to three times their annual salaries (Lamberth, 2015). Alkahani (2015) mentioned the costs to replace employee consist of loss of productivity, recruitment cost, and training costs. Kogan (2015) mentioned organization could benefit from learning how to use a boarder range of hiring and recruitment techniques. Hannan (2016) stated companies could reduce risk by gaining a clear understanding of what is expected from potential hires to ensure the right person is hired for the position. Khandelwal and Rajotia (2017) noted organizations should assess workforce needs by analyzing the skills, and competencies, and to track and measure the strength and weakness of their employees to identify training opportunities. Clark (2017) mentioned it requires work to find employees with the right education, skills, and personality to fit the organizations' culture. Clark's survey revealed many applicants lie on their application and misrepresent their qualifications. Organizational leaders should check the background of applicants, and applicants should

sign a statement that the information provided is accurate (Clark, 2017). Ahamad and Lemba (2017) mentioned organizations must conduct performance appraisal to evaluate, manage and improve employees' performance and develop skills. The organization retrieves and verifies as much information as possible about the potential candidate to ensure the potential candidate meets the requirements based on information collected from the application. The employer may offer trial periods to see if the potential hire can perform the tasks. During the trial period, potential employees are supported and evaluated. P1 mentioned all jobs are reviewed to understand what type of skills sets are needed and work backward to determine how to find those skills and create training program to develop these skills. The hiring managers allow potential employees the opportunity to try working in the position for a two-week trial period to determine if the potential candidate is a viable candidate or give the potential candidate an opportunity to determine if they want the position. The organization conducts over 50 difference performance reviews, and their management team supports lean practices across the board with an emphasis on quality standards to meet expectation or exceed expectations. The hiring managers review customer complaints, quality control reports, return ration, and scrap overage to measure employees' performance as well as performance reviews. These quality standards are measured on three categories; meet expectation, exceed expectation, or not meet expectation. These quality standards apply to the manufacturing processes as well. Performance management reviews conducted annually and semiannually. New hires are evaluated 30 days, 60 days, 90 days, and six months to ensure the new hires are hitting their mark and performing the task on their own.

Both participants noted new hires have a training matrix to help achieve success. The training matrix provides systematic instructions to perform tasks. If the new hires are not meeting expectation, P1 and P2 determine if the training protocol was honored and work with supervisors to ensure new hires get enough support. One option may be to reassign the new hires in another role if possible. P1 and P2 stressed their commitment to helping new hires to succeed; however; there are times when the new hires will be let go because both participants believe it is wrong to keep new hires if they cannot meet expectations. The hiring managers use the applicant evaluation process, which consists of 34 behavior-based questions. Hiring managers gain wide range of information dealing with the applicants' past work experience and other questions to uncover the candidate's attributes. The purpose of asking these questions are to uncover strengthens and weakness. The application for employment asked for information pertaining to past employment history, education and three business references and required a signature for background checks. The organization requires drug screening, driving reports, and criminal reports, and will monitor the record during the course of employment at the organizations, and drug testing can be conducted at any time during the course of employment as well.

Becker (1964) developed the human capital theory and noted education and experience lead to higher levels of firms' productivity. Schultz (1961) noted skills and knowledge are forms of capital and capital is an investment. The hiring managers use several strategies to hire skilled STEM professionals to perform tasks to aid in continuous growth and profits for the organization.

Table 4 provides a summary of the word frequencies related to the forth theme that emerged during data analysis.

Table 4

Meticulous Investigation, Evaluations, and Trial Periods

Theme 4	Sources	References
Performance management	2	13
Quality standards	2	6
Trial period	2	3
Total Reference		22

Additional Factors for Successful Recruitment of STEM Workers

Employers use social and professional networking websites to attract new hires (Kogan et al., 2015). Nikolauo (2014) stated social networking websites are tools to help human resource professionals recruit new hires. Jin et al. (2016) mentioned employer find their best candidates using social and professional networks. Jin et al. mentioned two-thirds of organization use social media to hire new employees. Stockman, Hoye and Carpentier (2017) mentioned applicants referred by employees are more qualified, more satisfied, and more inclined not to quit compared to other applicants recruited by another method. Hoffman (2017) noted the benefits of using employee referral programs are lower turnover, lower recruiting costs, higher productivity than not using employee referrals.

Hiring managers that use this recruiting method should consider how the applicants add value to the organization and encourage diversity, thus ensuring the referral program is unbiased (Hoffman, 2017). P1 and P2 noted their organization uses LinkedIn, Monster, internal postings, and colleges to attract potential employees because using recruiters is extremely expensive. P1 mentioned the organization also utilize a bonus referral program by asking employees for referrals. The organization will pay up to $300 for hired referrals that will work for over one year, and there is no limit to the number of bonuses for referrals. P1 noted their organization reaches out to the community, especially the Virginia Employment Commission and the local colleges and colleges in other states, because the skills needed are unique.

Employers use branding their company name and image as a tool to attract employees (Elving, Westhoff, Meeusen, & Schoonderbeek, 2013). Schiemann (2014) noted all forms of labor are important to innovation, the production of products and services and may affect the image of organizations positively or negatively. Organizations want their employees to perceive their organization as a great place to work (Jain & Bhatt, 2015).

Human resource managers understand the importance of creating a corporate culture where people want to work (Anbuoli et al., 2016). Jin et al. (2016) recommended human resource staff uses social media sites to help build the employer brand. Khandelwal and Rajotia (2017) noted finding the right candidates with key skills is a big challenge and stated organizations should use employment branding to communicate the organization image to increase market position to attract skilled candidates. Both

participants noted the importance of building the company brand. Their organization is one of the first companies in the industry to obtain certification from Scientific Certification Systems, Inc. that states the company has environment sustainability. The participants want new hires and employees to buy into the philosophy to protect the environment with efforts to reuse everything. The company has equipment and processes to collect dust in order not to pollute the earth.

Our company does not dig into the earth metal but instead uses recycled metals. P1 stated their company has collaborated with several artisanal miners' communities in South America. The programs have taken people out of poverty and build schools housing, as well as provide medical care, and all of the profits made go back into the community. P1 mentioned their organization trucks water into the community every day and is in the process of building a water tower for the community. Both participants stated their organization strives for excellence in every area of their business such as operations, customer service, producing quality products, being corporate responsible, manufacturing, innovation, and being financially responsible, thus being leaders in the industry and branding their organization as a great place to work to attract new workers.

Applications to Professional Practice

Hiring managers could use the findings from this study as a guide to implement strategies to aid in recruitment of STEM professionals, build partnerships within the community and abroad to find STEM professionals, as well as continue to positively build company brand image to attract STEM professionals. The findings could also contribute to organizations building a solid performance management program to

improve the level of production, service, and work more efficiently. Organizations may use their strategies to design a training matrix manual to ensure STEM professionals are successful in their present position and possibly grow into a potential management or leadership role over time. In addition, organizations can conduct market analysis to better understand hiring trends, which include competitive compensation packages and ways to attract and retain skilled employees.

The findings from the study could help hiring managers implement new strategies that may help organizations reduce recruitment costs, improve employee retention, and improve productivity. Hiring managers within organizations should continue to improve their best practices, strategies and collaborate with all internal divisions and external stakeholders such as government agencies and local colleges that support and build a vital STEM workforce. Hiring managers can collaborate with marketing managers to promote and improve company brand image to help attract new hires. Hiring managers can participate in local college job fairs and utilize social media to create awareness of the opportunities at their organization. Companies can also host fun activities to engage staff and build stronger working relationships with employees.

Implications for Social Change

Social change implications for hiring managers include implementing strategies to attract skilled STEM professionals and aid hiring managers who lack strategies for hiring qualified STEM professionals. Providing proven recruitment strategies may also benefit other industries seeking to hire qualified skilled workers. Hiring managers might gain a better understanding of the process and adopt other recruitment strategies for hiring

STEM professionals from this study. Another social change implication could help business leaders create jobs within the local community, thereby facilitating economic growth and prosperity within the community. Skilled STEM professionals are capable of providing exceptional service and products to customers, thus increasing customer satisfaction, repeat customers, sales, and profits. The implications for social change could provide hiring managers with new strategies to recruit skilled STEM professions, business drive innovations, increase profits, remain competitive, foster partnerships to build a vital STEM workforce, streamline the recruitment process, reduce recruitment costs, train, develop and retain STEM professionals. Hiring managers can drive innovations by discovering inventive and cost-saving ways to attract employees. Hiring managers can look to replace practices, which do not add value and narrow down the recruitment process by conducting panel interviews instead of scheduling second and third interviews.

For employees, the social change impact of this study might help employees' commitment to foster innovation, creative, growth and strengthen teams. Another social change for employees may improve their lifestyle by having an excellent compensation package to take care of employees and their families. The employees can further their education and enhance their STEM skills with the organization' generous tuition reimbursement program. Since the organization investment in their employees' development, employees may be eager to take on more responsibilities, which may lead to management and leadership roles.

Partnerships between business leaders and the community may led to social change by developing more programs aimed at building a skilled workforce to meet the needs of companies in the STEM field. The organization could to continue to work with the government and other partners to expand their apprenticeship program to help community residents develop STEM skills and provide opportunities for potential new hires. Government social impact could result in a flourishing economy, allowing more stakeholders to contribute to the economy.

Recommendations for Action

Innovation, creativity, visions, skilled workers, and commitment are all attributes of employees striving to drive profits for their organization (Philip, 2016). Bressler (2014) stated employees help companies achieve their mission statement. I interviewed participants who work for an organization created 100 years ago. The commitment, vision, innovation, creativity, and hard work from their staff have led the organization to success. Most importantly, hiring managers have recruited, hired, trained, developed, and retained their STEM professionals to help the business leaders succeed in the industry and increase profits. Findings of the study may apply to all hiring managers in various industries because even in the recession their strategies help their organization stay in business while some of their competitors have closed.

The first recommendation I have for business leaders is to adopt and implement some of the successful strategies identified in the study to aid in hiring skilled workers and reduce recruitment costs. The second recommendation I have for business leaders is to use these strategies to remain and improve competitiveness, retain skilled workers,

attract new workers, drive innovation, build company brand and foster partnerships within the local community, and globally to make a positive impact to change the lives of all stakeholders.

My goal is to publish the findings of this study to help business leaders and spark interest of strategies for hiring managers to build the STEM workforce. I plan to disseminate my findings with the interviewees who participated in the study. I plan to publish my findings in human resources journals and STEM journals. I would like to visit local high schools and government community employment centers to promote and speak of STEM trends and STEM employment opportunities.

Recommendations for Further Research

I used a qualitative single case study to explore the strategies hiring managers used to recruit STEM professionals. The study results provided ideas for future research. The study had a limited number of participants, but I was able to retrieve enough information due to the participants' willingness to share pertinent information regarding recruitment strategies. Both participants responded to the initial interview questions and member checking through follow-up questions.

Recommendations for further research may include further exploration of strategies to retain employees and developing strategies to ensure the success of new hires because of the cost to replace skilled workers. Researchers may also explore how hired employees' commitments and how contributions influenced the organizations. Researchers may also conduct a similar study in various industries. My study on successful strategies that hiring managers use to recruit STEM professionals and the

recommendation for further exploration of strategies to retain STEM employees could be expanded to other states, more participants, and other industries. This additional research could entail conducting a quantitative study, mixed method or even a different kind of qualitative study such as a phenomenological or narrative. A quantitative correlational design could provide valuable information to companies that are seeking data on different variables relevant to the requirement of STEM professionals. It could also entail additional qualitative case studies using the same data collection techniques or possibly different data collection techniques, such as a focus group, questionnaires, surveys, and direct or participant observation.

Reflections

I knew from a very young age that I wanted to attend Baruch College, but never did I imagine I had the grit to obtain a doctorate until I was at a commencement receiving my Master's and I saw doctoral students, I knew my journey would continue. My journey has brought me to this point in time. The journey has been rewarding and challenging. I had to make sacrifices and experienced setbacks throughout this journey, but I would not change anything. I even appreciated my setbacks because it helped fuel me to work harder to achieve goals. I acquired research skills and made everlasting relationships that are priceless.

When I complete my study, I plan to use my knowledge and research skills to publish articles pertaining to successful strategies that business leaders may use to improve STEM areas and recruitment of STEM professionals in their organization. I

would like to work with organizations to help develop and train staff. I would also like to work in a non-profit setting to create awareness of STEM opportunities in the workforce.

The hiring managers shared so much valuable information that could help hiring managers with STEM recruiting best practices. Both participants expressed a passion and commitment to improve organizational profits by hiring skilled STEM professionals that could bring ideas of innovation and creativity to their company. I realized their strategies may benefit other business leaders, and I realized how the information ties to the literature review after I had the opportunity to analyze the data. I had no predetermined notions of the study, but after reading numerous on the STEM shortage, I wondered if some hiring managers lacked strategies for recruiting STEM professionals. I was unbiased throughout the research study, and I alleviated bias by using protocols. I was extremely nervous when I arrived, but shortly after meeting the participants, I became comfortable and relaxed. The participants made me comfortable by their willingness to share so much information. Both of my participants had over 10 years of experience hiring, managing, and developing staff, so I gained a wealth of knowledge from them. I also gained a better understanding of the responsibilities of hiring managers and how their work influences their organization.

Conclusion

Although hiring managers have challenges recruiting skilled STEM professionals, their roles are critical to the success of organizations, staffing needs for business leaders, and the communities. STEM workforce shortages contribute too many factors; nevertheless, hiring managers have to find strategies to recruit skilled STEM

professionals to drive innovation, creativity, and profits within organizations. In this study, I collected data using seminstructured interviews and reviewed company documents pertaining to the organization's hiring practices. By using these two data collection techniques, I was able to achieve data saturation when no new information emerged from the data. The data I gain from the interview, member checking, and documentation provided study findings. The findings can be strategies hiring managers may adopt to recruit STEM professionals. After I completed data collection, I analyzed and coded the information until themes emerged. The themes are linked to the literature review and the conceptual framework human capital theory. The four themes that developed for the study were (a) partnerships with state government and local colleges, (b) leadership and employee developmental programs used as recruitment incentives, (c) competitive compensation packages and work-life balance to entice new hires, and (d) meticulous investigations and trial periods. The themes related to my literature review and the human capital theory. The findings of this study may help hiring managers with successful strategies to recruit STEM professionals, reduce recruiting costs, and retain skilled talent to help the organization achieve growth and profits.

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Appendix A: Interview Protocol

<table>
<tr><th colspan="2">Interview Protocol</th></tr>
<tr><th>What you will do</th><th>What you will say—script</th></tr>
<tr><td>Introduce the interview and set the stage—often over a meal or coffee</td><td>Good afternoon and thank you for participating my qualitative single case study. My name is Elizabeth Williams. I will be conducting the interview and the interview should conclude in an hour. May I have your permission to record this interview? I would like to collect the consent form before the start of the interview. After the interview, I will review the company's documents</td></tr>
<tr><td rowspan="8">Watch for non-verbal queues
Paraphrase as needed
Ask follow-up probing questions to get more in-depth
Ask to review documents pertaining to hiring practices (i.e. job advertisement, job application, etc.)
Ask to review hiring tests</td><td>1. What strategies do you use to recruit qualified STEM professionals?</td></tr>
<tr><td>2. What strategies do you use to determine which skills are important to your organization?</td></tr>
<tr><td>3. What strategies do you use to determine the qualities that are essential when hiring qualified STEM professionals?</td></tr>
<tr><td>4. What strategies do you use to determine if the candidate will be successful in the position?</td></tr>
<tr><td>5. What competitive compensation strategies do you use to recruit qualified STEM professionals?</td></tr>
<tr><td>6. What strategies do you use to test the skills of STEM professionals?</td></tr>
<tr><td>7. What strategies do you use to overcome challenges when recruiting STEM professionals</td></tr>
<tr><td>8. Are there any other strategies for recruiting STEM professionals that we did not discuss and that you wish share?</td></tr>
<tr><td>Wrap up interview thanking participant</td><td>Again, thank you for your participations</td></tr>
<tr><td>Schedule follow-up member checking interviews</td><td>In addition, can we go ahead and set up a follow-up member-checking interview for next week.</td></tr>
</table>