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What are the necessary skills to lead an innovation center in Saudi Arabia?

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WHAT ARE THE NECESSARY SKILLS TO LEAD AN INNOVATION CENTER IN SAUDI ARABIA?

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by

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DEDICATION

"O my Lord! Increase me in knowledge." (Quran 20:114)

The prophet Mohammad, peace be upon him, said, "A father gives his child nothing better than a good education." Through all the years of my childhood my parents did the best they could to raise my education and I love and thank them both for this. I could not reach this level of education without first the will of Allah (God) and then my parents' prayers and support. This work is dedicated to my precious parents—Hamad and Azizah—whose words of encouragement ring in my ears. My soul mate and wife, Ala Binmahfoodh, without her none of this have been possible, and without her help, wisdom, and support, this dissertation would never have come to fruition. She lived this challenging journey with patience, offering me motivational words, love, and compassion. This work is also dedicated to my two beloved knights, my sons Hamad and Badr, and the owner of my heart, my daughter Zainah. I also dedicate this work to my wise father in-law Abdullah Binmahfoodh and my mother in-law Zainah Algabbaa; without their endless support, love, caring, and patience, none of this would have been possible. This work is also dedicated to my brothers Sultan and Saud and my sisters Amal, Abeer, Areej, and Hind for their prayers, support, and constant encouragement.

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ABSTRACT

In the early 2000s, technology innovation became a strategic choice for Saudi Arabia, supported by an increasing base of start-up technology businesses and young Saudis, who are considered a potential driving force for innovation and entrepreneurial activities. Since then, technological innovation encouraged more Saudi young people to become entrepreneurs or innovators. Thus, in mid 2000s, Saudi Arabia launched many initiatives related to innovation, science, and technology, such as the establishment of innovation centers and research parks, in an effort to support developing individuals who could potentially become future entrepreneurs. The purpose of this study was to identify the top leadership skills for running Saudi Arabian technology innovation centers and examine the key factors that affect the Saudi innovation environment. In addition, the SPELIT framework was used to identify the driving forces/factors affecting the Saudi Arabian innovation environment. This quantitative study used an online survey instrument to capture 78 responses from Saudi Arabian citizens. This study was limited by the shortage of available information and data about the Saudi Arabian technology innovation base. After collecting the data, the findings were analyzed and substantively discussed, leading the researcher to draw conclusions, highlight implications, and suggest a series of recommendations for policy, practitioners, and future research. The total male participation was more than female participation by almost 18%. The age mean was 34 and the majority of the respondents were highly educated. More than half of the respondents were either involved in the past or currently involved in innovation, with experience that ranged from less than 6 months to more than 5 years. About 60% of the respondents reported that they were either aware or completely aware of the concept of *innovation centers*. The study concluded that goal setting, self-confidence, and ability to motivate are the most needed leadership skills to lead an innovation center in Saudi

Arabia. Additionally, it was found that young people; cooperation among the government, universities, and the private sector; and skilled human capital were the most three significant factors affecting the technology innovation environment in Saudi Arabia as perceived by respondents.

Chapter 1: Introduction

This dissertation sought to identify the skills necessary to lead Saudi Arabian technology innovation centers. In the early 2000s, the Saudi government began to realize how vital these centers are to Saudi Arabia's economy and society. Technology innovation centers were becoming a hub for many people to organize and assemble, as well as develop and test their innovative ideas. Many of the countries and organizations around the world that are seeking to spur and support untapped technological and innovative ideas have started to establish similar centers. Technology innovation centers in Saudi Arabia are expected to multiply significantly due to an increase of the number of young Saudi entrepreneurs and/or innovators, each of whom requires multiple types of support in order to implement and commercialize their ideas. The majority of those young people are below the age of 30. In actuality, people under the age of 25 comprise greater than half of the Saudi Arabian population (Saudi Central Department of Statistics and Information, 2007). Saudi young people are highly motivated, eager to change the status quo, and looking for new and innovative ways to succeed and prosper. The Saudi government, as well as the large and multinational companies operating in the Saudi market, has recognized the importance of technology innovation centers and began initiatives in mid 2000s to take advantage of this promising concept.

The introductory chapter presents an overview of the study and outlines and discusses the background of the study, in addition to the problem statement, purpose, and the significance of the study. Then the research questions are presented, as well as the limitations and assumptions related to the study. Finally, the content of the remaining dissertation chapters will be outlined.

Background of the Study

It is widely recognized that technological change is essential to the national development of any country in the world (Robertson & Al-Zahrani, 2012). In as much as technological change requires adaptation to a knowledge-based society, Saudi Arabia has strived to make every effort to shift to such a society. This shift has required innovation in all directions and the establishment of a strong science and technology base. Many economies and organizations around the globe, including Saudi Arabia, aim to blend newly innovative mechanisms into their processes and operations in an effort to improve their competitiveness. Technological innovation, in particular, powers growth and development while enhancing competitiveness. In Saudi Arabia, technological innovation is a new phenomenon that drew the attention of many intelligent people and organizations. In the early 2000s, Saudi Arabia became conscious of the importance of technological innovation and its potential impact on the national economy and overall human welfare. In fact, technology innovation became a strategic choice for Saudi Arabia, supported by an increasing base of start-up technology businesses and young Saudis, who were considered a potential driving force for innovation and entrepreneurial activities. Also, many organizations realized that technological innovation is crucial if they want to compete effectively and be successful in the global economy (Saudi Ministry of Economy and Planning, 2004).

As the country moved forward, the government began to understand that technological innovation encouraged Saudi young people to become entrepreneurs or innovators. Moreover, Saudi youths were a major catalyst for driving innovation in general, and technological innovation in particular, through their entrepreneurial mindset. Thus, during the 2000s, the Saudi government started to formulate policies and introduce many initiatives related to innovation,

science, and technology in an effort to support developing individuals who could potentially become future entrepreneurs (Saudi Ministry of Economy and Planning, 2004). In addition, the government was pushing private sector companies to start supporting the wheel of technological innovation initiatives by focusing more time and money on the research and development (R&D) field. One of these initiatives involved establishing technology centers, which were also referred to as incubator or innovation centers. These centers focused on speeding up the early development of innovations and provided innovators, entrepreneurs, researchers, business visionaries, and developing organizations with one-stop access to science and technical experts (Goddard, Robertson, & Vallance, 2012). Technology innovation centers accommodated individuals or start-up companies that had proof of a promising idea or concept and then provided them with office space and a variety of business, professional, financial, and educational services throughout their journey until they emerged as fully operational business entities. These centers or departments could be found in universities as *research* or *science parks*, in companies as *technology center*s, as public non-profit entities known as *incubators*, or as for-profit entities known as *accelerators*. Innovation centers exist in many forms, and these terms can be used interchangeably to a certain extent. These centers provide a promising business channel for Saudi young people to commercialize their ideas and disruptive technological innovations.

Innovation centers started emerging in Saudi Arabia in 2007. Some of these centers were publicly funded by the Saudi government and others were privately funded by individuals or businesses. Mainly, the privately funded centers were intended to serve the development of a company's existing line of business, products, or services, or to come up with new technology that added to that company's line of business. For example, companies such as General Electric

(GE) and 3M established technology innovation centers in Saudi Arabia to serve their business needs and growth. The individually funded centers were typically small-scale centers or business incubators that served a specific field or industry with the ultimate objective of turning a profit. The centers that were publicly funded were large in scale and served important sectors such as Information and Communication Technology (ICT), Advanced Manufacturing Technology (AMT), and biotechnology. These types of technology centers emerged in an effort to serve the government's national plan for the development of vital sectors.

Since 2007, publicly funded centers in Saudi Arabia accepted numerous applicants either as individuals or as start-up entities. However, only a handful succeeded in turning their ideas or concepts into reality and started commercial businesses. Others were either still working on their ideas, had withdrawn, or had been forced to give up completely. This low output has been attributed to many factors, among the most important which was the environmental factors affecting the technology innovation community in Saudi Arabia. These environmental factors could be investigated thoroughly by the use of the Social, Political, Economic, Legal, Intercultural, and Technological (SPELIT) power matrix framework, which this study used to develop an understanding of the various driving forces affecting the Saudi Arabian technological innovation (Schmieder-Ramirez & Mallette, 2007). In this study, the SPELIT framework was used to discuss and reveal the opportunities and obstacles that the Saudi Arabian technology innovation environment faces.

Another valuable component of innovation centers is leadership, which contributes to the development of more innovators, entrepreneurs, and start-up companies within the market. Technology innovators and entrepreneurs need special attention, as they possess a special and distinct mindset and behavior. Many of them do not know how to begin or continue to develop

their technologically innovative ideas or how to turn these ideas into reality. They need people to guide and lead them throughout their journey. Experienced leaders need to be leading innovation centers and working with innovators and their potential. According to Northouse (2010) and Robbins and Judge (2010), effective leadership involves support, dedication, commitment, mentorship, and team effort, which may not have existed within many organizations in Saudi Arabia. Since these centers were founded to work with innovators and entrepreneurs, effective leadership plays a significant role in achieving the vision, mission, and objectives of these technology centers. Moreover, an effective leader needs to adopt certain leadership qualities in order successfully guide innovators and entrepreneurs and lead technology innovation centers

Problem Statement

In spite of its tremendous financial resources, until recently Saudi Arabia devote little attention to the creativity and technology innovation centers that has the potential to affect the country's national strategy to shift to a knowledge-based society. Technology innovation centers in Saudi Arabia have achieved less than what the country's consecutive national development plans expected with regard to producing successful start-up companies, innovators, and entrepreneurs. There were many reasons for this problem. Among the most important of these reasons were the environmental factors related to the technology innovation community in Saudi Arabia. By way of example, the lack of communicating a clear national innovation initiative was a major environmental factor that affected technology innovation development in Saudi Arabia. Furthermore, another major contributing factor was the lack of support to develop proper technology innovation centers that nurtured Saudi Arabian technology innovators and entrepreneurs and helped them unleash their disruptive technologies. To explore this issue, a

thorough understanding of the Saudi Arabian technology innovation environment through the use of the SPELIT framework was deemed necessary.

Additionally, the need existed to study the leadership component of innovation centers by identifying the various leadership qualities that such individuals found valuable for operating an innovation center. This information was used to identify and resolve any leadership deficiencies or shortages of experienced leaders in technology innovation centers. Therefore, both a need and an opportunity existed to enrich the literature and boost the country's competitiveness toward becoming a knowledge-based society: specifically by studying the environmental factors affecting the technology innovation community and then identifying the leadership skills required to lead the technology innovation centers in Saudi Arabia.

Purpose

This quantitative study's purpose was to examine the SPELIT environmental factors that affected the Saudi Arabian technology innovation community. In so doing, the researcher hoped to shed light on ways in which the development of innovation centers could be improved in Saudi Arabia. Furthermore, the findings of this research informed existing policies regarding technology innovation. Additionally, by using an online survey, this study intended to identify the necessary leadership skills required to lead technology innovation centers in Saudi Arabia.

Significance of Study

It was hoped that this study would increase awareness of the significant impact that technology innovation centers have on the Saudi Arabian economy. Additionally, the findings of this study should encourage Saudi Arabian policymakers to continue promoting policies that support the development of the technology innovation base in Saudi Arabia. Implementing the SPELIT framework provided insight into the environmental factors affecting the technology

innovation community within the country. Furthermore, the findings of this study will give Saudi policymakers access to information relevant to technology innovation centers, in addition to enriching the existing literature in this area. By researching the relevant leadership theories and conducting an online survey, the study aimed to identify the leadership skills necessary for managing technology innovation centers in Saudi Arabia. Thus, the leadership skills that were identified via the online survey created knowledge for existing and future Saudi leaders who were heading or will head technology innovators and centers.

This study also contributed to the knowledge base in the field of technology innovation and helped leaders of innovation centers enhance and improve their organizational performance. A better understanding of people's perceptions regarding the importance of technology innovation will assist Saudi leaders in their efforts to promote and sustain the involvement and empowerment among innovators, improve morale among leaders, and increase innovation centers potential for success.

Summary of Theoretical Frameworks

The theoretical foundation for this study was based on the use of the SPELIT power matrix framework and a comprehensive review of the literature related to the study subject. An examination of the SPELIT framework provided Saudi policymakers with useful knowledge regarding the impediments to developing successful innovation centers. Moreover, the findings of this study should encourage these policymakers to continue to promote policies in support of developing the technology innovation base in Saudi Arabia. Alternatively, researching the relevant leadership theories that are taught in graduate schools in the United States and reviewing the existing innovation and entrepreneurship literature built a knowledge base to suggest the necessary leadership skills required to lead technology innovation centers in Saudi Arabia. The

SPELIT framework was discussed briefly in previous sections; however, the following paragraphs present an overview of the relevant leadership literature, which is discussed in greater detail in Chapter 2 of this study.

Leadership is an important factor in creating successful, innovative ideas. Certain traits are common among leaders of successful, innovative organizations. Robertson and Al-Zahrani (2012) identified the following common leadership traits: adoption of a macro perspective, ability to make connections between ideas, focus on the future, compassion, proactive stance, willingness to take risks, persistence, creativity or appreciation of creativity, flexibility, respect for others, ability to delegate, and strong networking skills. In addition, the successful leader acts as a source of inspiration for others, translates the big picture into a vision, and translates visions into action plans in order to create change (Kotter, 1996).

Certain attributes are used to characterize innovation leaders. These traits share features and qualities that are found in transformational leaders, including the ability to elevate and motivate those they lead or exert a general emotional influence upon them (Mimouni & Metcalfe, 2012; Northouse, 2010). The bedrock of an innovative and transformational leader rests on altering and transforming individuals and organizations. Transformational/innovation leaders must possess charisma and encourage followers to embrace change (Mimouni & Metcalfe, 2012). Innovation leadership bears many of the characteristics of transformational leadership theory to the degree that these two terms are considered virtually interchangeable as used in this study.

A review of the relevant literature pinpointed three characteristics that serve to epitomize successful innovation leaders: proactivity, innovativeness, and the ability to take shrewd risks (Cross, 2013; Mimouni & Metcalfe, 2012). Several organizations have sought to ingrain at least

one of these traits in their leaders; however, the organizations that have been able to adopt each of these attributes so far are typically run by leaders that possess or have acquired these entrepreneurial traits. Additionally, innovation leaders also promote the process of experimentation followed by rewarding both success and mistakes (Mimouni & Metcalfe, 2012). Such leaders are able to recognize that not all experiments are successful and that one of the by-products of innovation is failure. Leaders of innovation centers foster innovation by developing a supportive atmosphere that is both advantageous and nurturing for learning and innovation (Cross, 2013). The literature reflects that innovation leadership is more than merely effective leadership, but also leadership that empowers others to develop new and better methods of completing everyday tasks while encouraging creativity through the use of rewards. Successful innovation leadership translates into doing more; in addition to merely creating and advancing new ideas, it also involves taking action on promising solutions in innovation and transforming those solutions into positive results to generate tangible value, enhance processes, and establish original competitive opportunities (Northouse, 2010).

It is vital that leaders gain an understanding of their own potential—both weaknesses and strengths, preferences, and style—in addition to acknowledging the effect these factors have on those around them. Such self-awareness is a foundational key to becoming an effective technological innovation leader. Leaders that are more self-aware are more adept at minimizing the subjective influence they hold while also understanding and listening to others, as well as aiding them in their quest to accomplish objectives by making decisions that are well-considered and taking risks prudently (Bennis, 1994; Cashman, 2008). Thus, technology innovation leaders are able to actualize success through both self-awareness and self-knowledge, while also taking

into account the aspirations and needs of others objectively and considering the needs and aspirations of others.

Research Questions

The design of this study was aimed at answering the following guided research questions:

1. What are the top leadership qualities that are needed to lead a technology innovation center in Saudi Arabia?
2. What is the perception of Saudi Arabians about the factors affecting the technology innovation environment in Saudi Arabia?
3. Are the respondents' answers about the top leadership qualities that are needed to effectively lead a technology innovation center in Saudi Arabia related to their experience?
4. Are the respondents' answers about the top leadership qualities that are needed to effectively lead a technology innovation center in Saudi Arabia related to their demographic characteristics?

Limitations

Limitations of the study usually describe situations that are uncontrollable and may have affected the findings of this research. These events might have been related to, but were not limited to, resources, methodology, or analysis (Kumar, 2011). Since technology innovation centers are a new phenomenon in Saudi Arabia, this research was limited by the shortage of available information and data about the Saudi Arabian technology innovation base. Additionally, the research was limited with time and resources that restricted the study population to only one organization.

Assumptions

Two assumptions were made prior to conducting this research study:

1. A fundamental premise of the present research study is that there is a definitive correlation between solid, strong leadership and an innovation center's success.
2. Another assumption is that the nature of the study; the comprehensive review of the relevant literature on leadership, innovation, and entrepreneurship; and the findings of the study will offer a useful reference and a set of guidelines for Saudi Arabia to extend its planning of an improved technology innovation base.

Definition of Terms

Invention and innovation: Under the umbrella of technological change, invention and innovation represent the backbone of the technology development process. Hunter, Cushenbery, Ginther, and Fairchild (2013) argued that the two concepts interact, but each has its own logic. Robertson and Al-Zahrani (2012) defined invention as the discovery or creation of a new idea, whereas innovation refers to the first use or adoption of the new idea. Thus, innovation is not a technical term; rather, it is an economic and social term denoting the act or process of changing the yield of resources. The concept is considered to be the means for developing entrepreneurship.

There has been some tendency in the literature to define innovation as encompassing invention. Thompson, Al-Aujan, Al-Nazha, Al Lwaimy, and Al-Shehab (2012) pointed out that invention is the first step in innovation. Moreover, Mimouni and Metcalfe (2012) emphasized that innovation is invention in addition to exploitation. Roundtable discussions at the 1970 annual Industrial Research Institute (IRI) meeting described innovation as being comprised of

two distinct elements: the discovery of a new construct or brainchild and the implementation of that brainchild into a business or another type of useful application (Thompson et al., 2012).

Technology: The term *technology* is derived from the Greek words *techno* (artifact) and *logos* (thought or reason). Thus, by extension, technology means systematic knowledge transformed into tools (Dutta, 2012). Numerous authors have defined the term with different degrees of explication. For example, Badger, Khan, and Lanvin (2011) defined technology as "a system of components directly involved with acting on and/or changing an object from one state to another" (p. 127). A definition proposed by AlHussain and Bixler (2011) describes technology as "the means by which knowledge is applied to produce goods and services" (p. 115). For the purposes of the current study, technology refers to the practical application of scientific or engineering knowledge (Aarons & Sommerfeld, 2012).

Technological innovation: The term *technological innovation* is often used synonymously with *technological change;* however, the two concepts differ slightly with regard to level of specificity. According to Badger et al. (2011), technology innovation is "the process of creating and implementing new technology, products, and production and service capability" (p. 127). Technological innovations are the disruptive ideas that are diffused and then affect people's lives, such as Google, YouTube, email, etc.

Knowledge-based society: Eickemeyer (2001) pointed out that "a knowledge-based society is more than the idea of an information-rich society. Something of greater substance is there … the innovativeness and inventiveness of its labor pool" (p. 3). According to the World Science Forum (2003), a knowledge-based society embraces continuous learning and technological innovation. To become a knowledge-based society, innovators, entrepreneurs, and

innovative entities within a community should all be involved in researching and producing technologically innovative ideas.

Knowledge-based economy: These types of economies, as identified by the Organisation for Economic Co-operation and Development (OECD, 1996), are "economies which are directly based on the production, distribution and use of knowledge and information" (p. 7). Subsequently, Cheng, Hossain, and Guo (2009) noted that "information by itself does nothing for you, but knowledge of how to use it can result in previously unimaginable opportunities to enhance production, out-compete rivals and maximize goals-related outcomes" (p. 255). Advanced nations' economies are largely based on knowledge and resources that drive economic development. Countries that require building stronger economies should focus on certain pillars that drive economic growth. According to Schiliro (2012), innovation is one of the pillars needed to create an efficient knowledge-based economy.

Organization of Study

The stage for the balance of the study was set in Chapter 1 by presenting the research problem, purpose, and the subsequent questions that were used to guide the research. In addition, the discussion demonstrated the rationale behind the study and reiterated the necessity for this undertaking.

The extant literature reviewed in Chapter 2 goes into greater detail as to how to clarify the theoretical foundations that leadership and innovation rested on. This chapter also discusses Saudi Arabia's background and the environmental factors affecting Saudi technological innovation by using the SPELIT power matrix framework.

Chapter 3 discusses the methodology employed in this research with the ultimate goal of fine-tuning the skills-led technological innovation centers in Saudi Arabia. The chapter clarifies

the exact method of research that was performed, the source of the collected data, and the various tools and techniques that were utilized for analysis. In addition, the chapter addresses the steps the researcher undertook to guarantee validity and ensure reliability.

Chapter 4 includes a detailed analysis of the collected data that was gathered according to the defined methods that were delineated in Chapter 3. Each respondent's answers are presented statistically along with constructive elaboration on each set of the research survey data.

Chapter 5 features a discussion and summary of the results of the study and conclusions were drawn that were based on an analysis of the collected data. Opportunities and areas for additional research are also identified. Included in this discussion are both theoretical contributions and practical implications that the study offers with regard to technology innovation and leadership in Saudi Arabia.

Summary

The importance of the required leadership skills necessary to lead Saudi Arabian technology centers was introduced in this chapter. The purpose of this study was to ascertain and suggest leadership qualities that are vital for effective leadership in the technology innovation centers and develop an understanding of the environmental factors affecting technology innovation in the country. Guiding the research were the research questions, which were set forth for this study and were clearly presented. Some assumptions and limitations continued to be considered throughout the study. The study paved the way for enhancing the knowledge base regarding the need for inclusion strategies and extending policies to improve and lead technology innovation in Saudi Arabia. The following chapter will present a review of the academic literature related to this subject.

Chapter 2: Literature Review

This chapter is comprised of four main sections. The first two sections provide the reader with a comprehensive review of the major studies about the variables relevant to the problem, which include innovation, entrepreneurship, and leadership. From the literature review, the reader will be able to identify some arguments, viewpoints, and gaps that surround this area of study. The third section discusses the skills needed to lead innovation. The fourth part presents a review of the Saudi Arabian innovation environment through the application of the SPELIT power matrix framework in order to understand the different environmental driving forces affecting technology innovation in Saudi Arabia. As the focus of this study was to identify the necessary leadership skills to lead technology innovation centers in Saudi Arabia, it is essential to briefly introduce the setting of this study, which is Saudi Arabia.

In 1932, King Abdulaziz Al-Saud unified the country and reclaimed his forefathers' state by founding the Kingdom of Saudi Arabia (KSA). The country occupies over 830,000 square miles and is approximately of one-third the total size of the United States (Bait-Almal, 2000). At the end of 1970, the Royal Embassy of Saudi Arabia (2012) reported that the country had announced its first 5-year development plan. The motivation behind this plan was to form an up-to-date industrial establishment so that economical and societal developments could be achieved. Since then, Saudi Arabia has grown rapidly by meeting and achieving the objectives set forth for the country through the implementation of all its successive developmental plans.

It is vital when studying a particular setting to look at some of the basic facts related to that setting. One of the important factors to explore, especially for this study, is the population. Innovation in general and technology innovation in particular are widely known for their relationship to young people. Most of the newly innovative ideas include the pursuit of a

youthful mindset. In 2013, Saudi Arabia reported an estimated total population of over 28 million; Saudi citizens constituted about 70% of the total population and the balance of the population was non-Saudis (U.S.-Saudi Arabian Business Council, 2013). Out of the total population, about roughly 60% was below the age of 30. Additionally, it has been estimated that the population will grow annually by an average growth rate of 3.4%, reaching a total population of over 36 million by the year 2020 (Saudi Arabian Monetary Agency, 2012). The increasing rate of population did not hinder the country from continuing its aspirations; rather, it took advantage of this increase to develop a productive human base, focusing largely on the young people who will thrive and contribute to the national development plan.

Innovation

Innovations have a critical impact on a society. So many inventions have had a tremendous impact on the way societies operate: the invention of the wheel, the car, and other means of locomotion; the creation of indoor heat, plumbing, and electricity; the communication innovations of the telephone, copier, and facsimile machine; and the social inventions of charity, social security, and democracy (Mimouni & Metcalfe, 2012). As society has changed, people's perceptions of their needs and interests have changed as well. This can be seen in the markets where different products are being sought; in the political arena where people demand change, either backward or forward; and in the requirements for services that society demands. As markets innovate and politicians create new messages to address these shifts in interests and needs, so must human services adapt to respond to these shifting trends. Innovation is important to solving many problems as well as creating more effective, productive, easier, or otherwise better lives for people individually or societies in general (Dutta, 2012). Experimenting with new

ideas is valuable because it identifies new possibilities, some of which may be an improvement and some of which will show that the current system is the best available alternative.

The term *innovation* refers to the application of new ideas for the creation of unique products and services (Drucker & Drucker, 2007). In this technologically advanced era, innovation has become the foremost priority for organizations to survive and thrive in the intensely competitive business landscape (Dekkers, 2005). Since innovation is the use of novel, and better ideas, it is considered a necessity for companies rather than just a mere option (Bergfeld, 2009). Theorists have researched the conceptualization of innovation extensively in order to determine the most appropriate definition of the term. Innovation, as defined by Peter Drucker (as cited in Hesselbein, Goldsmith, Simerville, & Drucker Foundation for Nonprofit Management, 2002) means a "change that creates a new dimension of performance" (p. 1). Damanpour (1991) investigated the relationship between the concept of innovation and change, finding a strong relationship between the two. Innovation is a way of transforming organizations and contributing to organizational success and efficiency. Additionally, organizations undergo such transformation processes to influence their surroundings or due to the fact that they are being influenced by their inner and outer surroundings.

According to Zahra and Covin (1994), "Innovation is widely considered as the life blood of corporate survival and growth" (p. 183). Organizations usually innovate in order to restructure their processes and technologies in a way that brings them something that opponents cannot. This has become a critical strategy to survive in today's dynamic environment. However, this definition focuses only on a single dimension and lacks the various subjects where innovation has been involved. As Damanpour and Schneider (2006) have argued, innovation cannot be

defined solely from an organizational perspective; rather, it must be defined from the point of view of the numerous fields of study where it is being discussed.

With so many definitions, there has been some confusion regarding the concept of innovation. This confusion was addressed by Baregheh, Rowley, and Sambrook (2009), who researched the definition of innovation by focusing on multiple dimensions rather than a single dimension. They suggested a definition that included different aspects of innovation, such as social systems, stages of the procedure, the means through which it is processed, the nature of innovation, its objective, and the type of innovation, e.g., product or service. They defined innovation as a whole process rather than an absolute concept that includes different phases. According to the authors, this process begins with any idea or creative spark that is transformed into any new or improved product, procedure, or service by firms so that the firm can gain competitive edge or can become distinguished.

Archibugi and Iammarino (2002) have given evidence of the concept of innovation at the global level, arguing that innovation is becoming the essence of globalization. Many firms have gone international with this notion of innovation, using it to develop new and breakthrough products and processes. Additionally, Archibugi and Michie (1995) have posited three attributes of *globalization of innovation*: utilization of products or innovative technologies at global basis that are invented at a national level, generating products or technologies at a global level, and high tech integration at an international level.

With the emergence of globalization and a highly dynamic global environment, innovation has become the survival tool for multinational companies. According to Torun and Cicekce (2007), this concept of innovation has proven to be a useful tool; in fact, they consider it to be the main driver of any country's economic growth. Bringing creativity and new ideas in the

form of new products and services into the market has become an engine for economic expansion. Moreover, creativity and new ideas are quite important for corporations, as innovation serves as a source of competition.

Rosenberg (2004) has further examined the relationship between innovation and economic growth. His research posited that economic growth is the result of growing output with the least possible input in the most basic way. This could be achieved by two methods: either by growing the quantity of inputs to get maximum output, or by any other innovative approach that can be used with the same quantity of input but will provide greater output. In their research, Black and Lynch (2003) presented a case study of the United States to determine the reasons that have led to growth in the country's economy, ultimately attributing the growth to organizational innovation. Recent reforms in U.S. organizational arrangements—such as self-management groups, workers' empowerment, etc.—have resulted higher productivity that has created more opportunities for further economic development.

Another concept related to innovation was investigated by Chesbrough (2006), who suggested a new paradigm known as *open innovation*. Chesbrough argued that open innovation is different from the existing kind of innovation where an idea is provided by the R&D department and is then used to create a new product or service. Instead, open innovation encompasses all the ideas coming from any department of the company, or even from outside of the company as well. Such innovation is argued to confer additional value to the business when combining ideas coming from inside the company with ideas from outside the company. This concept is applicable to industrial innovation as well.

Eveleens (2010) has researched the innovation process, its stages, the key players in the process who initiate it, and real-world inferences for management. Eveleens described several

basic stages that are present in each organizational innovation model, such as generating innovative ideas, selecting an idea to implement, launching and promotion, post launch assessment, and learning. These stages may vary according to the industry type and size, innovation type, and environment.

There are some sources from which innovation emerges consistently, known as *innovation initiators*, such as organizational strategies, culture, organizational structure, employees' abilities, the allocation of capital, leadership, and firms' forward or backward linkages. However, Eveleens (2010) did not describe what kind of management practices are needed to bring in innovation and support the initiators in order to foster innovation. The connection between management and innovation was modeled by W. Smith and Tushman (2005), who argued that whenever an innovation is introduced in the workplace, it leads to strategic conflicts. Such conflicts arise from the change the organization is undergoing due to the introduction of innovation. Further, they showed that management must provide better leadership to make proper use of innovation for the firm's ongoing performance, as sometimes employees have innovative capabilities but need proper leadership to bring their ideas to fruition.

Miller (2002) noted that when implementing innovative processes, many organizations have failed to convey their revised strategies that may be effective for both the company's management and the company as a whole. Doing so entails an approach that is strong and forthright, and generating ideas for product concepts that will steer the company toward the planned innovation and explicit areas. These strategies require strong leadership to yield positive performance in product improvement. The key areas where innovation is necessary for implementing a change need to be evaluated prior to the execution of innovative strategies and transformation in an organization's system of management.

When thinking about innovation, it is difficult to ignore the concept of entrepreneurship and its relationship to the innovation environment. Innovation plays a major role in developing entrepreneurial activities because when innovation happens, it means that something tangible is ready to be used, either socially or economically (Martin, 1994). However, before discussing innovation and entrepreneurship, it is essential to review innovation on a worldwide scale by identifying the most innovative countries around the world. The following section sheds additional light on worldwide innovation.

Worldwide innovation. Reviewing worldwide innovation encompasses the identification of countries that have optimally adopted and adapted technological advancements for bringing something unique into the market (Bergfeld, 2009). Considering the nature of this research, it is critically important to review worldwide innovation because it furthers current understanding of the underlying factors that allowed top innovative countries to reach the top 10 ranking in the world. The review of worldwide innovation will also uncover factors that can be adopted by Saudi Arabia to improve while developing its technology innovation environment. Table 1 presents the top 10 innovative countries for 2014 from two well-known indices, the Global Innovation Index (GII) and the Bloomberg Index.

Global Innovation Index 2014. Published annually by Cornell University, the European Institute of Business Administration - INSEAD, and the World Intellectual Property Organization (WIPO), the GII is one of two major indexes on innovative countries with the objective of measuring the innovation capabilities of 142 countries across the globe via 84 indicators (Lanvin, 2014). The indicators have helped gauge the countries' innovation capabilities with measurable results, while ranking the top countries as role model for others worldwide. In 2014, GII found some interesting facts and figures as compared to the previous

years. For instance, Switzerland was able to retain its first place position; meanwhile, the United Kingdom ranked second and Sweden third. This is compared to their positions in 2013 where the United Kingdom was ranked third and Sweden second (Dutta, Lanvin, & Wunsch-Vincent, 2014).

Table 1

Worldwide Innovation Ranking

Rank	Global Innovation Index 2014	Bloomberg Ranking 2014
1	Switzerland	South Korea
2	United Kingdom	Sweden
3	Sweden	United States
4	Finland	Japan
5	Netherlands	Germany
6	United States	Denmark
7	Singapore	Singapore
8	Denmark	Switzerland
9	Luxembourg	Finland
10	Hong Kong	Taiwan

Note. Adapted from "Most Innovative in the World 2014: Countries," by Bloomberg, 2014, retrieved from http://images.businessweek.com/bloomberg/pdfs/most_innovative_countries_2014_011714.pdf. Copyright 2014 by the author. Adapted from "The Global Innovation Index 2014: The Human Factor in Innovation," 2014, by S. Dutta, B. Lanvin, & S. Wunsch-Vincent, retrieved from Retrieved from http://www.wipo.int/edocs/pubdocs/en/economics/gii/gii_2014.pdf. Copyright 2014 by the author.

The index's factors are used to gauge worldwide innovation, investment in human capital, innovation infrastructures, and level of creativity. The top 10 countries have consistently scored high in most of the indicators like innovation infrastructure, business sophistication, innovation output, quality, cross-pollination of quality and knowledge workers, R&D, and economies of scale (Dutta et al., 2014).

In today's technologically advanced era, the education of workers is also an important factor by which to gauge worldwide innovation. Despite being ranked first, Switzerland does not rank high in terms of education factors, whereas countries like Argentina, China, and Gulf Cooperation Council (GCC) countries rank comparatively higher in terms of education (Lanvin, 2014). Saudi Arabia (38th) is expected to rise in terms of level of education, implying that Saudi

Arabia has the potential to develop young people's interest in information technology (IT) and engineering careers (Lanvin, 2014).

Bloomberg ranking 2014. Bloomberg's (2014) list of most innovative countries in the world was comparatively different from GII's, primarily because of the indicators used to gauge innovative countries worldwide. Bloomberg rankings prioritize the intensity of R&D, productivity, high-technology density, research concentration, patent activity, manufacturing capabilities, tertiary efficiency (which measures the ratio of secondary graduates who joined post-secondary institutions), workforce with tertiary degrees, and workforce with engineering and science degrees. On the basis of the delineated indicators, Bloomberg ranked South Korea as the most innovative country across the globe. Meanwhile, Sweden and the United States were ranked second and third, respectively. The total scores out of 100 of South Korea, Sweden, and United States were 92.10, 90.80, and 90.69, respectively. These statistics shows the countries' ability to innovate based on the seven weighted factors mentioned above (Seung-Ah, 2014).

Japan, German, Denmark, Singapore, Switzerland, Finland, and Taiwan were ranked among the top 10 most innovative countries worldwide. Even though the total score of South Korea was the highest in terms of the seven aforementioned factors, it failed to be recognized as the leader in any of the factors. For instance, Israel was the leading country in terms of intensity in R&D and Luxembourg obtained first place in terms of productivity; meanwhile, Finland was ranked second in this area, with significant expenditure as a percentage of nation's GDP. South Korea was the third leading country in terms of R&D intensity (Lu & Chan, 2014).

Similar results were observed in four of the other categories, including manufacturing capabilities, density in high technology, patent activity, and tertiary efficiency. In particular,

South Korea ranked second in terms of patent activity and manufacturing capabilities, and third in tertiary efficiency and high-tech density (Lu & Chan, 2014).

In terms of high-tech density, the United States and Taiwan obtained the first and second positions worldwide, respectively. In contrast, China remained the leader in the manufacturing capability category. In the factor of tertiary efficiency, Canada and Taiwan ranked first and second, respectively. In the final factor of patent activity, Taiwan was recognized as the leader and South Korea was ranked second (Bloomberg, 2014).

Best practices of most innovative countries. In light of the Bloomberg and GII 2014 rankings, it was observed that the measurement criteria of most innovative countries were significantly different. In particular, the Bloomberg ranking measured the most innovative countries on the basis of only seven indicators, whereas the GII 2014 gauged 81 indicators (Dutta et al., 2014). For clarity and simplicity, the researcher will review only the top 10 countries in the Bloomberg ranking. As per the Bloomberg ranking, South Korea was deemed the most innovative country, followed by Sweden and then the United States of America. South Korea failed to receive the first position in any of the factors, but being among the top three countries allowed the country to be recognized as the most innovative. The following sections offer a brief description of the ways in which each country attained its position in the top 10 most innovative countries worldwide.

South Korea. The country was ranked among top three countries in five categories: intensity in R&D (third), manufacturing capability (second), high-tech density (third), patent activity (second), and tertiary efficiency (third). The country has enhanced its investment in the delineated factors, which eventually resulted in the country's growth and success (Bloomberg, 2014).

Sweden. With a total score of 90.80, Sweden managed to be ranked as the second most innovative country worldwide. Sweden's best practice was identified as consistent investment in R&D. As a result, the country has been able to offer unique products and services to customers across the globe (Bloomberg, 2014).

United States of America. The primary reason why the United States was ranked among the top three most innovative countries has to do with its high technology sector. Its number one ranking in high-tech density has allowed the country to specialize in achieving optimal benefits associated with technology (Bloomberg, 2014).

Japan. Japan's patent activity rank and intensity of R&D can be considered the reasons behind the country's success and growth. These findings imply that Japan has consistently offered customers innovative products that are protected under proprietary rights (Bloomberg, 2014).

Germany. Germany's manufacturing capabilities has allowed the country to offer superior quality products to customers across the globe. For instance, the cars manufactured in Germany are perceived to be of superior quality in comparison to cars manufactured elsewhere (Bloomberg, 2014).

Denmark. The concentration of researchers is the reason for Denmark's sixth position in the top 10 innovative countries worldwide. Denmark ranked third in the factor of researcher concentration. This factor implies that there are statistically more professionals engaged in R&D per one million people in Denmark than in other countries (Bloomberg, 2014).

Singapore. The country also specializes in researcher concentration, like Denmark. Singapore was ranked fourth in terms of researcher concentration (Bloomberg, 2014).

Switzerland. The production rank of Switzerland is higher than that that of the top 10 most innovative countries worldwide. This implies that the country has been focusing extensively upon production and efficiency (Bloomberg, 2014).

Finland. Finland is ranked ninth in the Bloomberg index due to its achievements in some of the determining factors. Finland's intensity in R&D followed by researcher concentration are the primary reasons behind the country's success and growth (Bloomberg, 2014).

Taiwan. Taiwan is ranked first in terms of patent activity followed by second rankings in high-tech density and tertiary efficiency. The continuous focus on the delineated factors has allowed the country to remain ahead of others in terms of competitive advantage (Bloomberg, 2014).

Discussion. The examination of each of the top 10 innovative countries, which is based on the Bloomberg (2014) ranking, shows the efforts dedicated by each country that allowed each one to reach its position on the index. Since Saudi Arabia did not appear on the list, the country could examine these top innovative countries in more detail and then benchmark its existing innovative environment to these countries. The Saudi Arabia SPELIT matrix will discuss the innovation environment of the country in more detail. The following subsection will discuss the concepts of both innovation and entrepreneurship.

Innovation and entrepreneurship. Entrepreneurship is a widespread phenomenon that many researchers have studied. The concept of entrepreneurship was defined by Link and Siegel (2007) as the "perception of opportunity and the ability to act on that perception" (p. 3). Carter, Gartner, and Reynolds (1996) defined entrepreneurs as individuals capable of developing a way to create new value or venture. They further divided entrepreneurs into three categories: individuals who started a business and became successful, individuals who gave up the idea

because it did not lead to success, and individuals who are still trying to find their way, describing these three categories as *evolving entrepreneurs*.

A great deal of literature has emphasized the impact of entrepreneurship on economic growth for any country. Pfeffer (1993) has researched the economic importance of entrepreneurship, demonstrating the economic significance of the profound emergence of this phenomenon. This entrepreneurial phenomenon is significant to economic productivity and workers' occupations in both advanced and emerging countries. An entrepreneurship survey conducted by the World Bank Group in 2007 showed a positive relationship between economic growth and entrepreneurship. The survey further postulated that countries that support entrepreneurship realize corresponding upsurges in their trade and industry development (Klapper, Amit, Guillén, & Quesada, 2007).

Johnson (2001) explored the relationship between two concepts being used for organizational development that are critical for organizational growth: *entrepreneurship and innovation.* Entrepreneurship and innovation both refer to various stages and aspects of the same process. Entrepreneurs use their capabilities to add value to the existing products or processes without harming them, whereas innovation is a necessary element to make a product or process happen in reality. Larger organizations are using these two concepts to define their strategic objectives and move from *what is* towards the future vision of *what should be* (Johnson, 2001).

Hasan and Harris (2009) explored these phenomena in their research investigating the connections between entrepreneurship and innovation and exploring their roles in organizational growth in all companies, but specifically in virtual companies. The researchers concluded that both concepts of entrepreneurship and innovation are considered critical elements for the sustainability of electronic commerce or virtual businesses in the long run. Moreover, they

considered these activities as central to organizational progress, so management must include them in their routines as well as consider them on a perpetual basis.

Crumpton (2012) has further debated the significance of innovation and entrepreneurship in contemporary economic situations and the leadership required by managers to bring these two factors into reality. Primarily, groundbreaking ideas come from cultures that encourage innovative ideas and entrepreneurs' intellectual abilities. Crumpton emphasized the role of leadership and noted that managers must create a culture that fosters innovation among employees, which will result in bringing new ideas and developing an entrepreneurial culture that enables the organization to grow economically and succeed in a dynamic environment.

Chatterji, Glaeser, and Kerr (2013) investigated the same concepts discussed previously using a case study approach. They examined the existing literature regarding the realistic application of entrepreneurship and innovation concepts in the United States that has caused a profound economic upsurge, finding that the United States has been working to generate strategies to stimulate entrepreneurship and innovation among people as well as companies. The objective behind promoting entrepreneurship and innovation is to reach long-term economical growth and achieve sustainability.

Chatterji et al. (2013) also offered best practices for fostering innovation and entrepreneurship, including widespread experimentation as well as cautious evaluation. Experimentation is a method that must be supported by governments and organizations, and managers must make people ready to take risks and tolerate failures in order to innovate. Careful evaluation of innovative ideas is another important method that can create innovativeness, as sometimes ideas are rejected without proper assessment in their first stage of development.

Moving from the lens of the economic perspective to the organizational perspective, Ndubisi and Iftikhar (2012) conducted a study to explore the connection among entrepreneurship, innovation, and superiority of performance in Small and Medium Enterprises (SMEs), finding that these three concepts are directly and positively correlated. Some features that were components of entrepreneurship were found to have key significance for entrepreneurial success or good performance, namely: the extent to which the company is willing to take risks, the degree to which the company is engaged in predicting uncertain events before they happen, and the extent to which the company is autonomous. Further, it was also concluded that the company's size has no effect on the development of innovation and entrepreneurship.

In his research study, Stam (2008) explored the role and nature of entrepreneurship and innovation with economic prosperity. The study demonstrated this phenomenon in the economy of the Netherlands, because in 2006 the country witnessed a huge increase in the number of primarily self-managed companies, which could be considered an indication of a flourishing economy. However, Stam pointed out that the Netherlands was far behind in entrepreneurial activities and thus in its economic advancement compared with other countries, as it had no innovational and entrepreneurial companies: the type of companies that are considered drivers for a country's economic growth.

Stam (2008) also considered additional factors to address the question of what actually stimulates innovation's impact on the economy, finding that research institutes or universities have a major role in generating innovation and thus economic growth. Since research centers and universities are hubs for people to launch their innovative capabilities, they are some of the most important resources for any company, as well as major innovative idea initiators. They allow

people to experiment and try their innovative ideas, and in turn help trigger innovation and entrepreneurship, thus boosting the economy of the country.

Lewrick, Omar, Raeside, and Sailer (2010) have explored ways to foster entrepreneurship and innovation in order to boost the economy. They found results consistent with Stam (2008), noting that entrepreneurship and innovation are derivatives of recognized university programs. They explored what drives innovation, entrepreneurship, and success, using high tech companies for their analysis. However, they found it was challenging to make a new company a huge success and added that doing so requires much more than merely good planning; rather, it requires continuous education that fosters successful innovation.

The aforementioned researchers discussed the relationship between innovation and entrepreneurship. As the setting of this research study is Saudi Arabia, the following subsection presents a discussion of innovation in Saudi Arabia.

Innovation in Saudi Arabia. For several decades, the economy of countries in the Middle East has been dependent on the natural resource of oil for their capital aggregation. These countries, including Saudi Arabia, are moving toward differentiating their structures and processes. Nair, Veeresh, and Eagar (2011) have described a way to attain this objective via fostering innovation in such countries. They have demonstrated that the governments in this area are involved in the adoption of some diverse initiatives to raise innovation by focusing on the statistics of Saudi Arabia, United Arab Emirates, Jordan, and Qatar, each of which has shown different ranks of achievement.

Saudi Arabia has been making developments since 1938, when oil, the most important resource at this time, was first discovered in the country. The passage of time saw huge increases in oil prices, which has made the country's economy flourish. Ochsenwald and Fisher (2010)

indicated that this economic success has enabled Saudi Arabia to work toward upgrading the country and fostering innovation. The inhabitants of the country have made steady progress toward a modern way of life. Such competitive environments are actually making it necessary to adopt new technological innovations.

Saudi Arabia is a dramatically transformed country when compared to the prior 50 years. It was previously considered an inaccessible desert, but the country has reformed itself into a modernized and well-developed kingdom. Saudi Arabia started its move toward innovation by converting the state-owned telephone and telegraph sector to a public company named the Saudi Telecom Company (STC), and then privatizing it in 2002. This is one of many strategic initiatives Saudi Arabia has undertaken to develop the communication and technology infrastructure and many of the vital sectors in the country (Gallagher & Searle, 1985).

Since the 1990s, considerable enhancements have been made in Saudi Arabia in terms of law, public services, communities, and technological development. Khorsheed and Al-Fawzan (2014) asserted that such developments signify the evolution of Saudi Arabia's economy, which was previously based on natural resources but that is now moving towards a knowledge-based economy. The Saudi government realized the need for this knowledge-based economy, as the country was facing many problems and needed to be able to compete economically in the Middle East region. Knowing it needed a long-term policy, Saudi Arabia wanted to aim for creating a knowledge-based economy, and this objective has resulted in the development of research academies and privatization of some industries.

Alsodais (2013) conducted a study of a long-term initiative taken by the Saudi government, known as King Abdulaziz City for Science and Technology (KACST). This initiative was the result of a strategic action as prescribed by the government and developed by

the Ministry of Economy and Planning, termed the National Science, Technology, and Innovation Plan (NSTIP). This national and long-term plan supports the cooperation of the private sector, where other private companies are assisting KACST to bring innovation within the NSTIP's agenda (The Ministry of Economy and Planning, 2012).

The main objective of the plan was to produce a knowledge-based economy by enhancing the country's most important human capital capabilities. The plan is further divided into some strategic actions that are currently under consideration, such as developing research and innovation events in academies to enhance young people's abilities, creating R&D research hubs for new products and services, providing resources for innovative procedures, shifting and limiting technology to the local base, and augmenting lawmaking and governmental contexts to encourage inventiveness and innovation (Alsodais, 2013). Moreover, the government is making a lot of expenditures for the advancement of education and research areas, as seen in many universities, to enhance the value of education for the new generation, as the government realized that building human resource skills is vital for the economy's success (Obeid, 2013).

Further, Alsodais (2013) has noted that numerous agendas are being recognized under the NSTIP plan. Such agendas are directed toward the tactical sectors, such as water machinery enhancement, information technology, use of innovative resources, nanotechnology, bio-technology, integrated circuit technology, transmission abilities, better gas and oil technology, petrochemical equipment, healthcare services and medical facilities upgrading, the energy sector, astronomical innovations, cultivation, and, most importantly, huge investments in the construction sector.

Bashehab and Buddhapriya (2013) examined the status of Saudi Arabia in terms of knowledge-based economic development and described the issues that resulted in this economic

transformation. Certain foundational concepts regarding the knowledge-based economy must be implemented to advance the economy, such as institutional ideals, improved educational system, R&D, and ICT. For that reason, Saudi Arabia has planned for the development of several projects at a time. Thus, the government of Saudi Arabia has begun investing in renovating the country's economy so that it will prosper and foster innovation.

Saudi Arabia's long-term project to evolve from an economy based on natural resources to an economy based in knowledge is being achieved by virtue of its tremendous initiatives. Alsodais (2013) described further the level of planning and implementation going on in Saudi Arabia. Certain dedicated investigation hubs within nationwide academies and other applicable government organizations have created a well-organized, cohesive system for transporting and restricting citizen expertise to the national level, and these start-ups are playing an important role in furthering the functions of technology incubators, high technology improvement hubs, and science parks.

To strengthen national innovation capabilities, the government has been searching for experienced, systematic, and practical studies in all of the strategic zones of technology. A large number of systematic and procedural collaboration contracts have been signed with trustworthy worldwide organizations for the enhancement of experience and obtaining the competencies required. Additionally, among the many initiatives, an STI (Science, Technology, and Innovation) Human Resources Program is responsible for many progressive functions, such as launching and facilitating the creativity and scientific innovation centers; allocating higher education scholarships; and devising a program for research, inventiveness, and novelty in public education, as well as the recognition of Saudi eminent scientific scholars (Alsodais, 2013).

Another major development was the establishment of the Technology Development and Investment Company (TAQNIA), which is owned by the Saudi Arabian government. TAQNIA was created specifically to amplify the outcomes of national research for commercial as well as industrial purposes and is considered to be an additional sign of Saudi Arabia's promise to engage in innovation and technology development (Alsodais, 2013).

Entrepreneurship in Saudi Arabia. Saudi Arabia is an emerging country in terms of entrepreneurship, thus there is very little literature regarding this issue. Rahatullah's (2013) infers that entrepreneurial activities are relatively novel to Saudi Arabia. Though, appreciating the prominence of the SME segment, the Saudi Arabian government has taken steps to enhance entrepreneurial development.

Bokhari, Alothmany, and Magbool (2012) investigated entrepreneurship in Saudi Arabia, conducting empirical and theoretical research in order to understand the entrepreneurship that is becoming more prevalent among Saudi Arabian young people. In their working paper, they found a positive correlation between unemployment and the concept of entrepreneurship. Many young people in Saudi Arabia are facing the problem of not obtaining market employment; thus, they substitute market jobs with entrepreneurial activities, which has caused Saudi Arabia's economy to grow. To help mitigate the unemployment problem, the study suggested encouraging young people to engage in entrepreneurial activities in order to become self-employed.

Scholars have been particularly interested in the concept of women's entrepreneurship, especially in a country like Saudi Arabia, due to the many cultural barriers that may hinder their entrepreneurial activities. Minkus-McKenna (2009) investigated entrepreneurship in Saudi Arabia by interviewing many women entrepreneurs. The researcher presumed that Saudi women would face cultural obstacles and societal issues in the course of entrepreneurship, but in reality,

these women face issues that are similar to the issues being faced by entrepreneurs from all over the world. Overall, Saudi women experience some minor government and religious resistance, but they are negligible. In contrast to other countries, funding is readily available for them, and numerous Saudi women are highly educated.

Technology innovation. The term *technology innovation* or *technological innovation* is often used synonymously with technological change; however, the two concepts differ slightly with regard to level of specificity. It is to be noted that, in this particular study, the term innovation specifically refers to technology innovation and does not include other forms of innovation. According to Badger et al. (2011), technology innovation is "the process of creating and implementing new technology, products, and production and service capability" (p. 127). Technological innovations refer to disruptive ideas that are diffused and then change people's lives, such as Google, YouTube, email, etc. Hill and Utterback (as cited in Bagherinejad, 2006) defined technological innovation as "a major agent of development and change in societies which has been linked to rising productivity, employment growth and a strong position in export market, trade and improved quality of life" (p. 363).

Developing technology in countries such as Saudi Arabia is of great importance, especially for improving the industrialization process (Bagherinejad, 2006). To advance and grow its economy, Saudi Arabia needs to improve the pace of its industrialization process, which is dependent on technology innovation activities. Therefore, the country started to create an innovation climate to support technology innovation. Many initiatives and policies have been submitted to promote innovation efforts, extend support for the entrepreneurship ecosystem, and overcome barriers to generating technology ideas in the country. As part of creating a culture of innovation, Saudi Arabia started launching and encouraging the establishment of technology

innovation centers. The following subsection discusses the innovation center concept in more details.

Technology innovation centers. Many organizations, especially multinational companies, have realized the importance of implementing innovative ways of doing businesses. Improving products and services and finding newly innovative solutions and processes has become a necessity in order to remain viable and build competitiveness. Companies such as GE and 3M are progressively moving towards innovative technologies in order to thrive. They established technology centers in Saudi Arabia, known as innovation centers, to develop their existing products and services or come up with new technologies that will add to their existing successful business lines.

Innovation centers concentrate on speeding up the early development of innovations and upgrading different prospects for joint efforts and ventures across different organizations (Goddard et al., 2012). Innovation centers give researchers, business visionaries, and developing organizations that are focused on initial stage opportunities a one-stop resource to access science and technical experts who can encourage joint efforts. Innovation centers also secure novel coordinated efforts that speed improvement of those developments to fulfill unmet needs (Kahn & Dempsey, 2012).

According to Thierstein and Wilhelm (2001), incubator, technology, and innovation (ITI) centers are a new method of conducting business in the market. Political and public understanding of their presence in the field as well as their capacities is quite weak. There is no standardized understanding of ITI centers; instead, an extensive variety of ideas is used continuously in the general population and also in the experimental, systematic discussions that included, but were not limited to: research parks, technology centers, and start-up initiatives

(Luger & Goldstein, 1989; Sternberg, 1988; Thierstein & Wilhelm, 2001). A simple way to recognize these centers is to search for business incubators and innovation centers that generally offer office space and developmental tools and services outfitted to their particular customers.

Sternberg, Behrendt, Seeger, and Tama (as cited in Thierstein & Wilhelm, 2001) characterized these centers as an "allocation group of moderately youthful and for the most part recently established endeavors whose actions mostly comprise in the advancement, the creation or the promotion of excellent innovative businesses, and frameworks" (pp. 316-317). The main objectives of Saudi innovation centers are to accelerate the use of new technologies in the country, foster national industry, and raise the competitiveness of the country's economy in the international arena. Additionally, these centers help with the economy's structural change to expand the rate of new business growth and advance the country's economy by creating more jobs.

Innovation needs to be a daily element of society, and achieving innovation relies on proper planning, support, and execution of the innovation model. Thus, to bring innovation into the organization or country, it is necessary to build a culture that fosters the innovation process, and management or policymakers within the firms or country must concentrate on implementing and maintaining proper leadership skills to introduce innovation.

Leadership

To create a culture of innovation, it is essential to bring in leadership that will help in developing innovation and entrepreneurial activities. Thus, it is important to understand the concept of leadership. Northouse (2010) put forth the idea that leadership is "a process whereby an individual influences a group of individuals to achieve a common goal" (p. 3). Robbins and

Judge (2010) presented a similar definition of leadership to Northouse's, stating that leadership is "the ability to influence a group toward the achievement of a vision or set of goals" (p. 160).

Organizations typically view leaders as the managers who are working in a supervisory position and directing their employees. This difference between managers and leaders has been a focus of debate for many years. Zaleznik (1992) conducted a study regarding the difference between these two concepts, finding that, contrary to common practice, the two terms are quite different. Both differ with regard to the behavior needed to realize their goals; managers are focused on objectives because they need them to be achieved. By contrast, leaders try to focus on people's interests. Their concepts regarding work are also diverse; managers tend to be risk avoiders and leaders are generally risk takers. In terms of building relationships with employees, managers are considered to be unfriendly. In contrast, leaders are seen as emotionally attached to the people working with them. The two heads of business also view themselves in different ways; a manager sees himself or herself as part of the company, whereas the leader sees himself or herself as outside of the company and fosters outer environmental conditions too.

There are several different types of leadership. Among these types, the most widely recognized are *transactional* and *transformational*. Many researchers have studied these two different types of leadership. A transactional leader identifies what his or her subordinates are trying to achieve from their work and is always focused on whether or not the subordinates are getting what they want and need. If this type of leader sees any issue with the subordinates' performance, he or she encourages them by giving recognition and prizes for their hard work. He or she recognizes the subordinates' objectives only when the work is being done successfully (Bass, 1997).

Den Hartog, Van Muijen, and Koopman (1997) defined transformational leaders, also known as *charismatic leaders*, as leaders who express a genuine vision of the future and then share it with followers. Transformational leaders encourage followers logically while giving consideration to the conflicts among them. With such powerful vision and inspirational personalities, these leaders can alter the ways followers perform, inspire others, and include the whole organization in their vision.

Kirkpatrick and Locke (1991) conducted a study of various leadership traits. The study presented an argument regarding whether or not these traits are actually relevant to leadership. Additionally, they explored whether adoption of these traits guarantees the leader's goals are achieved and the project is a success. Some of these characteristics include taking initiative, being visionary, an inspirational personality, being trustworthy, confidence, being willing to take risks, innovativeness, flexibility, and humility. Such characteristics aid leaders in achieving certain leadership skills that are important when taking the organizational goals and transforming them into reality.

There are also different leadership theories regarding the perceptions of followers, which Bennett (1977) strived to describe. Such perceptions actually have a great impact on the results of the leadership process, as these mental impressions set the terms of the relationship between subordinates and leaders. These perceptions are involved in creating either a feeling of distance or a good relationship between leaders and followers.

Researchers have developed two theories regarding the traits and characteristics of leadership: *implicit* theory and *explicit* theory. Explicit theory studies a leader's actual behaviors compared to his or her overt or explicit behavior. In implicit theory, a leader's inner behaviors are studied and investigated; these are summarized into *cognitive models*. Lord, Foti, and Phillips

(1982) have argued that these cognitive models affect the perceptions about leadership that were described by Bennett (1977). These mindset perceptions of a leader's evolves from cognitive models, so every leader has some behaviors and personalities regarding his or her cognitive model.

The effect of a leader's cultural background that emerges in his or her cognitive model is also evident in many research papers. Lord and Maher (1991) stated that cultural backgrounds affect perceptions about leaders in such a way that followers will conform to any specific trait of a leader only if their culture supports it. Gerstner and Day (1994) have also investigated the cultural impact of leadership traits and noted that leadership personalities and behaviors have a strong effect on cultural norms and values.

Casimir and Waldman (2007) tested leaders' traits or characteristics by using a case study approach. They investigated the importance of traits for effective leadership and concluded that the prominence of leadership traits is established by recognized social norms and by the necessities of the leadership role. Moreover, they found that that traits considered to be high-level were associated with charismatic or transformational leadership, as was expected, whereas traits considered to be low level were associated with transactional leadership.

Ahn, Ettner, and Loupin (2012) studied leadership traits from a values-centered standpoint and tried to identify key components of leadership, such as culture, values, and vision. They postulated that a values-based notion of leadership has yielded some important components, such as clear vision and establishing a resilient culture. They described eight key leadership values: honesty, upright judgment, leadership by illustration, decision-making skills, belief, impartiality/equality, humility, and wisdom.

Further, P. Smith and Sharma (2002) suggested that leadership qualities must be present across the entire organization. Leadership qualities do not depend on the authority or power of the individual, such as managers. Rather, leadership qualities and traits can come from anywhere or anyone in the organization. Thus, to gain a competitive position and sustain organizational success, people in the organization must demonstrate responsibility towards their duties and the organization as a whole. As a result, leadership traits or behaviors should be exhibited by all the employees of the organization and not leaders only.

Leadership and innovation. According to Hesselbein et al. (2002), "leadership is needed to support innovation in organizations and communities across the country and the world. It must be leaders who focus on performance and results and then discover all the ways for success to travel" (p. xv). Leadership and technological innovation are interrelated; both have implications regarding organizations and entire economies. The reason behind this synergy is that leaders are able to foster innovation in their followers by using their leadership skills. Leaders must transform their visions about the organization into reality, but they must also create a culture that can breed creativity among employees to gain sustainability in a dynamic environment.

Crawford (2001) oversaw and completed a study in order to investigate the association between innovation and leadership. There has been much debate among theorists regarding whether the two concepts are overrated in organizations, and Crawford presented some useful information regarding this issue. His research concluded that innovation and leadership were positively correlated. Innovation has a considerable relationship with transformational leadership aptitudes. One possible reason behind this relationship is that a transformational leader is able to

experiment and accept changes as well as encourage his or her followers to accept creative solutions.

The same connection between leadership and innovation was also explored by Selman (2002), who revealed that innovation and leadership are intricately connected. Leadership is critical in order to yield improved prospects, which has made it a necessity for leaders to be innovators. The concept of innovation is also closely connected with transformation or bringing change into the organizational process, product, or service. Whenever a change is announced, it generates feelings of anxiety and stress among the employees. During a time of change, the leader needs to help employees, making them more open to accepting the change, reform, or innovation. Therefore, the important relationship between innovation and change is connected with successful leadership.

Carneiro (2008) further elaborated on the relationship between leadership and innovation. Firms must develop innovative structures and technologies because many competitive pressures drive organizations to do so, making it necessary to bring an effective innovation system into organizations. In order to achieve long-term sustainability, management must consider their strategic process carefully. Therefore, leaders play an important role in developing strategies for an effective innovation management system. Carneiro further suggested that leaders must encourage behaviors that breed creativity among employees. Additionally, he suggested that bringing strategic leadership into the organization could yield positive results, fostering innovation and long-term sustainability. Strategic leadership is of profound importance in that it can elicit real creativity from innovators or entrepreneurs and can safeguard and improve the organization's competitive position. Thus, organizations must focus on developing strategic

leadership skills that complement the development of effective innovation management systems in order to achieve sustained success.

A white paper by Scandura (2009) has posited a similar kind of relationship between organizational leadership and strategy in most high-tech or innovative companies, asserting that the two concepts of leadership and strategy are interrelated. Scandura argued that it is still a difficult task to build something innovative that one's competitors lack, but the most important and challenging task occurs when the competitor has also developed something similar to whatever the organization innovates. When leaders do not focus on competitive strategies and a continuous stream of innovations, problems may often arise. Firms must consistently develop strategies and create novel products in order to achieve and succeed.

Makri and Scandura (2010) conducted a study similar to Scandura's (2009), discussing the importance of the relationship of strategic leadership to innovation and success. They further postulated two perspectives related to strategic leadership—*operational* and *creative*—for the uppermost directors of high technological companies. *Creative* leadership reveals a Chief Executive Officer's (CEO's) focus on supporting organizational societal and human resources and capitalizing on the company's inner knowledge creation department. Compare this concept with *operational* leadership, which focuses on a CEO's skill to discover innovative tracks of development along with redesigning the prevailing ones by re-describing and spreading the limitations of the company towards innovative products and market spheres. Since the CEO plays an important role in creating the company's vision, he or she must show strategic leadership skills that will foster innovation, which is a significant competitive strategy that enables the company to compete effectively.

Leading Innovation

Leading innovation is as important as fostering innovation and has significance for the success of the businesses. Leading innovation necessitates an understanding of the global environment and the capacity to teach the system to others. Human capital is paramount in understanding and executing the innovation procedure (A. Cohen, 2004). Leaders must understand that collaboration among all stakeholders is vital and recognize that information can come from followers and or partners in order to take advantage of their abilities and talents. Leaders must be energetic about creating and building a learning organization (Bixenman, 2007; Liker, 2004). Executive leadership must provide clear guidelines and leadership to stimulate, energize, and reward exercises that support innovation (Bixenman, 2007; Davila, Epstein, & Shelton, 2006).

Leading innovation necessitates that leadership and management understand coordinated effort, communication, and relationship building. Leaders must encourage communication within the organization and remotely with the eagerness to change the status quo and enhance the innovation environment (Bixenman, 2007; Davila et al., 2006). Leaders must convey the vision, internalize a form of values with business partners, and execute a more responsive structure of governance on all levels. The vision must supplement the business partnership in order to achieve and extend development for all the people that are involved. Leadership from the top to the bottom of the management pyramid must interpret the vision, get the message out, and react energetically to new business courses and trends. To lead technology innovations effectively, leadership must be free from predominant behaviors and espouse collaboration and a shared vision (Bixenman, 2007; Sanford & Taylor, 2006).

Katz (1964) suggested a course that leads towards innovation. According to his research, organizations should develop their human resources' intellectual properties that can bring more innovation in the organization. Human resources are the most important form of capital that any entity can maintain, and organizations can achieve long-term success by developing their employees' intellects, which in turn helps them create knowledge-based competencies. Katz further postulated that organizations need to develop their structures and processes based on the notion of knowledge.

Jong and Den Hartog (2007) developed an important conceptual framework that can be used to lead innovation among individuals. They presented the ways in which a leader can better influence his or her subordinates' innovative behaviors, indicating that a leader has the strength to develop innovative behaviors among individuals. Jong and Den Hartog described six behaviors that leaders can implement to foster innovation among others. First, they must be role models for innovative behavior. Since followers must follow leaders, a leader has to engage in activities that can be considered innovative, such as struggling somewhat in doing an innovative task. The next behavior is to stimulate intellectual ability—in this case is the intellectual ability of innovators or entrepreneurs—by listening to them and helping them focus on creating novel ideas. Leaders must also encourage open communication to create knowledge for their followers or employees. A leader must provide a comprehensive, achievable vision to his followers; the entire road map must be understood easily by all the followers. Leaders must provide consulting services to establish friendly relationships with others with whom they are working or partnering. Leaders who are monitoring or checking behavior should do so in a way that supports others' creativity and draws them into the implementation phases. Some events must be arranged for the purpose of bringing knowledge creation and its diffusion among their followers' intellectual

property. Leaders should not anticipate similar behaviors from all the followers; rather, they must accept each person's own behavior in bringing innovation. These are some ways that leaders stimulate technological innovation among followers and or partners.

Deschamps (2005) argued that there must be different leadership skills for different innovation strategies since different kinds of leaders are working in the market. Front-end leaders are trying to identify the customers' needs and then making products according to their assessments. These leaders must possess skills to foster innovation in their products and services; for that reason they have to focus on the customers' or users' innovation needs. Front-end innovation leaders are likely to be categorized by a variety of exclusive abilities, such as frankness and inquisitiveness about the outside world, thoughtfulness, persistence concerning consequences, willingness to take risks, readiness to experiment, and acceptance of disappointments.

In contrast, back-end innovative leaders have to be dependent on quick deliveries to the market and try to shorten the period of time-to-market with the intention of gaining rewards for entering into the market earlier. Such leaders deal with real but dangerous responsibilities such as engineering challenges, manufacturing, and creation and introduction of new products and services. In many cases they have to deal with some of the organization's external connections, such as suppliers and governmental interventions. They are involved in many complex procedures because their goal is to enter into the market before their competitors so their skills are mostly strategically based. They need to bring innovation into their strategies in order to compete within such dynamic market situations (Deschamps, 2005).

Lorange (2000) further explained leading innovation in his innovative leadership skill research regarding top-down and bottom-up approaches. The leader must create a helpful setting

that inspires entrepreneurs to chase their visions and interrelate information universally. An important driver of bottom-up innovation is an organizational culture that permits knowledge interchange, facing threats, research, and learning from disappointments. In the top-down style, technology innovation leaders take the idea, describe the goals, and organize their followers behind groundbreaking developments. An important driver of top-down innovation is a structured procedure that is initiated with a vision.

Von Stamm (2009) described the importance of cultural values in leading innovation, offering some ways to create a culture that is favorable to innovation. To lead innovation in any organization, it is crucial to develop an innovative culture that is the main driving force for innovative practices. Leaders must focus on developing a sense of responsibility among followers. They should also foster a culture of empowering followers and partners to experiment and learn more by testing their ideas and learning from mistakes. Such developments can lead to many challenges. As a result, the leaders must have a great level of tolerance to face failures as well. There would be no innovation without experimentation and there would be no learning without failures. A positive and open culture reframes the concepts of *failure* as *learning*. Such a culture must be developed in order to lead technological innovation.

Barsh, Capozzi, and Davidson (2008) have explored some important considerations regarding innovation and leading innovation. The senior management of any organization mainly focuses on identifying innovation capacity among their followers. They crave the creation of new ideas and making them reality, but in the whole process, they forget to lead this innovation. Many theorists have argued that innovation is the responsibility of top management, and they usually think subordinates play no role in this process. However, Barsh et al. (2008) rejected this point of view, instead considering the innovation process as part of all the visions, goals, and

objectives of the company. In any organization, basic procedures and strategic initiatives must be built around their strategy for innovation. As discussed previously, every innovation has its own different kind of strategy. Leaders' behaviors also play an important role in bringing innovative encouragement among their followers.

Applegate and Harreld (2009) used a case study approach to emphasize innovation and its leading strategies, studying many innovative companies. The authors noted that today's organizations must not only survive, but also compete with breakthrough technologies and information systems. In such a turbulent economy, organizations will face challenges; however, challenges should be a motivation to companies and considered as opportunities for growth growth. Leaders need to take advantage of such opportunities and look for breakthrough innovations that will yield growth in their global competitive economic markets. Additionally, leaders should not only utilize existing resources but also look farther and exploit new ones in order to stay ahead in their markets.

Hood (2007) examined change management that is the result of the innovation process and how a leader has to cope with the challenging situations it poses. Hood's study sought to analyze the explanations and situations of strategic change creativities and how organizations and their leaders' conduct can go wrong if they are not properly addressed and managed. Strategic solutions must be implemented to address management problems. Whenever innovations are introduced in organizations, employees face a lot of stress and have difficulty coping with the resulting anxiety. In these situations, leaders must provide a solution that can motivate employees toward adopting the new technology and making employees aware of the reasons why this new technology will benefit the organization. Moreover, they must make employees feel that it is a two-way benefit, or a win-win situation to the company as well.

Eisenberg (2011) argued that another concept be brought in to increase innovation in businesses: the lead-user research approach. Lead-user research can help firms expose unfulfilled customer needs and the novel ideas or solutions that leading users are developing to meet those needs. Such a new method is better able to achieve success in today's competitive business environment. This concept differs widely from simpler customer-focused techniques. Rather, it tries to seek out more understanding, not only from customers but also from lead-users: individuals who are far in advance of the industry with their creative mindsets and have no option but to come up with creative solutions that satisfy their desires.

Pagon, Banutai, and Bizjak (2008) discussed additional leadership competencies, focusing on the leadership skills that can provide better solutions to lead innovative ideas. They pointed out that leaders are role models who are in a position to lead by example. The values and attitudes leaders exercise can be inspiring for others and leaders should expect their followers to follow their lead. Thus, their study stressed the importance of leaders adopting and exercising a number of leadership competencies such as multicultural skills, emotional intelligence and self-control, planning and decision-making, mentoring, understanding, an innovative mindset, and a sense of appreciation.

According to Thach and Thompson (2007), some leadership skills are still effective over time and are considered to be necessary in order to support the most effective leadership process. These skills include goal setting and vision, communication or interpersonal skills, awareness of one's character or self-knowledge, and experience or technical capability regarding the particulars of the business in which the leader is operating. In addition to these competencies, other common competencies exist in both for-profit and non-profit organizations, including honesty, creating a positive environment for diversity, developing and growing others, change

management, decision making, problem-solving skills, political practicality, being a visionary, customer focus, team leadership skills, inspirational skills, and social and environmental accountability.

Fu, Li, and Si (2013) studied the effects of leadership on fostering innovation. They investigated some leadership approaches, such as authoritarianism and benevolence, in encouraging or discouraging two types of innovation: exploratory or radical innovation and exploitative or incremental innovation. Radical innovation is intended to bring breakthrough products or processes, whereas incremental innovation is intended to make improvements to existing products and processes. In authoritarianism, leaders avoid changes and adopt a pessimistic approach toward conflicts. Benevolence is an approach where leaders encourage others to discuss and create knowledge from the conflicts that emerge. According to Fu et al., during the innovative idea generation period, the two leadership approaches have different effects on the two aforementioned innovation activities.

Authoritarianism has no significant impact on radical innovation and hinders incremental innovation because these leaders do not tolerate conflict and group knowledge creation techniques. Rather, they try their best to avoid conflicts that many researchers consider to be the source of radical innovation. However, benevolence has a stimulating effect on both radical and incremental innovation. Leaders that possess this quality are more involved in knowledge sharing and can better tolerate conflict than leaders that do not. Fu et al. (2013) suggested that it is beneficial to use a benevolent leadership approach in the contemporary business environment in order to lead innovation.

Benner and Tushman (2003) argued that in the current business climate, there are only two techniques for updating organizational capabilities and achieving adaptability in such a

dynamic and challenging environment: incremental and radical innovation. Therefore, organizations must find better ways to lead these two kinds of innovation for their long-term sustainability.

Newhall (2012) presented a global forecast regarding leadership skills that offers insights into the leadership qualities needed in the future. Newhall concluded that some skills are common and only four skills seem to be critical for leadership success: executing organizational strategy, developing other employees by coaching, fostering learning, and stimulating and managing change. Additionally, two skills were thought to be important to achieving success in the future environment: recognizing and developing talent, as well as nurturing inventiveness and innovation. The study found a vast discrepancy between the skills needed for better leadership and the skills actually present in existing leaders.

Newhall (2012) found that the most important leadership skill involves nurturing innovation among others, which can be accomplished by empowering them to experiment and building a culture that enhances their intellectual capabilities. Newhall also noted that employee or follower satisfaction and retention is another critical outcome for leading innovation successfully. Since the employees of the organization are the bearers of innovative ideas and organizations are trying to develop their intellectual capacities to promote innovation, they must be satisfied in a way that allows them to be retained long-term. Therefore, leadership should strive to satisfy innovators or entrepreneurs by inspiring and motivating them as well as building strong relationships with them so that they feel a sense of ownership of their work.

On the whole, it is not known to what degree leadership influences adoption of technology innovation in Saudi Arabia. According to Robertson and Al-Zahrani (2012), there is a gap in empirical research in this area, which has resulted in stereotypes that tend to be largely

inaccurate with regard to the adoption of technology and innovation in Saudi Arabia. The notion of innovative leadership practices in organizations is becoming widely recognized, but in reality steps to actually develop innovation are slow to be adopted (Aarons & Sommerfeld, 2012). The literature is incomplete with regard to addressing organizational innovation in a company-wide context. There is some evidence of the establishment of connections between organizational innovation and leadership (Robertson & Al-Zahrani, 2012). However, the end results have been inconclusive thus far, particularly regarding the way in which innovation that is encouraged by leadership affects the performance of an organization. A broad-based study of leadership is absent from the general literature, particularly regarding the role leadership plays in facilitating technology innovation practices. For that very reason, the need exists to research leadership skills that can better manage and facilitate innovation and/or technological innovation among individuals, groups, or organizations.

Saudi Arabia SPELIT Framework

As stated earlier, this chapter will use the SPELIT power matrix framework to understand the opportunities and obstacles facing the Saudi Arabian technology innovation environment. The SPELIT power matrix provides a visible picture of the different environmental factors and or driving forces affecting a country or organization (Schmieder-Ramirez & Mallette, 2007). Understanding these driving forces helps to reinforce or extend the existing Saudi policies about innovation. Table 2 presents the Saudi SPELIT power matrix.

Table 2

SPELIT Power Matrix for Saudi Arabia

SPELIT Drivers	Driving Force 1	Driving Force 2	Driving Force 3	Driving Force 4	Driving Force 5
Social	Authority relationship, low self regulation (-)	Male dominance, Women becoming more self-achievers	Sixty percent of population below the age of 30 (+)	Socially active, high values for teamwork (+)	Decisions generated at the top, centralized (-)
Political	Absolute monarchy. High authority & power on every aspect of the government	Visible efforts towards change & progress. Transformational leadership (+)	High bureaucracy & referent power. Administrative corruption (-)	Reform towards educational excellence (+)	Improved women rights & appointing some in the Shura (advisory) Council (+)
Economic	Command economy is oil; 90% of export earnings; 75% of budget revenues (+)	High unemployment rate (over 10%) (+/-)	Economic reform especially to energy, technology, entrepreneurship, health, transportation (+)	Strong & ongoing infrastructure spending (+)	Knowledge Economic City, $7b initial investment (+)
Legal	Law is solely based on Islamic law (Sharia)	Member of the WIPO since 1989 (+)	Lack of legal support for SMEs (-)	New Patent law enacted in 2004 (+)	Labors are highly protected by the labor law. Efforts on reforming labor laws & rights (+)
Intercultural	Diverse workforce are always welcome (+)	Exposure to global practices (+)	People values & ethics are derived from Islamic manner	Opens towards international business relations & increase focus on global customers (+)	Respect other cultures (+)
Technological	Growing infrastructure of IT market (+)	Low levels of innovation due to low investment in R&D (-)	Increase Ecommerce transactions (government & banks) (+)	Tech savvy young people (+)	Strong landline & cellular base (+)

Note. The (-) refers to a negative factor and the (+) refers to a positive factor. Adapted from *The SPELIT Power Matrix: Untangling the Organizational Environment with the SPELIT Leadership Tool* (p. 151), by J. H. Schmieder-Ramirez and L. A. Mallette, 2007, North Charleston, SC: Booksurge. Copyright 2007 by the authors.

Social environment. The Saudis are socially active people. They like helping one another and other people even if they are outside of their community circle. They place a high value on teamwork, which is a positive driving force since the technology innovation community requires a high degree of collaboration and teamwork. Additionally, the population density of the young people who are considered a major driving force for adopting or introducing new and innovative ideas offers great potential for building a successful technology innovation base (Fatany, 2013).

In contrast, the general style of authoritative relationships in the country affects the performance of many organizations; this style exists in Saudi social life too. Authoritative relationships that create a centralized decision-making could exist in innovation centers, which may affect the overall objectives of those centers. In addition, being a low self-regulated society also plays an important role (Fatany, 2013). Self-regulated refers to a person's feeling towards transition or the introduction of new ideas or processes. Being hesitant to change or show trust could hamper creativity and innovation. These issues create an obstacle for building a leader-follower relationship due to lack of leadership practices (Schmieder-Ramirez & Mallette, 2007).

The dominance of men in the social context and businesses environment is highly visible in Saudi Arabia. Due to the culture's complexity, women in Saudi Arabia have limited job options and their participation is limited to certain sectors. However, during the 2000s, the Saudi Arabian government made tangible efforts to liberalize the women's workforce and encourage more female participation in both the government and private sectors. In 2013, the King issued a royal decree granting Saudi women 30 seats in the Saudi Consultative Assembly, an advisory body to the Saudi Council of Ministers, which is led by the King (Fatany, 2013).

Thus, women in Saudi have become greater self-achievers and the new measures the government has taken to enhance their participation pushed many of them to play more prominent roles in society. Sadi and Al-Ghazali (2010) found that the motivation behind Saudi women starting businesses in Saudi Arabia was self-achievement. Even though these women faced some prominent obstacles—such as the limitations of customs and norms, absence of market knowledge, shortage of provisions from the government, and market dominance by some stakeholders—this did not prevent them from stepping forward.

Political environment. Matthes, Otto, Schützhold, and Seibold (2007) have reported comprehensively on the political system of Saudi Arabia. They noted that the royal family dominantly controls the political system of the country, adding that Saudi Arabia is an absolute monarchy led by the Custodian of the Two Holy Mosques, the late King Abdullah bin Abdulaziz Al-Saud who was succeeded by King Salman bin Abdulaziz Al-Saud. However, in the post-September 11, 2001 environment, there have been many internal and external pressures regarding political transformation in the country. This has resulted in a reorganization of the country's political system. In fact, the King is adopting a more transformational leadership style, which is visible in many of his initiatives for change and reform. Thus, the government of Saudi Arabia is now focusing on a steady and transparent reorganization program for supporting organizations as well as improving the overall political system of the country.

Although reforms are taking place, extremist scholars have demonstrated some opposition. Even so, due to the King's strong backing for these initiatives, all efforts to block progress were turned down. For example, King Abdullah University of Science and Technology (KAUST) was condemned by extremist scholars due to its lack of gender segregation. However, the King approved of and inaugurated the university personally. In fact, the government supports equal opportunity by offering leadership positions for women in the public sector and encouraging the private sector to consider women for leadership positions as well. This is a positive driving force for technological innovation initiatives that shows the strong will and support of the government to move forward (Fatany, 2013).

In addition, major reforms have been initiated regarding educational excellence. The government approved the establishment of a number of universities in different provinces to accommodate high school graduates, as well as a long-term scholarship program for Saudi

citizens. The aim of such programs is to raise literacy, reduce the pressure on local universities, and provide the country with culturally experienced workers who are equipped with a global mindset. Additionally, major financial support has been provided for scientific research projects and technology innovation centers, such as technology incubators, to develop a technological base in Saudi Arabia (Fatany, 2013).

Saudi Arabia has taken on the burden of fighting corruption in all its forms. Corruption has been highly noticeable in Saudi administrative transactions and sometimes in infrastructure projects. For example, the reason for the slow pace of implementing infrastructure projects in Saudi Arabia used to be the lack of institutional agencies to follow up on the country's projects. Recently, the government launched an agency responsible for fighting corruption on all levels and monitoring the performance of the existing planned projects (Fatany, 2013).

In general, Saudi Arabia can be characterized as possessing high referent power in that people with close relationships to authority or power are usually served better. This is the case with most Saudi organizations. For example, many people are employed because of their referent power in that organization. This could be the case in innovation centers as well. Referent power could play a role in accepting the wrong applicant for technological incubation and eventually causing low performance and poor results (Schmieder-Ramirez & Mallette, 2007).

Economic environment. Al-Shahrani and Al-Sadiq (2014) conducted an empirical study on the economy and spending of Saudi Arabia. They have observed tremendous economic growth in the country, explaining that Saudi Arabia is considered to be a wildly mounting economy in the Middle East. The economy of Saudi Arabia hinges cripplingly on the oil sector, from which about 90% of the country's revenue is derived. Eighty eight percent of the country's export income comes from oil exportation, and oil accounts for 33% of the Gross Domestic

Product (GDP). Such huge economic growth is the result of savings and increased oil prices in recent years.

Joharji and Starr (2010) also investigated the growth in Saudi Arabia's economy, conducting an assessment from 1969 to 2005. They found that the Saudi Arabian government has been making huge capital outlays over the decades and even in recent years. Saudi Arabia has been able to do so because of its higher level of savings due to increases in oil prices. Such expenses contributed a great deal to the positive progress of the economy. However, the existing spending has wielded greater influences on economic development in the non-oil segment.

Li and Jin (2012) also pointed out that Saudi Arabia has a higher level of savings rate than any other country, also due to increased oil prices. Accordingly, this encouraged the country to start many developments in the education, healthcare, entrepreneurship, construction, energy, and technology sectors. As a result, funding and supporting more technological innovation projects would not be an issue for the country since part of its strategic developmental plan is to focus on becoming a knowledge-based society. This is evident through the launching of a knowledge economic city with an initial investment of $7 billion to support the country's strategic goal of becoming a knowledge-based society (U.S.-Saudi Arabian Business Council, 2013).

Regarding the entrepreneurship segment and Saudi women's contribution to the economy, Shmailan (2014) investigated the entrepreneurship phenomenon among women in Arab countries and their reasons for entering into entrepreneurship as well as the hurdles they are facing. There was some evidence that the government of Saudi Arabia is supporting women to enter into the business world, but women must also face other social, cultural, and religious obstacles as well. Until now, a number of women have established and developed successful

local and regional businesses in Saudi Arabia, contributing effectively to job creation for Saudi women and fostering the economy as well.

In contrast, the high unemployment rate represents an obstacle and/or a deficiency in the country's economic progress. Nevertheless, the government is implementing certain measures to overcome this problem, beginning by enacting laws that support primary employment for Saudis called *Saudization*. They also launched an unemployment fund to temporarily support unemployed citizens for a maximum of 1 year or until they become employed, whichever comes first. This unemployment obstacle could be overcome in favor of supporting more innovators and entrepreneurs interested in technology innovation to pursue their ideas and establish start-up companies or projects that could create jobs and help lower the unemployment rate (Fatany, 2013).

Legal environment. Saudi Arabia's legal framework is based on the rules and regulations of Islamic Sharia that follows the Holy Quran and the teachings or sayings of the Prophet Mohammed, known as *Sunnah*. Thus, the King has limited power over the constitution, which is dictated by the rules of Islam. Bait-Almal (2000) discussed some of the legal aspects of the country, noting that Saudi Arabians are considered to be very conventional and devout people. Saudi Arabia's social system, culture, and political system are established around the country's religion, which is Islam. The country shows the influences of its religion over all the nation's systems and even among the activities of its people. When reforms were being considered for the country's development, it became the government's main focus that these developments be shaped in a way that was acceptable within the religious framework. Bait-Almal (2000) showed that this kind of plan was made possible with a policy established by the

government to make the reforms acceptable among society and the country's conservative Ulamah (scholars or clerics).

Saudi Arabia has been a member of the WIPO since 1989, which gives the country a credible position with regard to Intellectual Property (IP) rights (U.S.-Saudi Arabian Business Council, 2013). Accordingly, the country sought to enact many IP laws to meet WIPO requirements and ultimately to meet the requirements of the World Trade Organization (WTO). This is a positive driving force to continue promoting the advancement of technological innovation in Saudi Arabia. In contrast, SMEs face the obstacle of unsupportive legal contracts. Those SMEs make a substantial contribution to the economy and are either entrepreneurial start-up companies or innovators' ideas that developed into commercial businesses. Legal changes need to be reviewed and considered to improve these contracts in order to help SMEs obtain needed loans with minimal restrictions (Fatany, 2013).

Intercultural environment. Kabasakal and Bodur (2002) comprehensively explained the cultural aspects of Saudi Arabia, giving strong insights into the country's culture and society. The holy Quran is the chief force shaping the country's cultural, social, and legitimate structures. This is evident in almost all of the Muslim countries. Thus, the country's moral values and ethical standards are derived from its religion.

Sidumo (2007) also described the cultural perspective of Saudi Arabia in her study regarding the cultural knowledge of Saudi Arabia among non-Muslims. She explained that Saudi Arabia is a country where people are strongly rooted in their cultural traditions and civilization even though there has been a dramatic level of transformation and industrial development. In spite of such changes, the people of Saudi Arabia have remained focused on their religious values because they possess a strongly-rooted culture that cannot be changed easily. The

populace of the country includes a variety of people; some are the residents of hamlets and villages, and others belong to imperial families.

Additionally, the intercultural environment in Saudi Arabia promotes diversity and values cultural differences, which is important when communicating with a diverse workforce. Technological innovation activities require learning from others locally and internationally, which requires valuing and accepting differences (Schmieder-Ramirez & Mallette, 2007). In the same context, the country's efforts regarding openness towards international business relations and global customers are obvious in its intercultural practices.

Al-Gahtani, Hubona, and Wang (2007) investigated the use of innovative information technology among the Middle Eastern countries, as they were thought to be conservative countries that are opposed to adopting high tech changes. They showed in their research that Saudi Arabia has been enacting many initiatives to elevate the country's technological innovation capabilities. Additionally, they also explored the cultural factors that can affect the use of technology, especially in countries such as Saudi Arabia. The authors presumed that such a conservative culture in the Arab countries would be resistant to new technology and information system adoption. However, they discovered the existence of such innovative technologies in Saudi Arabia.

Technological environment. One of the negative driving forces affecting the technology innovation base in Saudi Arabia is the low level of innovation, which exists largely due to the country's low investment in R&D. Even though the government is trying to fund more science and technology initiatives, this has so far been insufficient to elevate the country's level of innovation. The Saudi people are heavier consumers than they are producers. They depend greatly on the importation of goods and services, especially technology-related ones. The

majority of the technology innovation ideas hosted in the technological innovation centers are related to phone applications and few basic inventions within ICT (Fatany, 2013).

In contrast, the technology infrastructure in the country is growing rapidly and people are becoming more experienced with technological advancements. The young people's intellect is growing rapidly and they are becoming tech savvy. They are heavy users of the Internet and major social media websites and applications. Additionally, the government has shifted aggressively to e-Government transactions. A number of initiatives have been implemented by Saudi Arabia to transform some of its major government, citizen, and residential services into electronic services, without the need to be present in person. All these positive movements and technology adaptations by the government help support the formulation of more policies that enhance the development of a better technological innovation base within the country (U.S.-Saudi Arabian Business Council, 2013).

In summary, the Saudi government is undergoing massive reforms in many sectors. These reforms have positively influenced the medium- to long-term strategies of the country to thrive on building a knowledge-based society. If these reforms continue to develop and are implemented properly, they will strengthen the support for many initiatives, including technology innovation centers. The launching of several economic cities around the country shows the seriousness of the country's leadership vision. This vision is expected to provide political stability and future opportunities for growth and development. By focusing on young people who represent the majority of the population and are valuable assets in growing a successful technology innovation community, Saudi Arabia can create leaders who will empower and lead the country to greater heights (Fatany, 2013).

Summary

This chapter briefly presented a historical background of Saudi Arabia. The researcher then presented a review of the available theories and schools of thought in order to familiarize the reader with the most notable studies on the notion of innovation, entrepreneurship, and leadership. Finally, the chapter examined in detail the factors affecting the Saudi Arabian innovation environment. Thus, it can be concluded from the presented literature that there is a great need for innovation and entrepreneurship in this dynamic environment and ever-changing market. Innovation brings changes with which a leader must be able to cope. Many organizations have pursued different and innovative ways to develop in the market, but they have failed. The reason behind such failure is mostly the result of an absence of leadership skills. Sometimes, organizations are focused greatly on innovation practices and entrepreneurial methods, but they forget to consider the two most important factors: the leadership required to take the vision and transform it into reality and the employees' commitment to the innovation and use of new technologies in doing so. Both must be emphasized in the strategies used to bring innovation to the organization. Leaders must focus on building an innovative culture and setting their goals and strategies according to the organization's strategic framework. The discussion in this chapter provides the background for the subsequent primary research on the necessary skills needed to lead innovation centers in Saudi Arabia. The next chapter will discuss the methodology for this dissertation study.

Chapter 3: Research Methodology

Since the aim of this research was to establish the necessary leadership skills for running technology innovation centers in Saudi Arabia, this chapter is concerned with describing the research methodology used to accomplish this objective. The processes and techniques that the researcher used are discussed in detail. In addition, the chapter identifies and defines the research questions as well as the study design, sampling plan, and methods that were used for data collection and analysis. Finally, the chapter explains the reliability, validity, and ethical considerations of the study.

Study Research Questions

The following research questions were addressed by this research study:

1. What are the top leadership qualities needed to lead a technology innovation center in Saudi Arabia?
2. What is the perception among Saudi Arabians about the factors affecting the technology innovation environment in Saudi Arabia?
3. Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their experience?
4. Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their demographic characteristics?

Research Methodology and Rationale

A quantitative methodology was used as the best means by which to analyze the gathered dataset, as it provided an expansive analysis of the research problem because it was specific and precise and there was little risk of it being one sided (Creswell, 2009). The strength and power of

this type of research methodology centers on the idea that the best method for obtaining focused and objective data is to utilize a survey instrument and use the exact measurements it supplies in a way that is both validated and structured (AlHussain & Bixler, 2011). The methodology for this research undertaking was a quantitative design that was non-experimental and used an online survey form as the instrument to examine the defined population and gather data.

Utilizing quantitative techniques, researchers are able to accurately describe, predict, and explain the witnessed outcomes with comparisons and correlations supported by statistically significant and repeatable results. Researchers are able to yield findings that are generalizable and can be applied to other populations (McNabb, 2010). To properly analyze the set of data, a quantitative methodology was selected in an effort to supply a solid representation that is both descriptive and reveals the important qualities needed to lead technology innovation centers in Saudi Arabia, as well as to predict relationships between the respondents' answers and their experience and demographic characteristics.

This non-experimental study was used to establish the link between the variables in the study, without the use of manipulation, as would occur in an experiment-based study: either a causal comparative, quasi-experimental, or experimental design. This non-experimental design was deemed particularly useful for determining the degree of association between the variables discussed in research questions 3 and 4 (McNabb, 2010). While such a methodology fails to identify a direct cause-and-effect relationship, the non-experimental design helps researchers measure the strength and directions of the relationships between and among variables (Pickard, 2013). This research design gathered data through an online survey instrument. Survey items for the study were based on respondents' perceptions of the necessary leadership skills to lead a

technology innovation center, major factors affecting technology innovation environment, and personal demographic questions.

Trustworthiness of the method. One of the most significant aspects in carrying out the study in an organized and well-managed way is ethics. For this particular study, the researcher obtained permission from the reporting instructor or chairperson to carry out the research study. The researcher also sought permission from the selected study participants to avoid rejection of participation during the research process.

Elements of bias were given great consideration. As the research study primarily used quantitative data from real people, the presence of researcher bias was probable. Volunteer effect or response bias is driven by the interest or motivational level of a person who will participate in the study voluntarily. Participant bias is the tendency of the respondents to behave in a way that they think researcher wants them to act. Additionally, non-response bias may also hamper the extraction of correct data (Creswell, 2009). In order to minimize non-response bias, the researcher used repeated contact to remind non-responders and achieve a high response rate.

Research ethics. Beneficence, justice, and autonomy were taken into consideration during the course of this study. The broad term *beneficence* incorporates all actions that are designed to promote good ideas and actions and prevent bad ones, particularly anything harmful to the participants. Mutual respect between the researcher and every participant was necessary. The researcher needed to view the participants as capable individuals that had the capacity to make logical, informed decisions concerning their participation in the study. Additionally, full disclosure of risks and benefits was provided to all participants. Participants then had the opportunity to ask questions and maintained the right to withdraw at any time. In order to participate in the study, all participants had to sign a clearly articulated informed consent

document. Participants were told to not reveal any information to researchers that they did not wish to share, and were never forced to do so. Furthermore, all participants' information as collected anonymously and, thus, remained secure, as it was unidentifiable (Kumar, 2011).

Philosophical worldview assumption. When conducting a research study that is both credible and effective, it is vital that the researcher understand the philosophical worldview or beliefs underlying the selected of method of research. The philosophy behind the research is the understanding that lays the groundwork for conducting a study of that type, in a manner that is both meaningful and appropriate. According to Creswell (2009), the main research philosophical worldviews are postpositivist, social constructivist, advocacy/participatory, and pragmatic.

Postpositivism is a belief among researchers that existing ideas, backgrounds, and past events can color a researcher's observations and that the propositions of established ideas must be viewed with the necessary data and support. There is a strong correlation between functional values and core ideas. Quantitative results are supplied by the numerical data, which is then analyzed. The aim of postpositivism is to make the generalizations where specific data that were collected and the results and findings garnered from an analysis of that data are also considered viable results for the same region. The primary methods of research that centered on postpositivism are surveys and experiments, as they concentrate on numerical data derived through the scientific method. Postpositivism seek to investigate the various associations and relationships between and among the different components to generate the study's findings (Creswell, 2009).

Another research belief is social constructivism, which concentrates on the understanding and interpretation of people's thoughts, actions, and ideas. This method is preferred if the end goal of a study is a more thorough understanding and interpretation of human behavior instead of

generalizations that predict cause-and-effect (Creswell, 2009). Generally, in social constructivism, the researcher seek to understood the individual participants' behavior, motives, causes, reasons, and views to determine their subjective perspective.

The advocacy/participatory worldview is related to a call for change or reform, a kind of a political agenda of the researcher, participants, or institutions where people work. It focuses on narrow issues/problems on the social level, offering a way for participants or people involved in the research to reach out to others and express their need for a reform or change. By contrast, Creswell (2009) described pragmatism as "a worldview [that] arises out of actions, situations, and consequences rather than antecedent conditions. Researchers emphasize the research problem and use all approaches available to understand the problem" (p. 10). It is most applicable for a mixed methods study. Therefore, in this research study, the researcher used a postpositivist approach because the study aimed to make generalizations and analyze relationships.

Population Sample

Two types of sampling designs are used extensively across various research studies: non-probability and probability. In the case of a probability sampling design, every individual that makes up the populace has an equal chance of being selected for participation in the study. In contrast, non-probability sampling design is based on the judgment of the researcher or field interviewer and the elements are unknown to the researcher or difficult to identify. This type of sampling design includes quota, accidental, judgmental or purposive, expert, and snowball sampling (Kumar, 2011).

The researcher employed a purposeful sampling method. The research participants of the study were selected at random from the Badir Program for Technology Incubators at King

Abdulaziz City for Science and Technology (KACST). The researcher selected the targeted organization based on the judgment that the organization's members were the best choice when it came to obtaining significant information that would help fulfill the objectives of this research study and were willing to share the needed information. Badir Program for Technology Incubators at KACST included employees, entrepreneurs, and innovators who are Saudi Arabian citizens. They represented a broad range of ages and included both genders. The researcher already had access to this population and believed that they were a representative sample of the targeted population. The criteria for participation in this study were Saudi Arabian citizens who were employees, entrepreneurs, innovators, or persons affiliated with Badir. Badir Program for Technology Incubators randomly sent the online survey questionnaire to members of the organization that best fit the research criteria. No limitations on gender or age were enforced; however, the researcher tried to look for balance in participants' gender and age, if possible. The researcher excluded participants that were not Saudi Arabian citizens and did not meet the criteria described previously.

For a study that examines a relationship between variables, Creswell (2009) advised that approximately 30 respondents are needed to conduct a learning research study. By taking a diverse sample for the research, the outcomes of the statistics were generalized from the sample to the population, which eventually added more strength to the study. Therefore, in this study the researcher estimated the necessary sample size to be 100 participants. However, the total sample population after conducting the survey was 78 participants.

Characteristics studied. This research aimed to study two crucial elements: the leadership skills each respondent endorsed for leading Saudi Arabian technology innovation centers and the respondents' perceptions about the factors affecting the Saudi Arabian

technology innovation environment. The first element helped generate data that answered the first research question. The second element helped answer the second guiding research question. These two characteristics and the other data that were obtained from the survey participants paved the way to answering the third and fourth guiding research questions.

Human Subject Considerations

The Institutional Review Board (IRB) committee reviews and validates all behavioral research dealing with human subjects. They administer a certification procedure that researchers must complete and follow when researching human subjects. IRB protects human rights from being violated and ensures the safety of participants, protecting them from any risk that might occur as a result of participation in the research study. According to Pepperdine University (2009), "The primary goal of the Pepperdine University IRBs is to protect the welfare and dignity of human subjects. A secondary goal of the Pepperdine IRBs is to assist investigators in conducting ethical research that complies with applicable regulations" (p. 7).

The researcher ensured compliance with all the policies and regulations concerning human subjects. Thus, the researcher filed an IRB application with the Pepperdine University Graduate and Professional School IRB personnel via email. Once the IRB application was approved, a copy of the approval letter was attached in the appendices.

Generally, ethical considerations carry immense importance in any form of research because they ensure that ethical values are incorporated into the study. It was imperative to conduct the study in an organized manner in order to enhance research integrity (Robson, 2011). Generally, the common research ethics are values, regulations, norms, and guidelines that reflect how the research study should be designed. However, in various research studies, the two most frequently addressed issues are philosophical and compliance-related matters. In this study, the

researcher ensured that the participants' personal records and data were kept intact and not used for any other purpose. The participants' data was kept safe and confidential. The data collected by the researcher were used to achieve the research aim and objectives. The researcher further ensured that all sources of data were disclosed in order to add transparency to the research study.

Moreover, the researcher obtained a site approval letter from the Badir Program for Technology Incubators. A copy of the site approval letter was submitted to the IRB committee when filing the IRB application. The researcher included a copy of the site approval obtained in Appendix A.

Consent agreement. Another important component of the study was the consent agreement. Since this research study included human participants, an electronic information sheet was prepared for each participant that included the agreement for consent. The researcher made sure to obtain informed consent from the participants via the informed consent form before they started the online questionnaire survey. The primary researcher's contact information was provided in case the participant had questions, comments, or concerns.

Each participant was provided ample time to read the information included in the consent agreement and decide whether he or she wished to join the research study or not. No participant was forced to participate. In fact, participation was based solely on voluntary willingness. If the participant agreed to take the online questionnaire survey then he or she was required to sign the informed consent form electronically before starting the survey. Participants could not access or continue to the survey without signing the consent electronically. Additionally, every participant had the right to remove himself or herself from study participation at any stage of the research process.

Confidentiality. One of the most essential components of organized and reliable research is confidentiality. In this particular study the researcher ensured the confidentiality and privacy of all participants. The researcher in this study gave great consideration to protecting the participants' personal information and identities. The researcher took the following protective measures to ensure confidentiality of all participants:

- No names of study participants were collected in the online survey questionnaires. To ensure anonymity, the researcher referred to each respondent by participant 1, 2, 3, etc.
- The researcher ensured that no IP addresses were collected or linked to participant responses.
- All electronic data, including statistical and quantitative, was stored on the researcher's external hard drive and could only be accessed from the researcher's password protected personal computer.
- The researcher ensured that all sensitive materials were saved according to IRB transcription coding sheets.
- All the collected data, responses, and data analysis, whether hard copies or electronic documents, were kept in a locked safety box at the researcher's house.
- The researcher was the sole person who had access to all quantitative data.
- After 5 years from the completion of the research, the researcher will destroy all the information and data collected throughout the study by using an appropriate procedure.

Creswell (2009) suggested additional preventative measures that the researcher can take when conducting the research in order to protect the participants' rights. Thus, the researcher made use of the following safeguards during and after the study:

- The researcher obtained written permission from the dissertation chairperson in order to proceed with the survey.
- The researcher clearly communicated the study's aim and objectives in the online survey.
- All of the participants were provided with the contact information of the primary researcher, dissertation chairperson Dr. June Schmieder-Ramirez, and Pepperdine's IRB manager. This allowed participants to express their concerns, raise questions, or offer comments regarding the research and their rights.
- The researcher informed the participants that the data collection tool was an online survey and the study was conducted through an online survey service provider.
- The researcher took the participants' rights into consideration when presenting the data.
- The researcher was aware of participants' right to withdraw from the study at any time throughout the research period without penalty. Additionally, the researcher reminded participants about their right to withdraw before taking the online survey.

The researcher ensured that risk was minimized while conducting the research and communicating with participants. No information about the identity of the participants or their associated organizations was required or included in the survey. No information was reported or used outside this study. Participants were informed that they had the right to discontinue the

online questionnaire survey at any point for any reason. These parameters were clearly communicated to all participants before they signed the consent form.

Instrumentation

According to Kumar (2011), the most common way to conduct a questionnaire is through a survey, which can be developed in many forms, such as face-to-face, telephone, and via the Internet. One of the most widespread instrument designs is the online survey; therefore, this study gathered survey data using an online questionnaire. An online survey helped the researcher to collect primary research data and offered the investigator a quick way to collect data with minimal administration cost. To administer the online survey, the investigator used Qualtrics, the world's leading technology provider when it comes to surveys. Qualtrics was used to develop and formulate the online questionnaire survey. The online questionnaire survey that was designed for this research study aimed to collect information that answered the four guided research questions set forth for this study.

The researcher designed the questionnaire with a focus on assessing the participants' perspectives and responses. Additionally, the questionnaire considered the nature of the respondents and or their characteristics. The questionnaire was designed in an appropriate and professional manner that reflected the highest standards of academic behavior in terms of language, design, and representation. The survey used English as the sole language for administering the questionnaire to the participants.

The design of the research instrument played a critical role in the study. Researchers used both structured and unstructured research instruments (Creswell, 2009; Kumar, 2011). In this study, the researcher used a structured questionnaire. The questionnaire statements were

designed in relation to the research questions and literature review. As a result, the researcher was able to obtain relevant and accurate data.

Several types of scales were used to assess participants' responses. The questionnaire was designed to gather responses using two 5-point Likert-type scales. In the first 5-point Likert-type scale, the response categories ranged from 1 = *much less important skill in leading technological innovation centers* to 5 = *much more important skill in leading technological innovation centers*. For the other 5-point Likert-type scale, the response categories ranged from a high score of 5 to a low score of 1, where 5 was defined as *Strongly Agree* and 1 was defined as *Strongly Disagree*. It was important to design the questions carefully in order to derive and extract valuable data.

The survey included three major parts. The first part of the questionnaire featured demographic questions (i.e., age, gender, and the participant's level of education). Next, the survey asked secondary questions to understand more about the respondents. These questions were not personal; rather, they were related to the respondents' previous or current experiences with innovation or technological innovation. The second part of the questionnaire used a 5-point Likert-type scale to examine the respondents' perceptions of the necessary leadership skills to lead technological innovation centers, which was based on the literature review. The third part of the questionnaire utilized a 5-point Likert -type scale to assess the participants' perceptions of the major factors affecting the technology innovation environment and the benefits associated with adopting technology innovation in Saudi Arabia. A copy of the survey is attached in Appendix B. For the purposes of clarity, the matrix presented in Table 3 illustrates how the survey questions relate to each research question.

Table 3

Survey Questions vs. Research Questions

Survey Questions/Parts		Research Questions
Part 2 of the survey, which covers Q.8 through Q.39, is intended to answer the first research question	➔	What are the top leadership qualities needed to lead a technology innovation center in Saudi Arabia
Part 3 of the survey, which covers Q.40 through Q.62, is intended to answer the second research question	➔	What is the perception of Saudi Arabians about the factors affecting the technology innovation environment in Saudi Arabia?
Part 1 of the survey, which covers Q.5, 6, & 7 and the scoring from part 2 of the survey, are intended to answer the third research question	➔	Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their experience?
Part 1 of the survey, which covers Q.1, 2, 3, & 4 and the scoring from part 2 of the survey, are intended to answer the fourth research question	➔	Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their demographic characteristics?

After receiving the chairperson and committee approval of the questionnaire, the researcher conducted a preliminary pilot study with the instrument in order to determine if the outcome was valid and verifiable. The researcher chose a sample of three individuals to crosscheck if the questionnaire could be comprehended easily. The pilot study identified any concerns or problems in the questionnaire and its questions. Extensive use of technical jargon, questions that create confusion, and the difficulty level of the questions are all examples of problems that might occur in a pilot study. After the pilot study delivered a satisfactory level of validity and reliability, the researcher was able to finalize and send the questionnaire.

Validity and Reliability

The online questionnaire was the main data collection tool, and it needed to be designed in such a way that it yielded reliable and accurate data. The reliability and validity of the data were ensured through accurate and careful designing of the research instrument. For primary data collection, the research instrument needed to be designed and developed with easily

understandable statements and questions. Clear language was used throughout the questionnaire. The research participants' level of understanding continued to be considered so they could understand the statements and questions that were asked. The questionnaire was sent to the research participants via email.

Validity is "the extent to which the instrument measures what it is designed to measure" (Pyrczak & Bruce, 2007, p. 86). It refers to the soundness of the meaning and interpretation of an event. Instrument validity has three primary factors: construct validity, criterion validity, and content validity (Lunenburg & Irby, 2008). Construct and criterion validity uses more complicated procedures and indicators to measure validity. Alternatively, content validity is a simpler method or procedure and is measured by ensuring that there is a connection between the questions of the research instrument and the study objectives (Kumar, 2011). For this research study, content validity was used. Accordingly, the research instrument for this study was developed in relation to the research questions in order to ensure validity of the research. The researcher used content validity to ensure that the instrument was aligned with the research guiding questions. Content validity is usually assured by seeking expert judgment (Kumar, 2011; Lunenburg & Irby, 2008). Thus, the researcher asked an expert to review and provide constructive feedback on the instrument. Additionally, the data that were collected were compared to the results of previous empirical studies as well as the theoretical underpinnings of the study.

Reliability refers to the consistency of the data when collected more than one time through the same research instrument (Kumar, 2011; Pyrczak & Bruce, 2007). Reliability is affected by many uncontrollable factors, such as the wording of questions and the respondents' mood (Creswell, 2009). The pilot study that the researcher conducted assessed the reliability of

the instrument employed. Additionally, an extra analysis of the instrument's reliability was completed, utilizing Cronbach's alpha in order to guarantee each set of questions drawn from the online survey remained consistent on an internal basis. This analysis was also used to determine that all of the survey questions were measuring the same foundational construct.

Data Collection Procedures

Pickard (2013) noted that "one of the most difficult stages of the study is the collection of right data from right sources" (p. 1). There are two methods for data collection: primary and secondary. For this particular study, the researcher collected primary data.

Generalizing the data from the sample to the population was a primary objective of the data collection process. The researcher estimated the sample size for this study to be 100 participants. Questionnaires are known for their low response rate, thus the researcher realized that not all the participants would complete and return their questionnaire, and the sample size ended up lower than originally expected. However, it was hoped that the convenience and the ease of accessibility the online survey approach offered to participants would help to overcome a lower response rate.

The survey questionnaire was administered to participants from the targeted population. Badir Program for Technology Incubators provided access to Saudi Arabian entrepreneurs or innovators, people working with entrepreneurs or innovators, or people guiding technology innovators. This researcher developed an online survey using the Qualtrics Online Survey Software and administered the survey to the participants using an online link embedded in an email sent to all members of Badir Program for Technology Incubators.

The participants' data were kept confidential to ensure that their anonymity was not compromised (Pyrczak & Bruce, 2007). Also, the participants were made aware that their

identity would be kept confidential and anonymous, which helped sustain their motivation to participate in the study. In addition, the participants were notified regarding the purpose, benefits, nature, and risks of the study. Before taking the survey, the researcher clearly communicated the purpose of the survey to the participants, which was to suggest leadership skills and traits that Saudi Arabian leaders should adopt when leading technology innovation centers. The survey also drew attention and provided conclusions to policymakers about the factors affecting technology innovation environment and benefits of encouraging and sustaining technology innovation in Saudi Arabia. To obtain quantifiable data, the research questions were addressed by specific survey questions. The questions on the survey used a response scale that assessed the different major variables discussed in the study.

Data Management

In this study, great consideration was given to protect the data and any other sensitive materials. The researcher took the following protective measures to ensure the safety and proper protection of all data:

- All electronic data, including statistical and quantitative data, were stored on the researcher's external hard drive and could only be accessed from the researcher's password protected personal computer.
- The researcher ensured that all sensitive materials were saved according to the IRB transcription coding sheets.
- All the collected data, responses, and data analysis, whether hard copies or electronic, were kept in a safe box at the researcher's house.
- The researcher was the sole person who had access to all quantitative data.

- After 5 years from the completion of the research, the researcher will destroy all the information and data collected throughout the study by using an appropriate procedure.

Data Analysis

Processing the data required cleaning or editing the raw data that were collected and then coding the data so the information entered could be analyzed and interpreted easily. Cleaning the data means ensuring the data collected were consistent and, as much as possible, free from errors (Kumar, 2011). Before the data were analyzed, they were organized and then assembled so that each participant was given a code. The data were then translated into numerical scores to be measured.

Data analysis encompassed two major phases: first, processing the data, and then displaying the data in the form of descriptive statistics. Quantitative variables were summarized using means and standard deviations when the data were normally distributed. When the data were not normally distributed, then the researcher used median with range. Qualitative variables were summarized using counts and percentage. Since this study was based on the collection of primary quantitative research data, Statistical Package for Social Science (SPSS) was used to analyze and display the collected data. SPSS is a statistical software that analyzes responses and describes variables and is considered a useful tool to explore data trends (Creswell, 2009).

In order to conduct the computer analysis through SPSS, a data file was created using the data converted from survey responses into numerical scores. The collected primary data were entered into one Microsoft Excel spreadsheet. From the Excel spreadsheet, the collected participants' responses were entered into the SPSS software. The analysis generated descriptive statistics, frequencies, and percentages. The descriptive statistics are given as mean and standard

deviation for the summary leadership scores as well as to identify the frequency of the leadership qualities and the factors that are associated with the factors affecting the Saudi Arabian technology innovation environment. In this research study, the researcher used independent samples t-test, since the variables were quantitative, in order to determine the leadership qualities that were frequently related to the ability to lead technology innovation centers. The researcher also performed comparison of the mean leadership qualities with the different demographic factors and factors associated with experience, duration and awareness. Thus, spearman's correlations were used to assess the relationship between leadership qualities and the different demographic factors and factors associated with experience, duration and awareness. By interpreting and analyzing the collected data, the researcher gathered appropriate findings for the study. This study used tables to illustrate the results further.

Summary

This chapter outlined the research methodology adopted, the research process and techniques that were used, and the justifications for using them. The chapter described the research design, which was based on a quantitative approach. The research process of the study was based on data collection whereby the researcher collected primary data using a questionnaire survey where Saudi Arabian people were selected as the research participants and the sample size was 78 participants. Data analysis was carried out through SPSS, a statistical software tool. Throughout this study, the researcher ensured the reliability and validity of the research design and method. Additionally, ethical considerations were given priority throughout the study. The findings of this study are discussed in the next chapter.

Chapter 4: Findings

Since the goal of this study was to identify the leadership skills necessary for running Saudi Arabian technology innovation centers and examine the factors that affect the Saudi innovation environment, this chapter is concerned with presenting the findings of the study survey. The chapter includes a presentation of the results of the data analysis conducted, followed by a summary of key findings. The study survey captured 78 responses from Saudi Arabian citizens. The research design was based on quantitative research methodology and collected primary data from Saudi Arabian people through an online survey questionnaire. The study was devised to provide answers to the following research questions:

1. What are the top leadership qualities needed to lead a technology innovation center in Saudi Arabia?
2. What is the perception of Saudi Arabians about the factors affecting the technology innovation environment in Saudi Arabia?
3. Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their experience?
4. Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their demographic characteristics?

In analyzing the dataset for this research study's online survey, frequency and percentage tables were used to display the demographic information of the survey participants. For research questions 1 and 2, standard deviations and means were used to display the ratings of both the necessary leadership qualities needed to lead a technology innovation center in Saudi Arabia and the perceptions of key factors affecting the technology innovation environment in Saudi Arabia.

Spearman correlations were used to test research question 3 and 4 in relation to experience and demographic characteristics. Finally, themes were created to display the participants' answers regarding an open-ended question that asked the participants to recommend or suggest ideas for improving the innovation and entrepreneurial activities in Saudi Arabia (See Table 7 and Tables C1 to C11 in Appendix C).

Table 4 displays the frequency counts for selected variables. Regarding the gender variable, 18% more male respondents (59.0%) participated in the online survey than female respondents (41.0%). Participants' ages ranged from 20 to 67, where more than half of the respondents fell into the category range of 30-39 (52.6%). The majority of the respondents earned higher education degrees; 16.7% had earned doctorate degree. About two-thirds (75.6%) of the respondents held bachelor's and/or master's degrees. There were twice as many married respondents (66.7%) as single respondents (33.3%).

Table 4

Frequency Counts for Selected Variables

Variable	Category	*n*	%
Gender	Male	46	59.0
	Female	32	41.0
Age [a]	20-29	23	29.4
	30-39	41	52.6
	40-49	9	11.6
	50-67	5	6.4

(continued)

Variable	Category	*n*	%
Education	High School Graduate	4	5.1
	Associate Degree	2	2.6
	Bachelor's Degree	26	33.3
	Master's Degree	33	42.3
	Doctorate Degree	13	16.7
Marital Status	Single	26	33.3
	Married	52	66.7
Experience in innovation and/or technology innovation field	Never involved	21	26.9
	Thinking about being involved	10	12.8
	Involved in the past	18	23.1
	Currently involved	29	37.2
Experience duration	Never been involved	29	37.2
	Less than 6 months	7	9.0
	6-24 months	13	16.7
	2-5 years	13	16.7
	More than 5 years	16	20.5

(continued)

Variable	Category	*n*	%
Level of awareness about the concept of "innovation centers"	Not aware	9	11.5
	Slightly aware	23	29.5
	Aware	33	42.3
	Completely aware	13	16.7

Note. $N = 78$. [a] Age: $M = 34.23$, $SD = 9.22$.

More than half of the respondents (60.3%) were either involved in the past (23.1%) or currently involved (37.2%) in the innovation and/or technology innovation field. Of the sample, 62.9% had experience in innovation ranging from less than 6 months to more than 5 years. About 60% of the respondents reported that they were either aware (42.3%) or completely aware (16.7%) about the concept of innovation centers.

Presentation of Findings

This section displays the detailed findings from the data analysis according to each of the study's guiding research questions. Each question is introduced with a table, as appropriate, and then supported with a brief objective narrative without any evaluation. Interpretations of the findings will be discussed in greater detail in Chapter 5 of this study.

Research question 1. Research question 1 asked, "What are the top leadership qualities needed to lead a technology innovation center in Saudi Arabia?" To answer this question, descriptive statistics were used. Table 5 displays the standard deviations and means for the relevant 32 survey items. The items are sorted from the highest mean ratings to the lowest. The survey item rating was based on a 5-point Likert scale: 1 = *Much less important skill* to 5 = *Much more important skill*. The three qualities rated as being most important were item 22, "Goal

setting" (*M* = 4.59), item 12, "Self confidence" (*M* = 4.56), and item 10, "Ability to motivate" (*M* = 4.55). The three qualities rated least important were item 35, "Thinks systematically" (*M* = 3.87), item 38, "Technical competence" (*M* = 3.76), and item 16, "Shatter the strategy monopoly" (*M* = 3.72; see Table 5).

Table 5

Ratings of Leadership Qualities Sorted by Highest Mean

Item	*M*	*SD*
22. Goal Setting	4.59	0.59
12. Self confidence	4.56	0.78
10. Ability to motivate	4.55	0.71
11. Encourage unique and diverse ways of doing things	4.49	0.77
32. Has a purpose	4.46	0.70
24. Ready to try new ideas	4.45	0.71
33. Has strong values	4.45	0.77
31. Has respect toward others	4.44	0.92
21. Inspirational	4.44	0.68
34. Proactive	4.42	0.88
36. Ability to manage change	4.40	0.76
8. Ability to engage innovators in meaningful issues	4.36	0.82
20. Visionary	4.31	0.96
39. Benevolence (ability of a leader to encourage others to discuss and create knowledge from the conflicts that emerge)	4.28	0.77

(continued)

Item	*M*	*SD*
25. Provide guidance and training	4.27	0.83
27. Desire and ability to lead	4.27	0.86
13. Develop relationships of trust	4.26	0.97
15. Ability to identify own mistakes	4.23	0.85
30. High self-esteem	4.22	0.86
14. Create leading-edge innovations or lead others to do so	4.18	1.00
28. Intelligence	4.17	0.84
29. High self-control	4.17	0.93
19. Networking	4.13	0.97
37. Understands diversity and cultures	4.09	0.91
17. Challenge the status quo	4.09	0.91
9. Curiosity	4.06	1.08
26. Risk taker	4.03	0.84
18. Have relevant knowledge and experience in innovation and entrepreneurship	3.94	0.98
23. Ability to understand the feelings and emotions of others	3.90	1.15
35. Thinks systematically	3.87	1.08
38. Technical competence	3.76	0.98
16. Shatter the strategy monopoly (promote new ideas that may have nothing to do with strategy or may even cut against it)	3.72	1.10

Note. *N* = 78. Ratings based on a 5-point metric: 1 = *Much less important* to 5 = *Much more important*.

Research question 2. Research question 2 asked, "What is the perception of Saudi Arabians about the factors affecting the technology innovation environment in Saudi Arabia?" To answer this question, descriptive statistics were used. Table 6 illustrates the standard deviation and means for the relevant 23 survey items. The items are sorted in descending order according to the value of the mean. The survey items evaluated using a 5-point Likert scale: 1 = *Strongly Disagree* to 5 = *Strongly Agree*.

The highest rated item was number 60, "The Saudi young generation is a major driving force for adopting or introducing newly innovative ideas" (M = 4.49). The lowest rated item was number 55, "In Saudi Arabia, being a conservative society obstructs the development and growth of innovation activities" (M = 3.04; see Table 6).

Table 6

Ratings of Perceptions of Key Factors Sorted by Highest Mean

Item	*M*	*SD*
60. The Saudi young generation is a major driving force for adopting or introducing newly innovative ideas.	4.49	0.77
50. In Saudi Arabia, increasing cooperation efforts among government, universities and private sector will foster innovation activities.	4.44	0.78
43. The provision of skilled human capital will accelerate technology innovation in Saudi Arabia.	4.38	0.67

(continued)

Item	*M*	*SD*
62. Focusing in building a strong knowledge infrastructure (IT networks and human capital) is an important factor in developing the technology innovation base in Saudi Arabia.	4.35	0.72
53. In fostering innovation, the Saudi government should encourage the emergence of more start-up companies.	4.33	0.77
40. Technology infrastructure is an important factor for building a technology innovation culture.	4.27	0.71
51. Strategic partnership between Saudi universities and leading international institutions accelerate the development of skilled human capital and enhance innovation capabilities.	4.26	0.87
54. Increased government supports and grants for start-up companies will foster innovation activities in Saudi Arabia.	4.22	0.73
52. Promoting further policies for the development of innovation will help advance the innovation base in Saudi Arabia.	4.21	0.78
42. Technology innovation centers are a driving force for innovation.	4.08	0.88
61. The Saudi Arabian people quickly adapt to new technologies.	3.96	1.09
59. The lack of skills required to develop and lead innovation is a major obstacles for the development of the Saudi Arabian innovation environment.	3.94	0.97
57. The lack of support to develop proper innovation centers is a major factor affecting technology innovation development in Saudi Arabia.	3.92	1.00

(continued)

Item	*M*	*SD*
56. The lack of communicating a clear national innovation initiative is a major factor affecting technology innovation development in Saudi Arabia.	3.87	0.89
44. The Saudi government plays an important role in developing its innovation ecosystem.	3.86	1.05
49. In Saudi Arabia, the participation of the private sector in developing the country innovation ecosystem is inadequate.	3.79	0.96
41. Saudi Arabia is considered a major importer of technology.	3.78	1.11
58. The lack of technology infrastructure is a main barrier to technology innovation growth in Saudi Arabia.	3.73	1.09
48. Saudi Arabia efforts to support the development of its innovation and entrepreneurial activities are inadequate.	3.58	0.86
47. Saudi Arabia investment on research and development is considerably low.	3.51	1.00
46. Saudi Arabia efforts in improving its intellectual property environment led to more technology innovation activities.	3.24	1.09
45. Saudi Arabia expended considerable efforts to support the development of its innovation and entrepreneurial activities.	3.21	0.97
55. In Saudi Arabia, being a conservative society obstructs the development and growth of innovation activities.	3.04	1.39

Note. *N* = 78. Ratings based on a 5-point metric: 1 = *Strongly Disagree* to 5 = *Strongly Agree*.

A 1988 study by J. Cohen suggests the parameter to guide the interpretation by determining how strong the linear correlation is. His study suggests that a correlation is considered weak if it has an absolute value of $r = .10$ (explains 1% of the variance). A moderate

association has a typical absolute value of $r = .30$ (explaining roughly 9% of the variance); whereas a stronger association sees an absolute value of $r = .50$ (accounting for roughly 25% of the variance). Given 224 correlations for research questions 3 and 4, a researcher would expect 11 correlations (or roughly five percent of the total number of correlations) in order for the correlation to be statistically significant ($p < .05$) due to the simple issue of data fluctuation (Abbott, 2011). This chapter on results focuses primarily on the correlations that were moderate or stronger in order to minimize the possibilities for Type-1 errors, which may be the result of drawing flawed conclusions based on potentially spurious correlations.

Research question 3. Research question 3 asked, "Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their experience?" To answer this question, Spearman rank-ordered correlations were used. The 32 ratings from Part 2 of the survey were correlated with the three experience variables. For the resulting 96 correlations, five were significant at the $p < .05$ level and one was of moderate strength using the J. Cohen (1988) criteria. Specifically, respondents who gave higher ratings for the importance of having strong values (Item 33) had shorter durations of experience (Item 6) ($r_s = -.31$, $p = .005$; no table shown).

Research question 4. Research question 4 asked, "Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their demographic characteristics?" To answer this question, Spearman rank-ordered correlations were used. The 32 ratings from Part 2 of the survey were correlated with the four demographic variables (gender, age, education, and marital status). For the resulting 128 correlations, nine were significant at the $p < .05$ level and two were of moderate strength using the J. Cohen (1988) criteria. Specifically, respondents who gave higher ratings for the

importance of challenging the status quo (Item 17) had more formal education (r_s = .31, p = .005). In addition, respondents who gave higher ratings for the importance of high self-control (Item 29) were more likely to be female (r_s =.33, p = .003; no table shown).

As an additional set of analyses, Spearman rank-ordered correlations were also used to compare the 23 ratings from Part 3 of the survey with the three experience variables. For the resulting 69 correlations, 11 were significant at the $p < .05$ level and two were of moderate strength using the J. Cohen (1988) criteria. Specifically, respondents who had higher levels of involvement (Item 5) had more agreement with Item 41, "Saudi Arabia is considered a major importer of technology" (Item 41; r_s =.31, p = .005). However, they had less agreement with Item 56, "The lack of communicating a clear national innovation initiative is a major factor affecting technology innovation development in Saudi Arabia" (r_s = -.36, p = .001; no table shown).

Spearman rank-ordered correlations were also used to compare the 23 ratings from Part 3 of the survey with the four demographic variables. For the resulting 92 correlations, seven were significant at the $p < .05$ level and one was of moderate strength using the J. Cohen (1988) criteria. Specifically, male respondents had more agreement with Item 41, "Saudi Arabia is considered a major importer of technology" (Item 41; r_s = -.30, p = .007; no table shown).

The online survey included a sole open-ended question that asked, "What is one thing you would recommend that Saudi Arabia adopt that would enable the country to support more innovative and/or entrepreneurial ideas and activities?" A theme analysis was used to capture the frequency of the participants' answers and then categorize the answers by the highest frequency. Each category was supported by a sample quote from the respondents' recommendations. Some respondents gave quotes that pertained to multiple themes. Specifically, the 78 respondents gave

a total of 105 separate quotes. The number located between the category and the sample quote in Table 7 represents the total number of quotes given by respondents in relation to that specific category. The other quotes pertaining to each category are displayed in Tables C1 to C11 (see Appendix C).

Table 7

Question 14 Categorized and Sorted by Highest Frequency

Category	*n*	Sample Quote
1. Change, create, and/or implement more technology and innovation within the school systems at various levels, elementary through university, and/or change the way the school system is currently set-up in order to promote critical thinking and/or give opportunities for students to create their ideas.	17	"Inspiration for young generation. / Foster innovation workshop for young generation in schools. / If possible, introduce such subject in local language."
2. Government support through increased budget, incentives, and/or cooperation with public sector	15	"A large amount of government budget should be allocated to R&D & innovation"

(continued)

Category	*n*	Sample Quote
3. Train and inform the public of the need for more innovation, help the public to be more open to new ideas, and/or support creativity	14	"Education, teaching society more about technology & innovation that will remove the barrier of fear and none acceptance of new ideas making us more capable of taking risks and thinking out the box and therefore taking an initiative to create."
4. Build more innovation/technology labs where innovators can come to collaborate with others in their field, have resources, and/or get licenses on their ideas	10	"I highly recommend a collaborative labs that have various specialists who can help creative Saudis to explain there innovation ideas, plans, patents by preventing their intellectual rights in order to foster the innovations in Saudi Arabia"
5. Collaboration between foreign and national entities, either between governments, universities, and/or experts in the field	9	"I would highly recommend the government of SA to attract diverse innovation's experts from all over the world. Also, it has to encourage both the universities and the private sector to work with the most innovative companies such as Apple, Google, Alibaba, etc. in order to benefit from these innovative companies."

(continued)

Category	*n*	Sample Quote
6. Fix current policies to make innovation easier and/or less regulated by the government and/or check to see if current policies are being effective	6	"Less regulated and more open market will lead entrepreneurs to make a difference in the market."
7. Create unity among the people, create specific innovation/technology goals, and/or strengthen the link between different entities (such as university to corporations)	6	"Focus on several areas and get everybody aligned to achieve this goal. We need no more visions or missions, what we really lack is to set goals and execute!"
8. Provide funds and/or training for leadership and/or mentor development	4	"To provide mentors who will coach innovators/entrepreneurs in developing the prototype, business plans and access to seed funds."
9. Focus on developing and/or investing in human capability	3	"Investment in the human capital capabilities for sustainability"
10. Other	3	"Developing a stronger and more effective home/street address that is national and standard, it will support the technological entrepreneurial ideas in terms of reaching out to they customers much faster and efficient."
11. I do not know, N/A, or No response	37	"I don't have any idea now"

Note. $N = 105$. These are 105 separate quotes given by the 78 respondents. Some gave answers that pertained to more than one theme.

Summary of Key Findings

This chapter presented the survey findings from 78 respondents to identify the leadership skills necessary for running Saudi Arabian technology innovation centers and examine the factors that affect the Saudi Arabian innovation environment. It was found that goal setting, self-confidence, and the ability to motivate are the top three rated leadership qualities needed to lead an innovation center in Saudi Arabia. In terms of the respondents' perceptions regarding the factors that affect the innovation environment in Saudi Arabia, it was found that the young Saudi generation is a major driving force for the adoption or introduction of new innovative ideas. This was evident in the respondents' recommendations for Saudi Arabia in terms of how to support more innovation and entrepreneurial activities. A number of respondents emphasized that focusing more on developing the young Saudis and changing or creating the school system to start promoting critical thinking would help improve the technology innovation environment. A detailed discussion of the key findings, recommendations, and conclusions regarding the findings will be presented in the following chapter.

Chapter 5: Conclusions and Recommendations

The purpose of this study was to identify the leadership skills necessary to lead technology innovation centers in Saudi Arabia and examine the key factors affecting the Saudi Arabian innovation environment. Additionally, the SPELIT framework was used to identify the driving forces and factors impacting this environment. The research design was based on a quantitative research method and involved primary data collection from Saudi Arabian people through an online survey questionnaire. The discussion of key findings in this chapter was organized according to each of the guiding research questions. To reiterate, the study was designed to answer the following research questions:

1. What are the top leadership qualities needed to lead a technology innovation center in Saudi Arabia?
2. What is the perception of Saudi Arabians about the factors affecting the technology innovation environment in Saudi Arabia?
3. Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their experience?
4. Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their demographic characteristics?

The total male participation in the study was greater than female participation by almost 18%. One possible reason for this finding might be related to the novelty of involvement of women in business, innovation, and entrepreneurship fields in Saudi Arabia. This finding is consistent with those of Fatany (2013), who found that women's participation in jobs in the past were only limited to certain sectors such as education and a few jobs in the public sector. In

addition, the existence of some cultural barriers, limit the presence of women's in other jobs. However, in recent years and with the boom of the reform process the country is undergoing, many of the laws and regulations have changed to facilitate women's participation in other sectors. The age mean of participation was 34.23 where more than half of the respondents (52.6%) fell in the category age range of 30-39. The majority of the respondents were highly educated, having earned bachelor's, master's, or doctoral degrees. More than half of the respondents were either involved in the past or were currently involved in innovation with experience that ranged from less than 6 months to more than 5 years. About 60% of the respondents reported that they were either aware or completely aware of the concept of innovation centers. Additionally, it was found that goal setting was the top rated leadership quality needed to lead an innovation center in Saudi Arabia and that the young Saudi generation was perceived by the majority of the respondents as a major driving force for the adoption or introduction of new innovative ideas. This chapter is concerned with presenting a substantive discussion of the study findings including a set of comparisons between the findings and the literature review. Additionally, this chapter presents conclusions and series of suggested recommendations for policy and practice. In addition, the chapter highlights the study's implications for policy and practice and offers recommendations for further research.

Discussion of Key Findings

This section is organized and discussed according to each of the guiding research questions. Discussion centers on literature that agrees or disagrees with results from the survey, addressing controversies or highlighting new contributions to the literature. This detailed discussion of the key findings and how findings relate to literature led to valuable conclusions and recommendations.

Research question 1. Research question 1 asked, What are the top leadership qualities needed to lead a technology innovation center in Saudi Arabia? To answer this question, descriptive statistics were used to rate the relevant survey items, which were based on a 5-point Likert scale: 1 = *Much less important skill* to 5 = *Much more important skill*. Table 5 in Chapter 4 sorted the leadership qualities needed to lead an innovation center in Saudi Arabia from highest ranked to lowest ranked according to respondents' answers. The table ranked the qualities based on means scoring from highest to lowest. Research question 1 asked about the top leadership qualities, thus the discussion for this research question was merely related to the three highest rated leadership qualities based on their mean scores. Additionally, by identifying the top three leadership qualities, it was possible to make specific and concise recommendations for policymakers, practitioners, and leaders in the Saudi Arabian technology innovation field.

As explained earlier in Chapter 2, leadership plays an important role in bringing or fostering innovation. Eveleens (2010) pointed out that leadership is one of the innovation initiators or sources from which innovation can emerge. In addition, W. Smith and Tushman (2005) noted that management must provide leadership in order to make proper use of innovation. Thus, leadership and innovation are inseparable. Saudi Arabian leaders should understand that the two concepts are essential and innovations that excel are the result of an integrated process between leadership and innovation. The following paragraphs discuss only the top three qualities rated as highest based on the mean score of each quality during the course of this research study.

The study found that the leadership quality believed to be the most important for leading an innovation center in Saudi Arabia was item 22, "Goal setting," which obtained the highest overall mean rating (M = 4.59). This finding was consistent with those of Thach and Thompson

(2007), who found goal setting to be an effective leadership skill. Further, they also considered goal setting to be necessary in order to maintain the most effective leadership process. In their definitions of leadership, Northouse (2010) and Robbins and Judge (2010) explained that leaders make every effort to influence others to achieve the goals set forth. This means that leaders must be capable of setting clear and achievable goals in order for others to engage and move towards success. Zaleznik (1992) shared a similar point of view when he found that leaders who truly recognized and understood their goals tended to focus more on people's interests. Technology innovation centers need leaders that focus more energy into developing innovators and entrepreneurs, and subsequently influencing others to work towards achieving the goals that were set forth. Similar to most other organizations, innovation centers cannot move forward without clear-cut goals. Furthermore, in his research on innovative leadership skills, Lorange (2000) found that setting and clearly describing goals helped inspire others, such as entrepreneurs, to follow their vision.

It is not surprising that the majority of respondents rated *goal setting* as the most necessary quality. This finding can be attributed to the absence of guidance provided to Saudi Arabian youths. For example, many young Saudis graduate from high school with no clear path or goal. They face difficulty knowing what to do and where to head after completing high school. Eventually they abide a parental decision or follow along with friends. Similarly, university students face the same dilemma after graduating; there is no clear direction or goals set forth for the next phase of their lives. Those who were fortunate to define and set their goals may have experienced a mentor who affected their way of thinking and helped them plan and identify their goals. Goal setting is an important quality that the vast majority of Saudi Arabians should

consider improving to become better leaders. Thus, Saudi leaders should know how to set goals and start adopting this quality in order to lead technology innovation centers.

The leadership quality that was rated the next highest in importance for leading an innovation center in Saudi Arabia was item 12, "Self confidence" (M = 4.56). Kirkpatrick and Locke's (1991) study on various leadership traits further supports this finding. They found that the adoption of confidence and other similar traits assured leaders' goals were achieved successfully. Thus, self-confidence plays an important role in transforming innovation center goals into reality. In his research, Deschamps (2005) agreed that leaders should be willing to take risks, be able to experiment, and accept disappointment. These abilities are highly dependent upon the leader's level of self-confidence. In the absence of self-confidence, leaders would be hesitant to take risks and go the extra mile by trying new ideas and innovative processes, causing the business to stagnate. The lack of readiness to experiment is directly related to a lack of faith in personal capabilities due to low self-confidence. Thus, self-confidence is directly related to creativity and innovation. Von Stamm (2009) supported this notion by emphasizing the importance of cultural values in leading innovation and pointing out that leaders should build a culture that empowers others to experiment and learn more by continuing to test new ideas. Strengthening one's existing skill set and increasing the ability to innovate among followers eventually increases the leader's level of confidence.

The majority of respondents endorsed this quality as one of the most important qualities needed to lead innovation centers in Saudi Arabia. Saudi people often feel judged because they rely more heavily on others' opinions instead of their own, which affects their self-esteem (Fatany, 2013). This may create a lack of self-confidence and leads people to lose confidence in their opinions and decision-making abilities; a leader without self-confidence is not a true leader.

Pagon et al. (2008) asserted that the values and attitudes leaders exercise can inspire others and true leaders should expect their followers to follow their lead. Leaders who are self-confident create a feeling of empowerment among followers. Thus, followers begin to feel secure and supported and start to gain self-confidence from their leaders' influence. Saudi Arabian leaders who will lead innovation centers in the country should build self-confidence and promote positive thinking that eliminates feelings of fear and negativity.

The third most important leadership quality for leading an innovation center in Saudi Arabia was item 10, the "Ability to motivate" (M = 4.55), as rated by respondents. Jong and Den Hartog (2007) found that leaders could better influence others' innovative behaviors by supporting their creative ideas and bringing them into the implementation phase. Leaders had the ability to motivate others by engaging in activities that were considered innovative. As such, motivational leaders were presented as role models for others. Rating the ability to motivate as one of the top three necessary qualities was not unexpected. The journey of any innovator or entrepreneur is filled with turbulence, challenges, and disappointments. Many give up and quit and others meet these challenges, but they may possibly slow the pace of progress until the idea becomes obsolete. However, having a leader who is able to motivate during these times helps to turn these challenges into a motivational force that brings innovative encouragement to innovators and entrepreneurs. Applegate and Harreld (2009) supported this finding by asserting that challenges should be considered opportunities for high growth and innovational change.

Many Saudis, especially young ones, have good ideas for either breakthrough innovations or a product for development. However, the absence of true leaders who guide and motivate their followers plays an important role in many of these ideas failing to be realized. Newhall (2012) indicated that leaders should strive to satisfy innovators and entrepreneurs by inspiring and

motivating them. He asserted that nurturing innovation among others empowers people to experiment and build a culture that enhances intellectual capabilities. Northouse (2010) pointed out that intellectual stimulation is an internal value of a transformational leader. Thus, Saudi leaders should adopt this quality to be effective at motivating others. For Saudis to nurture innovation in such a competitive environment, leaders must be able to motivate and stimulate others to pursue their novel ideas, and thus believe in the capabilities and capacities of others to achieve their dreams. Given a motivational leader and an integrated innovation center, people may develop breakthrough ideas and technologies that inspire a whole new generation. Therefore, for Saudi leaders to lead technology innovation centers, it is imperative that they embrace the skill of motivation and nurture innovators and entrepreneurs through well-established innovation centers. The ability to motivate necessitates that Saudi leaders be a source of inspiration for others and promote team spirit among those they lead.

Technology innovation centers are considered a platform for technological research and development. In this regard, it was expected that item 38, "Technical competence" (M = 3.76) would score high. However, it scored low. At first glance, the comparatively low estimation of technical skills is a puzzling finding that contrasts with the findings of Thach and Thompson (2007), given that these are leadership positions in technical organizations. There are several possible reasons for this pattern that need to be supported by additional research:

- The organization needs a combination of skills as reflected in the ratings. Imagine how Apple would have faired if Steve Jobs did the technical work and Steve Wozniak was in charge of marketing.
- The participants potentially saw the top leader as needing more *MBA style skills* because of the other technical people in the organization. If the research question

were reworded to ask about the skills needed for the Manager/Director of Operations position rather than the President/Owner position, it would be expected that the need for technical skills would be given a higher rating.

- Another possible reason why the technical skills score might not have been given higher overall ratings was because there was no mention in the study about the technical sophistication of the products that the leader was bringing to market. This could be an important independent variable for future research.
- Another possible reason why the technical skills score might not have been given higher overall ratings was because there was no mention in the study about the size of the organization. This could be an important independent variable for future research in that in a larger organization, the leader can be more concerned with project management and personnel issues and less concerned with specific technical or R&D issues.

The previous paragraphs discussed the findings of research question 1 along with the literature that generally supported these findings. To maintain a non-biased perspective, it was essential to also examine literature that disagrees with the findings of this study. However, the literature did not present any disagreements with the findings presented here. None of the scholars or research discussed in the literature chapter demonstrated divergent findings or came to different conclusions. This is could be attributed to the limited empirical research on the subject matter of leading innovation centers. Knowing that the literature lacks precise empirical research on the leadership skills needed to lead technology innovation centers in Saudi Arabia, the highest rated qualities discussed in this section could be presented as a new contribution to

the broader literature related to leading innovation. It is also a new addition to the literature related to innovation in Saudi Arabia.

In summary, goal setting, self-confidence, and the ability to motivate form the top leadership qualities needed to lead a technology innovation center in Saudi Arabia according to respondents' perceptions. These top qualities were deemed necessary for any leader who planned to lead or was currently leading an innovation center in Saudi Arabia. The top three ranked qualities complement each other. Leading innovation centers requires dealing with innovators or entrepreneurs who are focused on developing disruptive concepts or business ideas. The majority of these leaders are young and have little to no experience in the field. As such, mistakes or failures are expected due to the learning curve of these young innovators as they gain experience. However, with the proper guidance from leaders that are able to help them set achievable goals, build self-confidence, and motivate them throughout both good and bad times, the chances that these innovation centers will produce more breakthrough technologies and eventually more start-up businesses increase. It is also imperative that leaders of Saudi Arabian innovation centers consider reviewing the other qualities in table 5 and possibly adopt relevant qualities that can enhance their leadership skills to effectively lead technology innovation centers in Saudi Arabia.

Research question 2. Research question 2 asked, What is the perception of Saudi Arabians about the factors affecting the technology innovation environment in Saudi Arabia? To answer this question, descriptive statistics were used to rate the relevant survey items, which were based on a 5-point Likert scale: 1 = *Strongly Disagree* to 5 = *Strongly Agree*. Table 6 in Chapter 4 sorted the factors affecting the Saudi Arabian technology innovation environment according to respondents' perceptions. The table ranked the qualities based on means scoring, ranking them from highest to lowest. For consistency, the discussion for this research question is

related to the highest and most significantly rated factors based on their mean score. By discussing only the most highly rated factors, it is possible to make specific and concise recommendations for policy improvement.

The study found that the highest rated item was item 60, "The Saudi young generation is a major driving force for adopting or introducing newly innovative ideas" (M = 4.49). This finding was consistent with those of Fatany (2013), who found that the population density of the Saudi Arabian young people who were considered a major driving force for introducing innovative ideas offered great potential for building a successful technology innovation base in Saudi Arabia. Additionally, the Saudi Arabian Monetary Agency (2012) reported that 60% of the country's population is below the age of 30, with an estimated average annual growth rate of 3.4%. The SPELIT framework analysis further supported this finding. With such a growing population, Saudi Arabia is focusing more on developing the young people who are a main thriving factor contributing to the nation developmental plan.

Fatany (2013) indicated that the young people's intellect is growing rapidly; they are becoming tech savvy and are heavy users of the Internet and well-known social media websites and applications. Fatany emphasized that focus and attention should be shifted towards those young people who are considered a major and important factor in growing a successful technology innovation environment. This focus will help Saudi Arabia to create leaders who will lead the country to greater heights. Additionally, the Saudi Ministry of Economy and Planning (2012) agreed on the importance of this factor by formulating strategic actions in its National Science, Technology, and Innovation Plan (NSTIP), which included developing research and innovation events in academies to enhance young people's abilities.

The next highest rated factor was item 50, "In Saudi Arabia increasing cooperation efforts between government, universities and private sector will foster innovation activities" (*M* = 4.44). This finding was consistent with those of Alsodais (2013), who indicated that Saudi Arabia is moving towards strengthening cooperation between the government and the private sector through the NSTIP national plan. One of the main objectives of this national plan is to support the cooperation between King Abdulaziz City for Science and Technology (KACST) and the private sector to promote innovation activities. Stam (2008) and Lewrick et al. (2010) also found that universities, as research institutes, played a vital role in generating innovation and eventually leading to economic growth. Through their research centers, universities are considered a hub for innovators to develop and experiment ideas; thus, companies, in cooperation with universities, could utilize these centers to develop new products or improve existing ones. Through the NSTIP, Saudi Arabia is progressing toward the enhancement of strategic cooperation between universities' research centers and private sector companies.

Item 43, "The provision of skilled human capital will accelerate technology innovation in Saudi Arabia" (*M* = 4.38), was the third most significant factor rated by respondents as being important for the Saudi Arabian technology innovation environment. Alsodais (2013) found that a large portion of achieving the goals of the NSTIP was dependent on enhancing Saudi Arabian human capital capabilities. Obeid (2013) found results consistent with Alsodais, noting that the Saudi government was making a huge investment to advance education and research based on the consensus that building human resource skills is important for the country's economy. Decades ago, Katz (1964) found that investing in human resources intellect could bring more innovation. He added that human resources are the most important form of capital, and achieving long-term success requires developing human resources intellects. Furthermore, the GII 2014

index of the world's most innovative countries used investment in human capital and research as one of the major pillars to measure the innovation capabilities of each country while looking for components that stimulate innovative activities (Dutta et al., 2014). Saudi Arabia realized that in order to establish a solid innovation base, it needed to invest in human resources. Part of the NSTIP which was developed in 2009, Saudi Arabia is to develop a Science, Technology, and Innovation (STI) Human Resources Program responsible for facilitating creativity and scientific innovation centers, allocating higher education scholarships, devising programs for research and innovation in public education, and recognizing eminent scientific Saudi scholars (Alsodais, 2013).

To maintain a balanced study, the researcher also sought literature that questioned or disputed these findings; however, no such literature was located. Despite an extensive search, none of the available literature disagreed with the findings presented here, nor did any reach any differing conclusions. This finding could be attributed to the limited empirical research on the subject matter of leading innovation in Saudi Arabia. Knowing that the literature lacks precise empirical research on the technology innovation environment in the country, the highest ranked factors discussed in this section could be presented as a new contribution to the broader base of literature related to innovation and a new addition to the literature related to innovation in Saudi Arabia.

In summary, young people; cooperation among the government, universities, and the private sector; and skilled human capital were deemed the three most significant factors affecting the technology innovation environment in Saudi Arabia as perceived by respondents. As a massive share of the population, the young generation was identified as the main driving force for the introduction of innovative technologies. These young people require support and space to

pursue their innovative ideas. Therefore, cooperation among the government, universities, and the private sector creates a boost for national initiatives such as more research parks or innovation centers to accommodate the ideas of those young people. With more research and experiments, people learn and become more highly skilled human capital. Ultimately, fostering a culture of innovation and then accelerating and developing the technology innovation base. It was important to note that confident leadership with the ability to set clear goals, inspire, and motivate was a key player in bringing these results into reality.

Research question 3. Research question 3 asked, Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their experience? To answer this question, Spearman rank-ordered correlations were used. The 32 ratings from Part 2 of the survey were correlated with the three experience variables. For the resulting 96 correlations, five were significant at the $p < .05$ level and one was of moderate strength. However, with regard to the top qualities—goal setting, self-confidence, and the ability to motivate—no significant correlations were found between the most necessary leadership qualities and the three experience variables. Thus, it could be concluded that experience had no impact on the respondents' answers about the top leadership qualities required to run a technology innovation center in Saudi Arabia. Additionally, having a lot, a moderate amount, or minimal to no experience had no significant impact on determining the top leadership qualities. Since the literature suggested that there was not enough data regarding the impact of experience on the leadership qualities needed to run a technology innovation center, this finding is a new addition to the literature.

In contrast, as explained in Chapter 4, the discussion of the results for this particular research question focused on the correlations that were moderate or stronger in order to minimize

the possibilities for Type-1 errors, which may be the result of drawing flawed conclusions based on potentially spurious correlations. Thus, to avoid bias in this research, it was important to focus the attention on the moderate or stronger correlation found for this question. Specifically, respondents who gave higher ratings for the importance of having strong values (Item 33) had shorter durations of experience (Item 6; r_s = -.31, p = .005). According to the SPELIT framework, values and ethics in Saudi Arabia are derived from Islamic law and therefore are integral qualities of people's lives (Kabasakal & Bodur, 2002). Thus, it is possible that people who have more experience tend to value the leadership qualities they experienced over common or prevalent ones and they found those *experienced* qualities more necessary for running a technology innovation center than others. Alternatively, it is likely that people with shorter durations of experience tend to perceive common or prevalent qualities as more important than others. It is possible that they might need time to develop knowledge about the significant leadership qualities related to running innovation centers. This is an area that scholars can investigate further and in more detail in future research.

Research question 4. Research question 4 asked, Are the respondents' answers about the top leadership qualities needed to lead a technology innovation center in Saudi Arabia related to their demographic characteristics? To answer this question, Spearman rank-ordered correlations were used. The 32 ratings from Part 2 of the survey were correlated with the four demographic variables (gender, age, education, and marital status). For the resulting 128 correlations, nine were significant at the $p < .05$ level and two were of moderate strength. However, with regard to the most necessary qualities—goal setting, self-confidence, and ability to motivate—no significant correlations were found between the top leadership qualities and the four demographic characteristic variables. Thus, it was concluded that gender, age, education, and

marital status had no impact on the respondents' answers about the most necessary leadership qualities for running a Saudi Arabian technology innovation center. Since the literature suggested that there was not enough data regarding the impact of demographic characteristics on the leadership qualities needed to run a technology innovation center, this finding is a new addition to the literature.

As explained in Chapter 4, the discussion of the results for this particular research question focused primarily on the correlations that were moderate or stronger in order to minimize the possibilities for Type-1 errors, which may be the result of drawing flawed conclusions based on potentially spurious correlations. Thus, to avoid biased research, it was important to draw attention to the moderate or stronger correlations found for this question. Specifically, respondents who gave higher ratings for the importance of challenging the status quo (Item 17) had more formal education (r_s = .31, p = .005). Educated people are more likely to develop an understanding of what is necessary to enhance the innovation environment and how to challenge the status quo and lead change (Bixenman, 2007; Davila et al., 2006). Thus, the people that rated this quality sought it necessary to work for change in the innovation environment in Saudi Arabia and showed readiness to handle any challenges. In addition, respondents who gave higher ratings for the importance of high self-control (Item 29) were more likely to be female (r_s =.33, p = .003). Females are more likely to be emotional than males, and females who gave higher ratings for the quality of self-control could possibly feel the limitations of this quality in their gender, leading them to endorse this quality more strongly than men. Scholars could further investigate this result in more details in future research.

Conclusions and Implications

The aim of this study was to identify the top leadership skills necessary for running Saudi Arabian technology innovation centers and examine the key factors that affected the Saudi innovation environment. The study reached several interesting conclusions regarding the top leadership qualities necessary to lead technology innovation centers and the key factors affecting or contributing to the Saudi Arabian innovation environment. In brief, the total male participation in the study was greater than female by almost 18%. The age mean was 34.23 and the majority of the respondents were highly educated. More than half of the respondents were either involved in the past or currently involved in innovation with an experience that ranged from less than 6 months to more than 5 years. About 60% of the respondents reported that they were either aware or completely aware about the concept of innovation centers.

Based on these findings, the study concluded that "goal setting" (M = 4.59), "self-confidence" (M = 4.56), and "ability to motivate" (M = 4.55) were the highest rated leadership qualities. These qualities, as perceived by most respondents, represent the most necessary leadership skills required to lead technology innovation centers in Saudi Arabia. The findings of this study indicated that leadership has a great impact on facilitating innovation. Hesselbein et al. (2002) explained that leadership and innovation are interrelated and synergy comes from leaders who are able to foster innovation in their followers by using their leadership skills. Adopting the proper and most essential leadership qualities is essential for running technology innovation centers. Additionally, it must be emphasized that other leadership qualities cannot be overlooked, but should also be taken into account. The top-ranked leadership qualities that were suggested in this study were the result of the research and study methodology followed; however, in the event that the methodology were changed, it is likely that future research might reveal different

findings. For a complete list of all the rated leadership qualities please refer to Table 5 in Chapter 4. The items are ranked from high to low according to their mean score. Paying attention to these leadership qualities will help nurture skilled human capital. Leaders who adopt these qualities will develop the capacity to teach others and promote a learning culture that produces knowledgeable human capital. The provision of available skilled labor improves the technology innovation environment in Saudi Arabia.

A vast majority of the respondents strongly agreed that the young Saudi Arabian generation was a major driving force for the introduction of new innovative ideas. Focusing on young people and nurturing them with the proper education will help prepare potential innovators. Those potential innovators are the seed for developing a healthy innovation environment. The need exists for establishing better innovation centers that in turn necessitate preparing better leaders to lead these centers, which ultimately help in increasing the output of these innovation centers by launching more innovative ideas and start-up companies. The study determined that increased cooperation among the government, universities, and the private sector helps foster a culture of innovation and eventually launch fast-growing start-up companies. These start-up companies have a great impact on furthering the functions of technology innovation centers.

This study affirmed that innovation and technology innovation centers have a significant impact on the Saudi Arabian economy. The key findings of this study should spur Saudi Arabian policy makers to continue promoting policies that supported the development of the technology innovation base in Saudi Arabia. Furthermore, the findings of this study will give Saudi policymakers access to information relevant to technology innovation centers. The top leadership skills that were identified and rated via the online survey created a knowledge base for existing

and future Saudi Arabian leaders who were leading or will lead technology innovation centers. This study also contributed to the knowledge base and literature in the field of technology innovation and leadership and supports leaders of innovation centers to enhance and improve their organizational performance.

Policy and Practitioner Recommendations

Based on the results of this study and reviewing the relevant research in the field of innovation and leadership, the study yielded some important recommendations for policymakers and practitioners. Policymakers in Saudi Arabia should consider adopting the following recommendations to enable the country to support more innovative and/or entrepreneurial ideas and activities:

- Since Saudi young people are a major driving force for innovative ideas, then Saudi Arabia should create, or implement more technology and innovation within the school systems at various levels, elementary through university. Additionally, they should change the way the school system is currently set up in order to promote critical thinking and give opportunities for students to develop their ideas.
- Saudi Arabia should support increased cooperation with the public sector and encourage collaboration between foreign and national entities.
- Provide funds for leadership training and mentor development, and concentrate on developing and investing in human capability. Within the NSTIP, Saudi Arabia should develop specific high impact leadership programs that launch refined leaders. These programs should focus on a transformational style that empowers Saudi leaders with leadership skills that help them to set clear goals, build self-confidence, and become motivational and influential leaders.

- Train and inform the public regarding the need for more innovation, help the public to be more open to new ideas, and support creativity.
- Build more innovation centers/technology labs where innovators can come to collaborate with others in their field, receive the necessary resources, and obtain a patent for their ideas.
- Review existing policies with a focus on creating specific innovation and entrepreneurial goals to create a more open market that eases innovation and entrepreneurial activities.

Recommendations for Future Research

After researching and conducting the quantitative statistical methods of this study and then presenting and discussing the findings in conjunction with the literature, the researcher developed ideas for improvement. Thus, the following recommendations are offered for future research:

- Innovation centers are a new concept in Saudi Arabia; therefore, limited information regarding this concept and its relation to successful leadership has been published. After conducting this study, it is believed that a successful innovation center is correlated with the development of effective leadership skills. Thus, future research can be conducted on the relationship between successful innovation centers and effective leadership skills.
- Limited time and resources were reasons for restricting the study population to only Badir Program for Technology Incubators. Therefore, this study can be replicated by using different populations and a larger sample size.

- For future research, a researcher could apply some other methodological enhancements like changing the survey scale to a 3-point scale (e.g., disagree, neutral, agree). This could bring about different results.
- Additionally, future research could use qualitative methods with different instruments such as interviews, which could reveal different results.
- It would be fascinating to conduct a similar study in both Saudi Arabia and the United States and then compare findings. Because of the existence of different perceptions and culture, the study could yield interesting and contrasting results.

Summary

The purpose for this study was to ascertain and suggest leadership qualities that are vital for effective leadership in the technology innovation centers and develop an understanding of the environmental factors affecting technology innovation in Saudi Arabia. This chapter discussed the key findings of the study and the literature that supported these findings. The implications and recommendations for policymakers and practitioners were highlighted along with suggestions for future research.

In closing this chapter and the entire study, the researcher thought it would be appropriate to share personal insights with the reader. To facilitate innovation activities in Saudi Arabia, there is a great need to build a culture that fosters the innovation process. Additionally, leaders and policymakers in Saudi Arabia must focus on espousing or adopting proper leadership skills to introduce innovation. Fostering innovation results in bringing new ideas and developing a stimulating entrepreneurial culture that enables others to experiment, learn, grow, and succeed in this dynamic environment. Thus, a better understanding of people's perceptions regarding the importance of technology innovation should assist Saudi leaders in their efforts to promote and

sustain involvement and empowerment among innovators, improve morale among leaders, and increase the potential for success.

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APPENDIX A

Site Approval Letter

بسم الله الرحمن الرحيم

بادر badir
برنامج بادر لحاضنات التقنية
Badir Program for Technology Incubators

مدينة الملك عبدالعزيز للعلوم والتقنية KACST

(٧٠٠٠٨٧٥٢١٦) Date التاريخ

Encl المرفقات

(١٦١) No الرقم

Subject: Dissertation Survey – What are the necessary skills to lead an innovation center in Saudi Arabia

Dear Abdulaziz Algabbaa,

This letter is to inform you that we have received and reviewed your request to conduct your dissertation survey on our organization. On behalf of Badir Program for Technology Incubators in Saudi Arabia, we are pleased to inform you that your request has been approved. Accordingly, Badir is willing to help you in circulating your online questionnaire among the targeted audiences in the organization.

Just to be clear on terminology, we are a Business Incubation and Accelerator Program which supports the establishment and growth of technology ventures.

We look forward to support you by any means and wish you success and prosper,

Sincerely,

Nawaf Alsahhaf

Chief Executive Officer

Badir Program for Technology Incubators

بادر badir
مدينة الملك عبدالعزيز للعلوم والتقنية
البرنامج الوطني لدعم الحاضنات

المملكة العربية السعودية - ٢١٩١ ش عبدالواحد بن أحمد - النخيل وحدة رقم ١ - ص.ب ٧٣٥١ الرياض ١٢٣٨٥ - ت ١٢٠٥٢٠١٨ ٩٦٦+ - فاكس ١٢٠٥٤٠٦٣ ٩٦٦+

APPENDIX B

Copy of the Actual Online Survey

WHAT ARE THE NECESSARY SKILLS TO LEAD AN INNOVATION CENTER IN SAUDI ARABIA?

Dear Participant:

My name is Abdulaziz Algabbaa, and I am a doctoral candidate in Organizational Leadership at Pepperdine University in California State, United State of America. I am currently in the process of recruiting individuals for my study entitled, "What are the necessary skills to lead an innovation center in Saudi Arabia?" Innovation centers concentrate on speeding up the early development of innovations (Goddard, Robertson, & Vallance, 2012). It gives researchers, business visionaries, and developing organizations concentrated on initial stage opportunities a one-stop access to science and technical experts (Kahn & Dempsey, 2012). In general, these centers usually offer office space, labs, workshops, mentorship, access to funding, and other developmental tools and services designed specifically to nurture innovators and/or entrepreneurs while working on or developing their ideas.

The professor supervising my work is Dr. June Schmieder-Ramirez. The study is designed mainly to identify the necessary leadership skills required to lead innovation centers in Saudi Arabia and examine the factors that affect the Saudi innovation environment. The study intends to shed light on ways in which the development of innovation centers can be improved in Saudi Arabia. The findings of this research will lead to suggestions that will improve existing policies regarding technology innovation in Saudi Arabia. Thus, I am inviting individuals who worked or are working in innovation, technology innovation and entrepreneurship field in Saudi Arabia to voluntary participate in my study through this online survey and share their viewpoints on technology innovation and innovation centers in Saudi Arabia. Please understand that your participation in my study is strictly voluntary.

Please continue this survey after carefully reading the consent form below and signing it by checking the box that states; I have read and fully understand the consent form and agree to participate in this study; otherwise choose; I choose not to participate in this study; and you will be exited from the survey.

The following is a description of what your study participation entails, the terms for participating in the study, and a discussion of your rights as a study participant. Please read this information carefully before deciding whether or not you wish to participate.

If you should decide to participate in the study, you will be asked to complete an online survey by completing 3 main parts of questions and a closing open-ended question. The first part of the questions will be related to demographic information such as age, gender etc. The second part will be regarding your opinion on the leadership qualities needed to lead an innovation center in Saudi Arabia. The third part will be about your opinion on the factors affecting technology innovation environment in Saudi Arabia. It should take approximately 15 to 20 minutes to complete the survey. Please complete the survey alone in a single setting.

Although minimal, there are potential risks that you should consider before deciding to participate in this study. These risks include, people may discover that you participated in the study even though your identity is protected and that all survey responses will be kept confidential, so this risk is very low. Another potential minimal risk is the possible burden on your time. In the event you do experience any risk you could discontinue participation in the survey or activity at any time without penalty or loss of benefits to which I am otherwise entitled and you could do so by simply exiting the Internet browser. You understand that the investigator is willing to answer any inquiries you may have concerning the research herein described.

The potential benefits to you or society from participating in the study upon completion of the study are that the investigator will identify necessary leadership skills a leader must have to lead an innovation center in Saudi Arabia and identify factors affecting technology innovation in Saudi Arabia. The findings will help the society to better understand technology innovation in Saudi Arabia.

If you should decide to participate and find you are not interested in completing the survey in it's entirely, you have the right to discontinue at any point without being questioned about your decision.

After 2 weeks a reminder note will be sent to you to complete the survey. Since this will go out to everyone, I apologize ahead of time for sending you these reminders if you have complied with the deadline.

If the findings of the study are presented to professional audiences or published, no information that identifies you personally will be released. The data will be kept in a secure manner for a minimum of three years at which time the data will be destroyed.

If you have any questions regarding the information that I have provided above, please do not hesitate to contact me at the phone number provided below. If you have further questions or do not feel I have adequately addressed your concerns, please contact the faculty supervisor Dr. June Schmieder-Ramirez via email at june.schmieder@pepperdine.edu. If you have questions about your rights as a research participant, contact Dr. Thema Bryant-Davis, Chairperson of the Graduate & Professional School Institutional Review Board at Pepperdine University, via email at gpsirb@pepperdine.edu or at

By completing the survey and returning it to me, you are acknowledging that you have read and understand what your study participation entails, and are consenting to participate in the study.
Thank you for taking the time to read this information, and I hope you decide to complete the survey. You are welcome to a brief summary of the study findings in about 1 year.

Sincerely,

Abdulaziz Hamad Algabbaa
Doctor Candidate

Email: abdulaziz.algabbaa@pepperdine.edu

If you agree and decide to participate please check the first item to continue, otherwise check the next item to exit the survey:

- ◯ I have read and fully understand the consent form and agree to participate in this study
- ◯ I choose not to participate in this study

***Part One*: Demographic Information.**
[The following questions will collect demographic information]

Gender:

- ◯ Male
- ◯ Female

Age:

Education:
[Please choose from the highest level completed or currently in]

- ◯ No schooling completed
- ◯ High school graduate
- ◯ Associate degree
- ◯ Bachelor's degree
- ◯ Master's degree
- ◯ Doctorate degree

Marital Status:

- ◯ Single
- ◯ Married

Experience in innovation and/or technology innovation field:

- ◯ Never involved
- ◯ Currently involved
- ◯ Involved in the past
- ◯ Think of involving in the future

Experience duration:
[For how long you have been involved in the field of innovation and/or technology innovation?]

- ◯ I never been involved
- ◯ Less then 6 months
- ◯ Between 6 months and 24 months
- ◯ Between 2 years and 5 years
- ◯ More then 5 years

Level of awareness about the concept of "innovation centers":

- ◯ Completely aware
- ◯ Aware
- ◯ Slightly aware
- ◯ Not aware

Part Two: **Leading an innovation center in Saudi Arabia.**
[How important the following skills are for a leader to lead an innovation center in Saudi Arabia. Please select the answer that accurately describes your opinion]

	Much less important skill	Somewhat less important skill	Neither more important skill nor less important skill	Somewhat more important skill	Much more important skill
• Ability to engage innovators in meaningful issues	○	○	○	○	○
• Curiosity	○	○	○	○	○
• Ability to motivate	○	○	○	○	○
• Encourage unique and diverse ways of doing things	○	○	○	○	○
• Self confidence	○	○	○	○	○
• Develop relationships of trust	○	○	○	○	○
• Create leading-edge innovations or lead others to do so	○	○	○	○	○
• Ability to identify own mistakes	○	○	○	○	○
• Shatter the strategy monopoly (promote new ideas that may have nothing to do with strategy or may even cut against it)	○	○	○	○	○
• Challenge the status quo	○	○	○	○	○
• Have relevant knowledge and experience in innovation and entrepreneurship	○	○	○	○	○
• Networking	○	○	○	○	○
• Visionary	○	○	○	○	○
• Inspirational	○	○	○	○	○
• Goal-setting	○	○	○	○	○
• Ability to understand the feelings and emotions of others	○	○	○	○	○
• Ready to try new ideas	○	○	○	○	○
• Provide guidance and training	○	○	○	○	○
• Risk taker	○	○	○	○	○
• Desire and ability to lead	○	○	○	○	○
• Intelligence	○	○	○	○	○
• High self-control	○	○	○	○	○
• High self-esteem	○	○	○	○	○
• Has respect to others	○	○	○	○	○
• Has a purpose	○	○	○	○	○
• Has strong values	○	○	○	○	○
• Proactive	○	○	○	○	○
• Thinks systematically	○	○	○	○	○
• Ability to manage change	○	○	○	○	○
• Understands diversity and cultures	○	○	○	○	○
• Technical competence	○	○	○	○	○
• Benevolence (ability of a leader to encourage others to discuss and create knowledge from the conflicts that emerge)	○	○	○	○	○

Part Three: **Technology innovation in Saudi Arabia.**
[Please read the following statements and select the answer that accurately describes your opinion]

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
• Technology infrastructure is an important factor for building a technology innovation culture	○	○	○	○	○

• Saudi Arabia is considered a major importer of technology	○	○	○	○	○
• Technology innovation centers is a driving force for innovation	○	○	○	○	○
• The provision of skilled human capital will accelerate technology innovation in Saudi Arabia	○	○	○	○	○
• The Saudi government plays an important role in developing its innovation ecosystem	○	○	○	○	○
• Saudi Arabia made considerable efforts to support the development of its innovation and entrepreneurial activities	○	○	○	○	○
• Saudi Arabia efforts in improving its intellectual property environment led to more technology innovation activities	○	○	○	○	○
• Saudi Arabia investment on research and development is considerably low	○	○	○	○	○
• Saudi Arabia efforts to support the development of its innovation and entrepreneurial activities is inadequate	○	○	○	○	○
• In Saudi Arabia, the participation of the private sector in developing the country innovation ecosystem is inadequate	○	○	○	○	○
• In Saudi Arabia, increasing cooperation efforts between government, universities and private sector will foster innovation activities	○	○	○	○	○
• Strategic partnership between Saudi universities and leading international institutions accelerate the development of skilled human capitals and enhance innovation capabilities	○	○	○	○	○
• Promoting further policies for the development of innovation will help advance the innovation base in Saudi Arabia	○	○	○	○	○
• In fostering innovation, the Saudi government should encourage the emergence of more start-up companies	○	○	○	○	○
• Increased government supports and grants for start-up companies will foster innovation activities in Saudi Arabia	○	○	○	○	○
• In Saudi Arabia, being a conservative society obstructs the development and growth of innovation activities	○	○	○	○	○
• The lack of communicating a clear national innovation initiative is a major factor affecting technology innovation development in Saudi Arabia	○	○	○	○	○
• The lack of support to develop proper innovation centers is a major factor affecting technology innovation development in Saudi Arabia	○	○	○	○	○
• The lack of technology infrastructure is a main barrier to technology innovation growth in Saudi Arabia	○	○	○	○	○
• The lack of skills required to develop and lead innovation is a major obstacle for the development of the Saudi Arabian innovation environment	○	○	○	○	○
• The Saudi young generation is a major driving force for adopting or introducing newly innovative ideas	○	○	○	○	○
• The Saudi Arabian people quickly adapt to new technologies	○	○	○	○	○

• Focusing on building a strong knowledge infrastructure (IT networks and human capital) is an important factor in developing the technology innovation base in Saudi Arabia.	○	○	○	○	○

Part Four:
[Please read the following question and write your answer/perspective in the blank provided. Feel free to express your answer in a sentence, or even a paragraph]

What is one thing you would recommend that Saudi Arabia adopt that would enable the country to support more innovative and/or entrepreneurial ideas and activities?

APPENDIX C

Question 14 Response Quotes Break Down Pertaining to Each Category

Table C1

Category Number 1 Break Down

Response Number	Response Quote
4	Increase the R&D budgets: at KACST for all SI's, at Ministry of Education for R&D & Entrepreneurship at Academic Institutions, middle-high school FabLabs & interregional competitions in Robotics, 3D Printing, vocational schools throughout population centers, with emphasis in poorer neighborhoods.
7	Implementation of qualtive IPs and not just numbers quantitives to be commercialized through universities and research centre will shift up a gear towards a new era.
8	We should establish a subject for all school years that promotes thinking out of the box starting at a very early age with our kids in schools
10	Curriculum and program in High school to foster students to venture into their own business.
11	Encourage and nurture young minds from small age, elementary school to participate in innovative new ideas and provide the center for it.
12	Set up innovation & incubation centers in universities.
19	We need to change our approach to basic education to be concentrating more on building critical skills and information processing, and less on accumulating information while lacking a comprehensive purpose to build a mind capable of processing knowledge and adding to it innovative elements to affect actual change in thinking, behavior and problem solving towards accepting innovation as a basic requirement for development and growth both foe the individual and society at large.
24	Promote innovation at KG and primary schools
31	Fostering the youth and listening to them.
33	Having strong beliefs in the new generation and giving them the trust to practice their creativity, in my opinion is the first step in creating a bright future for an innovative country.
37	Change the stinky education system and upgrade it to a one that produces minds to build and develop not to use and consume ... Saudi educational curriculum is what driving this nation backwards ... Unfortunately...
61	Using 3D ways for education instead of the regular paper-based teaching or the PowerPoint.
63	Education system needs more improvement
64	To have the good education
86	Encourage and motivate the young generation to innovate
91	Inspiration for young generation. / Foster innovation workshop for young generation in schools. / If possible, introduce such subject in local language.
92	I think that focusing on the outcome of the scholarship program will benefit the country; Ministry of Education must mandate that students take certain technical majors instead of general majors

Note. $n = 17$.

Table C2
Category Number 2 Break Down

Response Number	Response Quote
3	Government support Revisit the NSTIP (National Science Technology & Innovation Plan) & include "entrepreneurship" as a "Strategic Initiative" (SI), not just another, but very important, perhaps match its budget to that of water as an SI; Increase the R&D budgets: at KACST for all SI's, at Ministry of Education for R&D & Entrepreneurship at Academic Institutions, middle-high school FabLabs & interregional competitions in Robotics, 3D Printing, vocational schools throughout population centers, with emphasis in poorer neighborhoods; Provide tax
4	credits/incentives for private industry for greater R&D towards innovation
8	a large amount of government budget should be allocated to R&D & innovation
13	R &D investment in universities, hospitals and carious development centers Saudi Arabia needs to take more chances & risk on innovators & entrepreneurs & push/involve private & public sectors in supporting, guiding, investing, & partnering with these individuals which at the end will result in favor of the whole
14	nation in boosting its economy.
20	Government must unite with private sector to develop that area; government should play very high financial support to develop innovation in Saudi Arabia.
21	Strong cooperation between the public and private sector in the field of research and development
24	Incentives companies to focus on R& D; allocate more budget for innovation centers
29	Support the research
30	Provide financial support
38	Private Sector involvements (voluntary and forced)
41	For the government to be the first adaptor of new technologies
52	Open free zones to import as many as possible of the global corporations and businesses. This will enable the locals to have better influence from the outside world. As the innovation scene in KSA right now is kind of limited to the campus of know individual's realms or universities in big cities. Gov focus on big cities is one of the biggest problems hindering the country from big growth opportunities in this space.
74	Government Support
85	Government and large corporations should invest

Note. $n = 15$.

Table C3

Category Number 3 Break Down

Response Number	Response Quote
10	Public education classes
12	Teach the importance and the benefits of innovation.
25	Community centers that gives lectures and advise for everyone, targeting all age groups with fruitful shows and commercials on tv as starting point
27	To be more open and accepting other ideas
34	Allow more creativity and support people who are
35	Creativity
42	If the society stop being so judgmental and be more open to implementing new ideas instead of fighting innovation for cultural or even religious reasons which is end up eventually by accepting them because it has nothing to do with them but only because majority of society just can't accept new ideas.
50	I believe when the government and universities collaborate together, they will help aware the public especially the educated ones.
53	Awareness! To create you have to know, to know you have to be aware first. I think the society requires awareness messages to support young minds and allow them to foster within their own societies. I believe innovation starts from people's minds.
54	I believe that we have all the essentials that we need but the we need more awareness to show how important is innovation nowadays worldwide !!!
62	Education, teaching society more about technology & innovation that will remove the barrier of fear and none acceptance of new ideas making us more capable of taking risks and thinking out the box and therefore taking an initiative to create.
63	People need more training
71	Why we are not at the top?
87	- Understand the need, not the wish (for example innovations related to hot weather) / - Build bottom-up system, not the opposite / - Learning curve should be considered /

Note. $n = 14$.

Table C4

Category Number 4 Break Down

Response Number	Response Quote
6	Continued creation of technology incubators (innovation centers) through increased funding of not only the facilities and infrastructure but capacity building for developing a cadre of incubation managers and staff. KACST is doing this with its BADIR Program for Technology Incubators but it needs further rapid growth
12	Attract local and foreign talents to work on incubation centers.
32	Create an agency that connect entrepreneurs, investors and new college graduates in the same field with each other and give them the tools to start new business.
33	Providing the ambitious individuals with adequate centers and trained leaders will definitely motivate them in creating, innovating and applying their own knowledge.
44	Innovation centers that provides funds, resources and adopts new ideas
50	Setting a hub that will help attract all innovators to connect with each other
51	I highly recommend a collaborative labs that have various specialists who can help creative Saudis to explain there innovation ideas, plans, patents by preventing their intellectual rights in order to foster the innovations in Saudi Arabia
73	Build more of them
81	Open more innovations centers and incubators
85	Developing Innovation centers that stimulate the development of new ideas.

Note. $n = 10$.

Table C5

Category Number 5 Break Down

Response Number	Response Quote
4	c) Governmental institutions, i.e. SAUDI ARAMCO, SABIC & Academia interconnected via collaborations, partnerships, exchanges & internships with academia, private industry, NGO's to weave its entrepreneurial tentacles both domestically & internationally.
8	we should not re-invent the weal and rather start where others stopped, we should use the knowledge and experience of top people in these fields from allover the world
12	Attract local and foreign talents to work on incubation centers.
20	Saudi Arabia must sent scholarships to countries that advances in the field of innovative and entrepreneurial ideas and activities for the purpose of gaining experience and mechanism
39	I would highly recommend the government of SA to attract diverse innovation's experts from all over the world. Also, it has to encourage both the universities and the private sector to work with the most innovative companies such as Apple, Google, Alibaba..etc in order to benefit from these innovative companies.
45	Saudi universities Cooperate with foreign universities in this major
47	Having more international technology conferences.
64	To have enough supportive companies to support the new innovation.
74	Benchmarking the country current system in supporting innovative and /or entrepreneurial ideas to a country which can be considered in an advanced stage.

Note. $n = 9$.

Table C6

Category Number 6 Break Down

Response Number	Response Quote
26	The government need to be sure that the money they pay going to what they really pay it for; also they need to decrease the amount of paper work on the scientists and employs people to be sure that money is spended in the way it should be
75	To Stop Bureaucracy
76	Less regulated and more open market will lead entrepreneurs to make a difference in the market.
77	Setting clear policies and copyrights regulations, then enforcing them on markets participants, would definitely improve the environment for innovation and entrepreneurship.
81	Fix ruled related to venture capital
90	Simplify and unify its regulations. As well as coordinate the efforts among the relevant authorities

Note. $n = 6$.

Table C7

Category Number 7 Break Down

Response Number	Response Quote
9	It is my opinion that KSA will never change if there is no sense of unity as apart of the country. There is a deeper sense of Me as an individual as opposed to a We of teamwork. / Scrutiny of individuals who work to improve any area should be noticed even if some of their efforts make mistakes... However most Saudi individuals like to just get by and make the paycheck...
17	Both innovative and entrepreneurial ecosystem (value chain) in Saudi is totally scattered. There are many initiatives and many supports regimes but the issue is with the coordination's and having a holistic support system.
18	1- Consistent precise approach / 2- Short term strategies should incumbent long term strategies; follow up for continuous improvements
60	Focus on several areas and get everybody aligned to achieve this goal. We need no more visions or missions, what we really lack is to set goals and execute!
88	Focus on strengthening the Link: / Schools to Universities to Research Centers to Industrial Companies together with policy makers
91	Innovation is a one word, but it could apply on everything, so Saudi Arabia should be specific on a number of innovation encouragement programs rather than open the whole spectrum. / Be specific in what segment of innovation is required

Note. $n = 6$.

Table C8

Category Number 8 Break Down

Response Number	Response Quote
5	To Provide Mentors who will coach innovators/entrepreneurs in developing the prototype, business plans and access to seed funds.
16	Build fellow ship program/attach they with leaders/build special program for student/build up summer program, such as "Mawheba" especially for leaders
22	To hire an honest and reliable leaders who care about their country future and people to adopt innovative or/and entrepreneurial ideas and activities.
36	Give expert people the opportunity to support more innovative

Note. $n = 4$.

Table C9

Category Number 9 Break Down

Response Number	Response Quote
18	Investment in the human capital capabilities for sustainability
24	Focus on human capability building
30	Encourage the human force to pursue more innovations, provide facilities that the innovators might need and acknowledge the entrepreneurs themselves

Note. $n = 3$.

Table C10

Category Number 10 Break Down

Response Number	Response Quote
15	Take responsibility and ownership of issues and the try to address them in accordance to your resources
28	Developing a stronger and more effective home/street address that is national and standard, it will support the technological entrepreneurial ideas in terms of reaching out to they customers much faster and efficient.
78	Encouraging innovators to present initiatives and explore implementing such to ensure applying the same

Note. $n = 3$.

Table C11

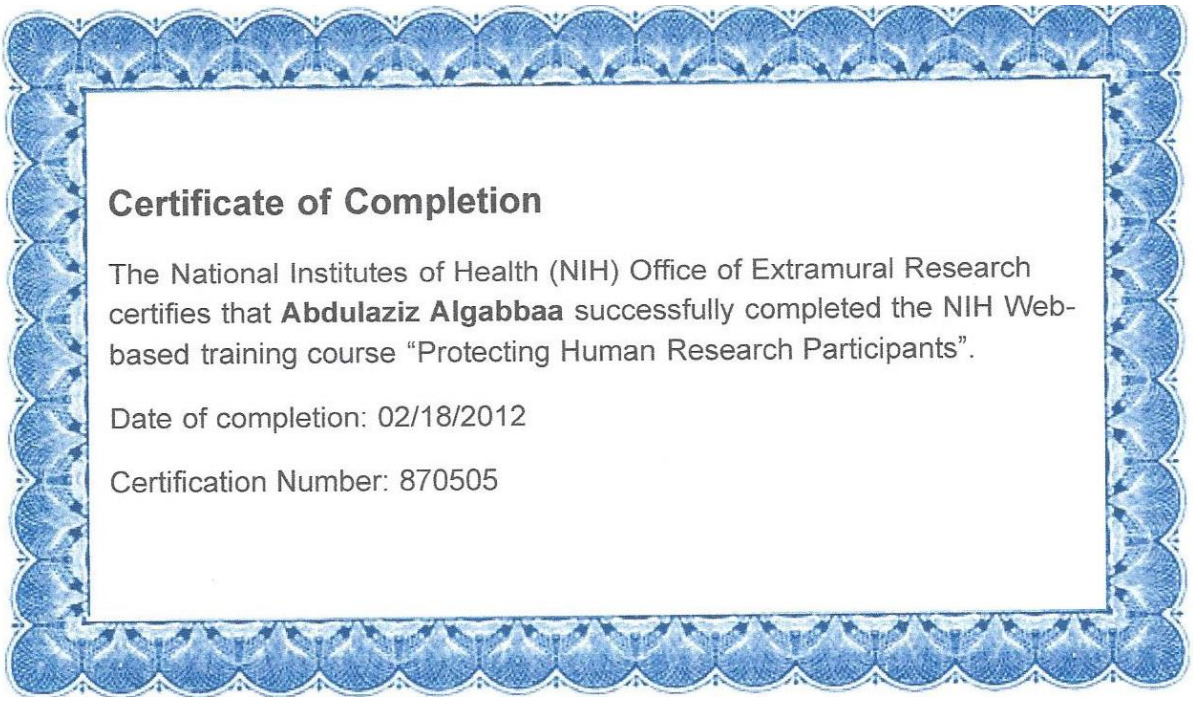
Category Number 11 Break Down

Response Number	Response Quote
23	nnn
40	
43	
46	I don’t have any idea now
48	
49	
55	
56	
57	
58	
59	
65	
66	
67	
68	
69	
70	
72	
79	
80	
82	
83	
84	
89	
93	N/A
94	
95	
96	
97	
98	
99	
100	
101	
102	
103	
104	
105	

Note. $n = 37$.

APPENDIX D

Protecting Human Subject Research Participants Certificate of Completion



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Abdulaziz Algabbaa** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 02/18/2012

Certification Number: 870505

APPENDIX E

Copy of IRB Approval

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

March 20, 2015

[redacted]

Protocol #: E0215D01
Project Title: What are the Necessary Skills to Lead an Innovation Center in Saudi Arabia

Dear Mr. Algabbaa

Thank you for submitting your application, *What are the Necessary Skills to Lead an Innovation Center in Saudi,* for exempt review to Pepperdine University's Graduate and Professional Schools Institutional Review Board (GPS IRB). The IRB appreciates the work you and your faculty advisor, Dr. Schmieder-Ramirez have done on the proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations (45 CFR 46 - http://www.nihtraining.com/ohsrsite/guidelines/45cfr46.html) that govern the protections of human subjects. Specifically, section 45 CFR 46.101(b)(2) states:

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

In addition, your application to waive documentation of informed consent has been **approved**.

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

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

6100 Center Drive, Los Angeles, California 90045 ▪ 310-568-5600

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

Sincerely,

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

cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives
Mr. Brett Leach, Compliance Attorney
Dr. June Schmieder-Ramirez, Faculty Advisor