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Successful Climate Change Strategies in Corporate Farming in North America

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This is to certify that the doctoral study by

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2018

Abstract

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by

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MBA, Regis University, 2000

BS, Colorado State University, 1986

Doctoral Study Submitted in Partial Fulfillment

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Abstract

The impact of climate change on agriculture is evident in changing growing seasons, crop yield, crop quality, and even complete crop losses. Changing climate conditions negatively affect the profitability of agricultural organizations. This study was a single descriptive case of one agricultural corporation in the western United States. The purpose was to identify and explore successful climate change-based sustainability strategies. The conceptual framework for this study was legitimacy theory. The data collection methods consisted of a semistructured interview of a corporate exectutive and obtaining corporate documents, including the annual report from the company's website. Data were analyzed using content analysis and principal themes were identified by reexamining and resorting the data into various categories. The findings indicated that the farm's sustainability strategy was based on the the basic qualities of successful sustainability strategies of corporate social responsibility, triple-bottom-line thinking, and systems thinking. Specific themes in terms of climate change-based sustainability strategies were mitigation-oriented strategies, and adaptation-oriented strategies. The distinctive approaches related to climate change mitigation that were identified were reducing carbon emissions, reducing fertilizer/herbicide use, and reducing the use of pesticides. The specific adaptation approaches identified were water conservation, soil enhancements, and diversity in business endeavors. Implications for social change include the advancement of climate change strategies within agricultural organizations to provide for increased food security and decreased danger of starvation and malnutrition of people in underdeveloped areas.

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Dedication

I am dedicating this study to my grandson Marley, my granddaughter Santana (Tana), my grandson Samuel, and my future grandchildren. This study was a labor of love.

Acknowledgment

I would like to first acknowledge the Lord for blessing us with the care of his planet and Jesus Christ my Savior for being right beside me in my darkest hours. Without the strength of my Lord and my faith, I would not have made it through this. All honor and glory are His and His alone.

I would like to recognize my family-particularly my husband and son-who had to adapt to our changed schedule for a considerable length of time. I am certain I missed a part of my son's growing up due to this endeavor. Recognition also goes out to my father who is the only person in my life that took the time to read my work. I also appreciate the help of friends and angels I have met along the way at Walden who truly made this process easier and encouraged me, particularly Melanie Kilian and Erin Fogle. Friends who were willing to listen were so appreciated on this journey, especially near the end – and I am sure you know who you are. Appreciation also goes out to my committee chair, Dr. William Stokes, and second committee member, Dr. Jaime Klein, and all other reviewers of this work.

I would also like to wholeheartedly acknowledge all those people who did not understand and did not support me because it was you and my God-given stubborn nature that fed my curiosity, concern, and perseverance. I would also like to recognize all the people who constantly asked if I was done with my doctorate yet – to which I can finally say I am done, but I am just beginning. This is the foundation of what I hope is a dedicated effort to make a difference through spreading the truth. It is always easier to

deny the existence of a problem than to face it head on and to be someone who makes changes for the betterment of the world.

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Section 1: Foundation of the Study

Climate change is expected to impact businesses of all types across the globe in numerous ways (Pachauri et al., 2014). The agricultural industry is particularly vulnerable (Hoffman, 2015). In this study, I identified climate change based strategies used in corporate agriculture.

Background of the Problem

Countless examples of extreme weather have occurred due to climate change - including droughts, flooding, heat waves, and hurricanes (National Climatic Data Center, 2016). Climate change is expected to have a severe impact on business (Pachauri et al., 2014). Examples of such impacts include decreased asset values, business interruptions, and loss of property for industries across the globe (Kousky, 2014). Agriculture and financial industries such as the insurance industry are expected to be among the most impacted (Hoffman, 2013; Starominski-Uehara & Keskitalo, 2016). As climate change brings threats to business, it also brings opportunities to innovate (Howden & Jacobs, 2016; Kaesehage, Leyshon, & Caseldine, 2014).

Sustainability is a common term that is used to describe how businesses can effectively manage the impacts of the external environment (Senge et al). Sustainability discussions include topics such as corporate social responsibility (CSR), triple-bottom line, and systems thinking (Senge et al). These terms, which will be discussed in this study, are used in conjunction and sometimes interchangeably with climate change terms. In this study, climate change-based sustainability strategies will refer to those strategies

used to remain profitable while managing impacts of extreme weather related to climate change.

Problem Statement

One of the most significant problems facing all businesses is the effect of severe climate change resulting from globally increasing temperatures (Howard-Grenville, Buckle, Hoskins, & George, 2014). According to the National Climatic Data Center (2016), climate-related disasters occurring from 2011 to 2015 caused property damages in excess of $230 billion U.S. dollars– with the agriculture sector incurring some of the largest losses (Hoffman, 2015). The general business problem is that managers in North America may lose profits because they lack climate change based strategies to improve profitability. The specific business problem is that some corporate farm managers in North America lack climate change based, sustainability strategies which may improve profitability.

Purpose Statement

The purpose of this qualitative single case study was to explore climate change based sustainability strategies that North American corporate farm managers use to improve profitability. I selected a North American corporate farm to analyze using the following criteria: (a) a climate change-based sustainability strategy was available on the Internet at the time of this study, (b) the goal of the strategy was to improve profitability, (c) the strategy was being used to improved profitability, and (d) the highest net income of the companies available with the other listed criteria. I obtained data from the corporate manager responsible for creating and maintaining the farm's sustainability

strategy. The study's potential contribution to social change is the promotion of profitability of agricultural businesses with derivative benefits of farms' sustainability to prevent a food crisis in marginalized communities.

Nature of the Study

In conducting this study, I sought to identify and explore solutions for addressing the potential impacts of climate change on agricultural businesses. As discussed in this study, climate change is a subject which involves human perceptions and motivations (Clayton et al., 2015). In a qualitative study, the researcher is interested in human perceptions and meanings that humans attach to various phenomena (Ritchie, Lewis, Nicholls, & Ormston, 2013). The complexity and human perceptions associated with climate change made this study ideal for qualitative research. In quantitative research, human interpretation is used less in analyzing data; instead, variables are measured in terms of amount or intensity (Ketokivi & Choi, 2014). Since this study does not involve quantitative data, I did not use the quantitative approach. Likewise, a mixed-methods study would not have been applicable because mixed-method studies have a quantitative component (Ritchie et al., 2013).

I used a single case descriptive case study design. According to Yin (2014), case studies are useful for exploring complex human situations. A case study, therefore, was the ideal design for this research. A phenomenological design is useful for studies in which the focus is on understanding personal experiences of individuals (Yüksel & Yıldırım, 2015). Two other types of qualitative study designs are ethnography, which is used to explore the culture of a particular ethnic group, and grounded theory, in which a

new theory on human behaviors is developed (Ritchie, Lewis, Nicholls, & Ormston, 2013). Because this study did not involve a particular ethnic group or development of a new theory, I determined that neither ethnography nor grounded theory would have been appropriate. According to Yin, a case-study design allows researchers to obtain a more in-depth understanding of phenomena which are out of the researchers' control. Yin categorized case studies as explanatory, exploratory, or descriptive. This case study is a descriptive case study. In this study, I explored a single case; therefore, a single case study design was appropriate.

Research Question

What climate change-based, sustainability strategies do North American corporate farm managers use which may improve profitability?

Interview Questions

1. Why do you have an environmentally related strategy for your farm?
2. What steps were taken in implementing the strategy you have in place to deal with environmental impacts?
3. How did you determine the components of your strategy for improving profitability that include addressing the impacts to the environment?
4. How did you determine the components of your strategy for improving profitability that include addressing the impacts to the environment?
5. How has your strategy benefitted the profit of your farm?
6. What, if any, do you consider to be other successes of your strategy (besides improving profitability)?

7. What other comments would you like to add about your sustainability strategy?

Conceptual Framework

The theoretical framework for this study was legitimacy theory (Dowling & Pfieffer, 1975), which I verified as being an appropriate lens for exploring the attitudes and motivations of farm managers toward climate change-based sustainability strategies. Legitimacy theory originated from organizational legitimacy, which was developed by Dowling and Pfieffer (1975). A tenet of the theory is that business behaviors result from attempting to legitimize activities based on the expecations of society (Prado-Lorenzo, Rodríguez-Domínguez, Gallego-Álvarez, & García-Sánchez, 2009). As applied to this study, legitimacy theory holds that organizations will implement sustainability strategies or programs to legitimize business decisions based on the expectations of society.

Operational Definitions

Corporate farm: A corporate farm is an agricultural organization characterized by share-based ownership, which may exist indefinitely (Farm Law, 2016).

Corporate social responsibility: Corporate social responsibility refers to the role businesses have in ethical decisions in regard to society (Carroll, 2015).

Sustainability: Sustainability is a term referring to a business approach in which the goal is to satisfy the needs of today without sacrificing the needs of the future (Senge et al., 2008).

Triple-bottom line: Triple-bottom line is an expression which suggests that the success of an organization is measured three ways: economic, environmental, and social (Elkington, 1997).

Legitimacy theory: Legitimacy theory is a theory which posits that an organization can continue to exist if it operates within socially acceptable boundaries (Dowling & Pfiffer, 1975).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions are factors the researcher does not attempt to control (Ritchie, Lewis, Nicholls, & Ormston, 2013). The assumptions in this study were that climate change is imminent, and the impact of climate change is expected to be dangerous and costly (Pachauri et al., 2014). I assumed that these scientific predictions are accurate. A further assumption for this study was that the research participant answered the interview questions honestly.

Limitations

Limitations are possible weaknesses of a study which are not within the researcher's control and which impact the outcome or generalizability of a study (Ritchie, Lewis, Nicholls, & Ormston, 2013). The principal limitation of this research was the lack of available publically held corporate farms for inclusion in the study due to the predominance of privately held corporations in the agricultural sector (Hoppe, 2016). According to Hoppe, less than 1% of large farms are operated by publicly held corporations.

Delimitations

Delimitations pertain to the scope or boundaries of a study (Yin, 2014). One delimitation of this study was that it included only a North American farm. The study's

delimitations also comprise the farm's specific geographic area within North America. A further delimitation of the study was that the farm chosen for the study was a publically held corporate farm.

Significance of the Study

This study is valuable to business because it may further the discussion regarding the role of strategies for economic impacts of climate change in long-term strategic planning. Survivability and profitability of businesses in general, and agriculture specifically, may benefit from long-term strategic planning associated with climate change strategies (Senge et al., 2008). This type of long-term focus brings competitive advantage and innovation to businesses (Friedman & Friedman, 2015). With more and higher quality strategies to use, business leaders may be able to improve planning for economic threats and opportunities related to climate change.

This findings from this study could result in beneficial social change from enhancing understanding why and how corporate farm managers pursue climate change strategies. Improving the outlook for agricultural businesses has a direct impact on society. For example, pursuing a strategy to mitigate damage from extreme weather may lead to more food production and the provision of food for needy communities (Cooper, 2016). The study's conclusions provide guidance needed within agriculture as food security is threatened in many areas of the world (Wheeler & von Braun, 2013).

A Review of the Professional and Academic Literature

The literature review consists of major themes related to the research and a comprehensive analysis of the existing body of knowledge on this topic. The literature

review begins with a discussion of the conceptual framework of legitimacy theory. A discussion of sustainability concepts and how these concepts relate to planning for climate change is also covered in this subsection. The second subsection of the literature review consists of an overview of the expected impacts of climate change on various types of businesses, industries, regions, topographies, and cultures. The third subsection of the literature review focuses on several broad, overlapping themes identified in the literature pertaining to the topic of corporate climate change. This subsection also includes literature establishing the avoidance of risks of climate change as well as values which accrue to businesses that implement a climate change strategy. It also includes literature regarding identified differences in approaches to sustainability among various nations. The fourth subsection consists of literature on establishing strategies for addressing the potential impact of climate change. Following this topic, the review encompasses literature regarding common motivations for establishing sustainability strategies specific to planning for economic impacts of climate change.

I obtained articles primarily from Walden University Library business databases. Keywords in the search criteria included *climate change*, *social impact*, *sustainability*, *environment*, and *business strategy*. As shown in Table 1, 100 resources were included as references in the study; 86% of the resources were peer-reviewed, and 88% of the resources had a publication date within the past 5 years (2013-2017). There are 80 distinct peer-reviewed references cited in the literature review subsection.

Table 1

Publication Dates of Resources

Year	# of resources per year	% of total
1975	1	1%
1997	1	1%
2005	2	2%
2006	1	1%
2008	1	1%
2009	1	1%
2010	1	1%
2011	2	2%
2012	3	3%
		13%
2013	17	17%
2014	26	26%
2015	20	20%
2016	20	19%
2017	5	5%
		88%
Grand total	101	100%

The available literature addresses concepts such as the types of strategies organizations pursue to plan for the economic impacts of climate change. The literature also addresses risks and opportunities related to climate change. These ideas are directly related to my study purpose. The purpose of this qualitative single case study was to explore climate change related sustainability strategies that North American corporate farm managers use that improve profitability**.** Exploring this area can provide the

impetus for other large-scale farm managers to develop and benefit from climate change strategies.

Legitimacy Theory

Legitimacy theory as it relates to business pertains to the tendency of organizations to display the same or similar values to those of society (Dowling & Pfiffer, 1975). The legitimacy of a business is jeopardized if a real or imagined disparity exists between the values of society and the values of the business (Dowling & Pfiffer, 1975). Legitimacy theory is often used to explain decisions made within an organization that benefit the environment or society (Dowling & Pfeffer, 1975). I used Legitimacy theory as the conceptual framework for exploring motivations behind the development of climate change strategies for improving corporate farms' profitability.

Sustainability

The meaning of business sustainability has been covered extensively in literature since 2000. According to Senge et al. (2008), sustainability refers to the ability to continue business today without sacrificing resource needs in the future. Sustainability simply means the ability to survive long-term and describes how businesses can manage the external environment (Senge et al.). Three other major topics related to sustainability are CSR, triple-bottom line, and systems thinking. These terms are used in literature related to sustainability and climate change strategies (Senge et al.).

Scholars have discussed the term *sustainability* in the framework of triple-bottom-line (Elkington, 1997)**.** Triple-bottom-line signifies a three-way view of measuring corporate success - societal, environmental, and economic – also called People, Planet,

and Profit (Elkington, 1997). Elkington (1997) indicated that managers should shoulder additional responsibilities to the various company stakeholders. The typical notion of capitalism, according to Elkington, forced competition that is harmful to the environment and society. Two topics related to sustainability and triple-bottom-line are CSR and the system view.

CSR is another common issue with differing interpretations. Garriga and Melé (2013), to simplify the various interpretations, classified the main theories of social impact management. The theories identified by Garringa and Melé were instrumental theories, political theories, integrative theories, and ethical theories. Friedman and Friedman (2015) tied the ideas of CSR with systems thinking by indicating that the needs of the business must include the needs of society.

The system view is a concept related to sustainability and CSR. As discussed by Senge et al. (2008), it is becoming critical for managers to acknowledge that there is interdependence between companies and larger systems. Natural resources are inherently limited, and business managers must look into the future to forecast the availability of resources they need (Senge et al., 2008). Identifying the health of the larger systems (social and environmental) is essential for long-term survival of businesses (Senge et al., 2008).

Expected Impacts of Climate Change

The literature on expected impacts of climate change is growing exponentially as the realities of climate change become clearer. According to the 2014 Assessment Report of the Intergovernmental Panel on Climate Change, the impacts of climate change are reflected on all continents and in all oceans (Pachauri, Allen, Barros, Broome, Cramer,

Christ,... & van Vuuren, 2014). Storms, droughts, ocean levels and acidity will increase (Pachauri et al., 2014). Assets and economies will be at increased risk due to climate change (Pachauri et al). Climate change is expected to increase the intensity and frequency of weather extremes (Thornton, Ericksen, Herrero, & Challinor, 2014).

The literature surrounding the expected impacts of climate change covers various businesses, industries, nations, regions, and topographies. Howard-Grenville, Buckle, Hoskins, & George (2014), noted that the most vulnerable populations will be the most impacted partially due to their inability to organize effectively. Howard-Grenville et al. (2014) also observed that certain populations in low-lying areas are particularly helpless due to the increased possibilities of flooding, and extreme storms. While Pachauri et al. (2014) indicated that the risks associated with climate change will ultimately impact disadvantaged areas more due to limited infrastructure and exposed areas.

The expected impact of climate change on islands and coastal areas is a predominant theme among the climate change related literature (Chan, Wright, Cheng, & Griffiths, 2014). Due to their low-lying nature and nearness to the ocean, storms and floods will become more devastating for coastal and island populations (Chan et al., 2014). According to Chan et al, (2014), one of the key reasons for the vulnerability in coastal areas is that typically large populations and large cities are located on coasts.

New York, according to Chan, Wright, Cheng, and Griffiths (2014), has 8.2 million inhabitants, and two million of those inhabitants are in Manhattan or other low lying areas. Wall Street is one mile from the coast and likely to continue to be highly impacted by severe climate change (Chan et al.). Hurricane Sandy forced the closure of

the financial markets for two consecutive days in 2012 (Chan et al). According to Aerts, Botzen, Moel, & Bowman (2013), economic and population increases make New York extremely vulnerable. In particular, flood risks in New York City are expected to increase (Aert et al., 2013).

Another prevalent topic in the literature comprises the impact of climate change on islands (Connell, 2016; Camare & Lane, 2015). High sea levels in the Pacific islands, according to Connell (2016), are destroying agricultural areas, and critical infrastructure. According to Camare and Lane (2015), increasing vulnerabilities such as rising sea levels, storm surges, salinization of water, and destruction of critical infrastructure are increasingly experienced on small islands and coastal areas.

The effect of climate change on specific industries such as marine, insurance/financial, carbon-intensive, and agricultural industries are recurrent topics in climate change related literature (Starominski-Uehara & Keskitalo, 2016; Wheeler & von Braun, 2013). Many researchers identified particular industries that would be impacted more than others (Kolk & Tsang, 2015; Starominski-Uehara & Keskitalo, 2016). Some of the impacts include those resulting from vulnerabilities of the basic resources a particular industry depends on for survival (Senge et al., 2008). As examples, extreme weather has increased the frequency and cost of insurance claims in the insurance industry (Starominski-Uehara & Keskitalo, 2016), marine industries see the destruction to marine life (Pachauri et al., 2014), and agriculture (Hoffman, 2015) is ravaged by storms and droughts are destroying crops.

Diversity, diversion, and populations of various species of marine life are the direct result of increased CO2 levels and warming ocean water (Pachauri, Allen, Barros, Broome, Cramer, Christ, ... & van Vuuren, 2014). Consequently, industries dependent on the variety and health of ocean life are expected to be negatively impacted by climate change (Pachauri et al, 2014). According to van Putten et al., (2014), in a study relating to Australia's marine industries, found that while Australia is experiencing warming many times the global average, there are some positive impacts of climate change in the Australian fishing industry. The positive impacts are mostly due to relocated species and a rise in tourism related to new fishing industry opportunities (van Putten et al, 2014).

Starominski-Uehara and Keskitalo (2016) concluded that climate change will severely impact the insurance industry. In May, 2008, the Geneva Association conducted research specifically directed at identifying the risks and opportunities that climate change poses to the insurance industry. Future claims due to the severity of climate change, risk diversification, and potential investments in the growing sustainability industry were among the economic impacts studied (Geneva Association, 2014). The Geneva Association (2014) advocated developing a climate change policy to guide insurance companies and the insurance industry in general through the various threats and collaborative solutions.

According to Hoeppe (2016), insurers do see a trending increase in extreme weather events, some of which can be tied to climate change. Climate change will challenge the insurance industry according to Hoeppe (2016). Contrarily, Keskitalo, Vulturius, and Scholten (2014) viewed the insurance industry as having the distinctive

ability to identify and assess the risks and opportunities that come with climate change. Keskitalo et al. (2014), identified flood risk as high in areas such as the UK, Germany, and the Netherlands, possibly doubling damages from waterways.

Feasible solutions provided by Keskitalo, Vulturius, and Scholten (2014), included the layering of insurance or distribution of responsibility for flood risks. Layering insurance, necessary because of the increased risk of climate change, means sharing the costs associated with climate tragedies (Keskitalo et al., 2014). Private households, governments, capital markets, primary, and secondary insurance would all share part of the burden for insurance claims (Keskitalo et al). Therefore, the threats to the insurance industry would be shared with other industries.

Kolk and Pinske (2005) presented the idea that the impact of climate change is more intense for industries which have fossil fuels as the base of their business, such as the automobile or utility industries. Although Kolk and Pinske (2005) also offered that these fossil fuel intense industries have more opportunity to capitalize on new technologies and alternative fuels. Similarly, Benhelal et al (2013) examined carbon reduction strategies in the cement industry, which is a carbon- intensive industry. The primary strategies identified by Benhelal et al. (2013), were carbon separation and storage, use of alternative materials, and energy-saving strategies.

In light of the post-2015 climate agreement, low carbon technologies will be essential to the industrial sector or any sector dependent on energy according to Cooper (2016). Cooper's (2016) research indicated that low carbon technologies can save

money and reduce carbon emissions. In particular, according to Cooper, solar and wind power are technologies which have become more efficient, quicker, and less costly.

The Agricultural Industry

The agricultural industry has been frequently identified as an industry which will be greatly impacted by climate change (Hoffman, 2015; Reidsma et al., 2015; Wheeler & von Braun, 2013). As mentioned by Hoffman (2015), agriculture is an industry which has always been dependent on climate factors. Hoffman (2015) pointed out that agriculture is an industry that is the second largest contributor to climate change and one of the most impacted. As noted by Singh, Poonia, and Kumhar (2017), agriculture and climate change are interconnected global processes.

According to Prokopy et al. (2015), agriculture accounts for 10-12% of the human-caused greenhouse gas emissions. Likewise, Hoffman (2013) stated that agriculture is a major cause of climate change and also severely impacted by climate change. Hoffman (2013) noted that nitrogen from fertilizer is one factor making agriculture a major sector in carbon and other emissions which lead to climate change. According to Stuart, Schewe, and McDermott (2012), nitrogen emissions heat up the atmosphere significantly faster than any other emissions, making agriculture a key contributor to climate change.

According to Baldos and Hertel (2014) given a high level of uncertainty regarding CO2 fertilization and how it impacts crops, crop production in most areas of the world may experience a lack of water and temperature increases related to climate change. Likewise, Wheeler and von Braun (2013) projected that due to the rainfall

irregularities and weather extremes inherent in climate change, crop production is envisaged to decrease in many areas. Wheeler and von Braun also foresee climate change indirect impacts such as land and water use issues, and food supply security issues. According to Wheeler and con Braun (2013), those countries already experiencing hunger will experience worsening food security issues.

Bill Gates (2015) wrote that agriculture is severely threatened by climate change, particularly in the poorer nations. Likewise, Hanna and Oliva (2016) noted that agriculture in developing countries is more vulnerable because developing countries are typically already in warmer climates. For example, According to Iqbal & Bakar Siddique (2015), temperatures in Bangladesh have changed in both the dry and wet seasons. Hanna and Olivia (2016) stated that the agricultural sector in these areas lacks funding to overcome severe weather. Anwar, Liu, Macadam, and Kelly (2013), asserted that soil fertility, water shortage issues, weeds, and insects are also climate change consequences for the agricultural sector. Additionally, according to Baldos and Hertel (2014), further strains on the agriculture industry worldwide include population growth and competing demand for crops between various industries including renewable fuels such as biofuels and crops for livestock.

Anwar, Liu, Macadam, and Kelly (2013) maintained that in the past climate change was gradual which allowed those in the agriculture sector to adapt to the change. However, Anwar et al. (2013) noted that the climate events are now becoming more sudden, severe, and more difficult to predict. Although the agricultural industry is frequently mentioned as an industry that will be severely impacted by climate change,

researchers Reidsma et al (2015), asserted that an analysis of such impacts should take place alongside multiple drivers such as improved technology and farming adaptations.

The federal government's crop insurance program (FCIP) subsidizes Insurance premiums for crop losses, according to Annan and Schlenker (2015). Annan and Schlenker (2015) studied whether these subsidies make farmers more sensitive to extreme heat and less able to adapt. Annan and Schlenker determined that this program provides a disincentive to adapt and may also leave farmers underinsured against extreme heat. Annan and Schlenker (2015) mentioned climate change could greatly exasperate these issues as extremely hot temperatures increase.

According to Trout (2014), eight states had anticorporate farming laws in 2008, yet the corporate farm still dominates agribusiness in production. These statutes, according to Trout, are designed to protect the smaller farm businesses that do not have access to levels of capital to compete with the corporate farms. According to Schroeter, Azzam, & Aiken (2006), anti-corporate farming laws are growing to protect the structure of the family farm.

Business Necessity for Climate Change Planning - Risks

A growing amount of literature is available pertaining to the business necessities related to planning for risks that may arise from climate change (Eptein & Buhovac, 2014; Friedman & Friedman, 2015; Rajput, Kaura & Khanna, 2013). For example, Rajput, Kaura, and Khanna (2013) discussed the risk of business failure due to the lack of sustainability practices. Howden and Jacobs (2016) discussed the impact of climate change on businesses and the need for public and private actions to take place.

Other risk factors are carbon and greenhouse gas emission regulations resulting in fees, fines, mandatory reductions, taxes, and litigation (Hoffman, 2005; Pattberg, 2012). According to Hoffman (2005), long-term planning for these types of risks involves estimating future exposure to such costs and making operational changes to mitigate these risks (Hoffman, 2005). Pattberg (2012) described climate change as a key business risk. Pattberg wrote that transnational climate change governance is on the increase and regulatory risk, both national and international, presents real consequences. According to Pattberg, the risks depend on the industry and can include mandatory emission reductions and mandatory renewable energy initiatives. Bui and Villiers (2017), proposed that regulatory uncertainty makes managers hesitant to pursue climate change management strategies.

Carbon taxes and cap and trade systems, according to Wang, Chen and Liu (2016), are the most commonly discussed approaches for controlling carbon emissions. Both of these mechanisms have real economic consequences for organizations (Wang, Chen & Liu, 2016). The cap and trade system, is widely used internationally and is an essential part of the International Kyoto Protocol, implemented in 2005 (Wang, Chen & Liu, 2016). Further economic impacts may result in the form of government sanctions and similar liabilities resulting from contributions to the level of emissions resulting in climate change (American Meteorological Society, 2016).

Organizations are also increasingly facing lawsuits for not meeting emissions standards (Vincent, 2013). According to Vincent, this is due to the lack of national official climate change legislation. Additionally, lawsuits arising from property damages

caused by climate change are becoming more prevalent (Vincent). In January, 2016, the Environmental Protection Agency, through the U.S. Justice System, filed suit against several automakers for emissions cheating (The United States Department of Justice, 2016). Volkswagen, Audi, and Porsche were sued for installing unlawful emissions control devices (The United States Department of Justice). The purpose of the lawsuit was to protect the public from the harmful effects of the added pollution. The United States Environmental Protection Agency plans to pursue any remedies available by law against these types of infractions (The United States Department of Justice). Giannakis and Papadopoulos (2015) addressed the climate change risks which can occur within an organization's supply chain – thus ultimately impacting the financial performance of the organization. Levermann (2014) provided examples such as droughts in one area of the world causing costly interruptions from climate change.

Another perspective on the business risks from a lack of climate change strategies relates to the value of a company's stock, which can be a considerable threat (Hoffman, 2005). Share prices are projected to fall significantly especially for companies in carbon emitting industries that have an insufficient carbon management strategy (Hoffman, 2005). The lack of a climate change strategy can impact a company's bottom line in a myriad of ways (American Meteorological Society, 2016).

Business leaders who are not concerned with strategies related to social responsibility can face other notable threats such as boycotts (Friedman & Friedman, 2015) and may have difficulty attracting quality employees. According to Senge et al., (2008), there is a growing knowledge that essential business resources are threatened by

the impact of climate change. Similarly, Kaesehage, Leyshon, & Caseldine (2014) claimed that lack of awareness regarding the hazards of climate change could bring wasted financial opportunities from the transition to sustainability.

Business Necessity for Climate Change Planning – Opportunities

Kurapatskie and Darnall (2013) looked at specific sustainability strategies to determine which provided the greatest financial payoff. To ascertain which sustainability activities provided the most payoff, two groups of strategies were identified: lower-order and higher-order (Kurapatskie & Darnall). Higher-order activities, according to Kurapatskie and Darnall are those which involve innovation of products or processes. The study conducted by Kurapatskie and Darnall found that the higher-order activities bring a higher average financial payoff, although they also found that all sustainability activities were associated with greater profitability.

Cheng, Ioannou, and Serafeim (2014) found a positive relationship between corporate social responsibility (CSR) and lower capital constraints and cost of capital. Through CSR, increased transparency, improved long-term focus, and compliance were shown to increase profit potential by Cheng, Ioannou, and Serafeim. Better relationships with customers, employees, suppliers, and business partners were found to be primary drivers of the long-term focus (Cheng, Ioannou, & Serafeim). One common theme in the literature regarding positive economic impacts of sustainability strategies is the focus on long-term strategic planning which accompanies sustainability (Friedan & Friedman, 2015). Friedman and Friedman (2015) indicated that similar sustainability initiatives could bring innovation and lasting competitive advantage.

Friedman and Friedman (2015), similarly noted that attention to triple-bottom-line and CSR means greater consumer and employee engagement which drives long-term success. The stakeholder view is similar to legitimacy theory, which asserts that corporate strategies are implemented to make businesses acceptable to various stakeholders (Fernando & Lawrence, 2014). Lourenço, Callen, Branco, and Curto (2014) found the value of an organization is directly related to their reputation for sustainable leadership. Hughen, Lulseged, and Upton (2014) surmised that CSR strategies and activities create a culture focused on long-term value.

Methods for Establishing Corporate Climate Change Strategies

According to Park et al. (2012), decision making in regards to sustainability requires new ways of approaching resolutions. Kunreuther et al. (2013) concluded it is difficult to apply quantitative analysis techniques to estimate climate change risks. Methodologies such as cost-benefit analysis are especially complicated due to the ambiguities related to climate change (Kunreuther et al). Bhave, Conway, Dessai, Stainforth (2016), proposed Robust Decision Making (RDM) as an approach to planning for climate change strategies. RDM involves an iterative process using multiple perspectives and is particularly useful where there is great uncertainty (Bhave et al., 2016).

According to Busch, (2011), there is specific industry adaptation guidance provided for industries such as the construction industry, yet no general guidance exists. Busch (2011) recommended that while developing adaptation strategies, organizations must have a system view of the organization and the external environment. Busch (2011)

also observed the importance of operational flexibility in developing adaptation strategies in the short-term. Strategic climate integration, which is focused on long-term innovation, was identified as Busch (2011) as key to long-term adaptation. Correspondingly, Ericcson and Molin (2015) proposed that flatter organizational structures are more capable of implementing core values such as sustainability.

Types of Climate Change Strategies

Climate change related literature covers many types of strategies. Radulescu (2016) discussed various types of sustainability strategies including those aimed at improving profit, environment and society. According to Radulesu, improving corporate image is a sustainability strategy that increases profits. Increasing the level of innovation, according to Radulesu (2016), impacts economic, social and environmental measures. Radulesu surmised that transformative strategies were primarily aimed at societal goals rather than economic or environmental. Kunreuther et al. (2013) presented climate change risk management and the complexities involved in calculating cost-benefit analyses related to climate change. Climate change risk management, similar to other business related risk management, involves determining what steps can be taken to limit the economic and physical threats (Kunreuther et al., 2013).

Kolk and Pinkse (2005) summarized the various types of climate change strategies, specifically acknowledging that strategy depends on factors such as nation and industry. Kolk and Pinske examined companies in the Global 500. The various strategies Kolk and Pinske identified include improving processes or innovative products and/or markets (Kolk & Pinkse). According to Kolk and Pinske, these types of strategies are

common in high energy industries such as automotive, mining, and chemicals. Changes within the supply chain, emission reductions, and emissions trading are also common climate change strategies, which Kolk and Pinske (2005) describe as compensatory.

Literature on climate change strategies covers comparisons between organizations which use transformative strategies versus those that use adaptive strategies (Park et al., 2012). Transformative strategies are long-term and involve organizations partnering for efficient use of resources and re-examining traditional business models (Ericsson & Molin, 2015). Adaptive strategies are more short-term and reactive in nature, while transformative strategies are proactive and longer-term (Ericsson & Molin). Transformative strategies, according to Park et al. (2012) are fundamentally riskier and require more vigorous decision making.

Collaborative consumption is an example of a transformative strategy, according to Ericsson and Molin (2015). Ericsson and Molin presented a unique perspective on climate change strategies which utilized *collaborative consumption.* According to Ericcson and Molin, collaborative consumption can provide the type of sustainability branding which can bring competitive advantages. On the contrary, Kurapatskie and Darnall (2013) distinguished strategies as higher-order and lower-order. Lower-order activities, such as pollution prevention, although also profitable, do not reap dramatic financial payoff (Kurapatskie & Darnall). Higher-order strategies, those associated with product innovation and new market prospects, bring greater financial benefits. Higher-order activities typically involve greater systems thinking and consideration of various stakeholders (Kurapatskie & Darnall).

The concepts of mitigation, adaptation, and resilience are consistently mentioned in climate change strategy related literature (Robbins, 2015; Busch, 2011). Mitigation, according to the Journal of Public Health Policy, relates to attempts to avoid additional global warming (Robbins, 2015). Contrarily, adaptation refers to efforts to safeguard against dangers of climate change (Robbins, 2015).

Busch (2011) maintained that it is essential for organizations to develop strategies to adapt to climate change. Protection of the very resources necessary to continue conducting business is an inherent part of adaptation (Busch, 2011). According to Kolk and Pinske (2005), adaptation and mitigation are equally important since mitigation makes adaptation less necessary. Kolk and Pinske (2005) maintain that the strategic approaches available in response to climate change depend on a firm's placement within the supply chain. Specifically, Kolk and Pinske (2005) identified that an organization positioned closer to the customer or end-user has more opportunity to benefit from product differentiation or innovation.

Disclosure as a Path to Climate Change Strategies

According to Kolk and Pinske (2005), the United Nations Kyoto Protocol required carbon disclosures of participating countries. Although not yet mandated in the United States, the disclosure of emission levels and climate change related strategies are becoming standard comparable to financial disclosures (Pattberg, 2012). Integrated Reporting, in which sustainability activities and disclosures are included with financial reporting has been proposed as an international framework (Hughen, Lulseged, & Upton, 2014).

Lee, Park, and Klassen (2015) found that disclosures such as carbon emission information are perceived as negative due to implied costs, thus causing a negative market reaction. However, Lee et al. (2015) also indicated that frequent corporate communication in advance of formal carbon disclosures could mitigate negative market reactions. Lee et al. also mentioned that carbon disclosures will eventually be required and therefore should not be ignored.

Milne and Gray indicated though that The Global Reporting Initiative (GRI) is recognized as the first worldwide reporting standards of triple-bottom-line results, although these standards lead to confusion regarding true sustainability practices. According to Milne and Gray (2013), there is a disparity between the actual use of sustainability reporting and the urgency of the looming environmental threat. Milne and Gray (2013) stated that although reporting standards are not addressing the real issues of sustainability, the standards likely encourage improved business behaviors. According to Sarfaty (2013), some of the disclosure efforts may seem symbolic, yet the efforts may transition into real changes. Relatedly, Hughen, Lulseged, and Upton (2014) noted that simply the reporting of sustainability activities could positively impact an organization's reputation and net income.

Barriers to Developing Climate Change Strategies

According to Rickards, Wiseman, and Kashima (2014), one of the key barriers to the development of climate change strategies is the lack of leadership among *senior decision makers*. Rickards et al. (2014) discussed elements such as social status, lifestyle, financial incentives, gender, and politics which prevent corporate decision

makers from developing climate change strategies. According to Moser and Ekstrom (2010), barriers to adaptation can occur in all phases of decision-making including awareness, information gathering, and understanding the problem. Additionally, the larger context, actors, and governance system impact decision making effectiveness (Moser & Ekstrom, 2010). Consequently, improper leadership, limitations of the governance system, and the inability to find agreement are all potential barriers to finding suitable climate change strategies (Moser & Ekstrom, 2010).

The obvious barriers of time and money, according to Moser and Ekstrom (2010), could be somewhat mitigated by effective leadership or the type of governance system. Moser and Ekstrom (2010) emphasized the existence of long-held values and beliefs which may significantly impact the use of the available information. Moser and Ekstrom (2010) also identified communication and accurate information as essential to developing an adaptation strategy for climate change.

Key barriers to mitigation, according to Stuart, Schewe, and McDermott (2012), are dominant economic, political and social barriers. Stuart et al. (2012) proposed that certain perceptions and worldviews inhibit the development of climate change mitigation strategies. In research conducted by Stuart et al., involving corn farmers in Southwest Michigan, their findings suggested that farmers were not changing their strategies relating to climate change due to long-held belief systems. However, Stuart et al., did notice signs of a transition in thinking related to climate change in their study.

Prokopy et al, (2015) specifically mentioned that interest groups in the agricultural sector, such as the American Farm Bureau Federation, which opposes climate change policies and has not acknowledged the link between practices in agriculture and climate change. Additionally, Prokopy et al. (2015) mentioned the short-term focus of private, public and financial advisors in the agricultural sector. It is due to the communication that farming business managers receive from these sources that serve as a primary barrier to the pursuit of climate change strategies (Prokopy et al., 2015).

Climate Change Strategies in the Agricultural Industry

According to Stuart, Schewe, and McDermott (2012), since nitrogen is the main contributor to global warming from the agricultural sector, reduction in the use of nitrogen fertilizer is a key climate mitigation strategy. Stuart et al. (2012) refer to reduction in the use of nitrogen in agriculture as *Reflexive Agricultural Production*. Alternatively, Arbuckle, Morton, and Hobbs (2013) found that in the agricultural industry, farmers tend to vary their approach to mitigation based on their trust in climate change information. However, their approach to adaptation was far less dependent on any trust or belief and more dependent on the perceived threat to their business (Arbuckle, Morton, and Hobbs, 2013). Arbuckle, Morton, and Hobbs, therefore suggested the best agriculture climate change strategies would be those that are a mix of adaptation and mitigation.

Prokopy et al. (2015) asserted that climate change in the agricultural sector could present both business risks and opportunities. Pursuing improved conditions and adapting to worsening conditions are examples of opportunistic and risk-averse strategies

suggested by Prokopy et al. (2015). Mitigation strategies such as increasing biodiversity, crop rotations, and cover crops serve as mitigation strategies as well as climate change risk management strategies (Prokopy, et al.). Prokopy et al. (2015) asserted that information pertaining to strategies which assist with nitrogen enhancement and soil retention would lead to greater acceptance of mitigation efforts, rather than focusing on the reason for climate change.

Prokopy et al. (2015) also stressed the importance of understanding various beliefs in the agricultural sector in finding effective climate change strategies. Likewise, Arbuckle, Morton, and Hobbs (2013), asserted that although a majority of farmers support adaptive measures, many do not support mitigation strategies due to a lack of trust in information and perception of risk. Anwar, Macadam, and Kelly (2013) focused their study on farm-level agricultural system productivity (FASP). Anwar et al. described the need for farm management practices which include transformative versus incremental change due to climate extremes. Anwar et al. (2013) suggested a systems-level strategy, rather than short-term independent planning. Alternatively, Arbuckle et al. (2013) suggested adaptive strategies that include an element of mitigation such as fertilizer management and tillage strategies.

Hamilton et al. (2016) discussed the feedback cycle inherent in climate change as it relates to agriculture. Pesticide use contributes significantly to climate change, and at the same time, climate change increases pests and disease (Hamilton et al.). These feedbacks create the need for complex and advanced mitigation and adaptation mechanisms in agriculture (Hamilton et al.). The types of advances recommended by

Hamilton et al. are referred to as constructed microbial community approaches. These strategies combine soil and plant microbes to both mitigate greenhouse gas emissions and improve profits through resource efficiency and plant tolerance. Within this approach, Hamilton et al. proposed the possibility of utilizing genetic engineering; but also indicated that through increased research of plant biology and ecology, other types of solutions are possible. Gates (2015) indicated that the greater use of satellite maps to identify what crops are best for soil in a particular region is a strategy which is working in Africa. Additionally, according to Gates (2015), the Gates Foundation is assisting in developing seeds that will perform in times of drought and times of flood.

According to Seo (2014), the agriculture sector has multiple strategies available in order to adapt to climate change. For example, crop production has historically involved decisions regarding crop selection based on current and predicted changes in weather (Seo, 2014). According to Jaworski (2016), adaptation measures include changing the crop mix in a particular location. Joworski admits, however, that the Federal Crop Insurance program in the United States incentivizes the planting of certain crops thus limiting the use of this adaptation measure.

Duda et al. (2014) recommend using minimal soil tillage, no tillage, and mulch with crop rotation as adaptation measures. Although acknowledging that mitigation and decarbonization efforts are necessary, Seo (2014) asserted that adaptation is possible. Seo (2014) suggested the remaining questions are how to adapt and how fast adaptations can occur.

An International Perspective of Sustainability Practices

Strategies for economic impacts of climate change vary depending on the political, social and cultural context. The United States has historically taken a stance against such treaties such as the Kyoto Protocol (Kolk & Pinske, 2005). According to Kolk and Pinske (2005), the reluctance to support such agreements has been in part due to a lack of accord regarding the scientific realities of climate change. Climate change has become a partisan dividing issue in the United States (Hoffman 2005), and the extremes of the opinions in the United States limit progress.

Other developed nations, however, have made strides with climate change legislation (Kolk and Pinske, 2005). In the countries which have adopted emissions regulations, it has become necessary for firms in those countries to create climate change strategies (Kolk & Pinske, 2005). Multinational entities benefit from having part of their business in the countries where emissions regulations exist (Kolk & Pinske, 2005). Fifka (2013) grouped literature pertaining to international corporate responsibility by geographic area and discovered that there have been significantly more studies conducted pertaining to North America and particularly to the United States.

Cultural factors make a significant difference in the approach to climate change strategies in various nations (Du, Jian, Zeng & Du, 2014; Hoffman, 2005). For example, Du, Jian, Zeng, and Du (2014) determined that the social norms of Buddhism were positively related to corporate environmental responsibility. Contrarily, Hoffman (2005) noted that cultural attitudes in the United States have led to the denial of scientific evidence and fears about limiting a free economy.

Penna and Geels (2015) researched the U.S. automaker industry and found a slow acceptance of climate change innovation and strategies despite the political and social forces requiring lower carbon technologies. Kolk and Tsang (2015), examined the vehicle industry in China and sustainability strategies implemented within central government and local governments. Kolk and Tsang found that the central government in China promotes the production of small cars, while the local governments discourage small car production in favor of large vehicles. Kolk and Tsang indicated that the local Chinese governments' ownership of automobile manufacturers influences the tendency to produce and promote larger vehicles.

Schiermeier (2015) noted that in the European Union, an increase in litigation brought by consumer groups might force governments to institute climate legislation. Schiermeier provided cases in the Netherlands and Belgium as examples. Citizens groups in these countries are filing suits against governments to bring greenhouse gas emissions to a more acceptable level (Schiermeier, 2015). These types of instances, according to Schiermeier (2015), could portend the use of an international agreement in bringing about similar lawsuits in the United States and other countries.

The United Nations Framework Convention on Climate Change (UNFCCC) in Paris, which took place in December, 2015, (Robbins, 2015) which at the time culminated in a unanimous international agreement among attending countries. According to Robbins, although the language in the agreement was weak and ambiguous, it will lead to opportunities for companies to innovate. According to Cooper (2016), the agreement is

progressive because it transfers resources from developing to developed nations and it will lead to a decarbonizing of the economy.

The International agreement referred to as the Paris agreement pointed to sharing technology and knowledge to decrease the costs of climate change (Cooper, 2016). The Paris agreement indicated that the need for mitigation can decrease the need for adaptation, while increased adaptation becomes more costly without mitigation (Cooper, 2016). The conclusion being is that earlier mitigation efforts will reduce long-term adaptation costs and total operating costs (Cooper, 2016).

Motivation for Corporate Sustainability Initiatives – Legitimacy Theory

Some researchers, to explain why corporations voluntarily pursue sustainability initiatives aimed at strategic planning for climate change, use legitimacy theory (Prado-Lorenzo, Rodríguez-Domínguez, Gallego-Álvarez, & García-Sánchez, 2009). The underlying implication of Legitimacy Theory, according to Fernando and Lawrence (2014) is a contract between society and business regarding acceptable business behavior. Fernando and Lawrence stated that legitimacy theory pertains to the relationship between the organization and society as a whole. Additionally, the theory posits that organizations cannot survive unless they function in a societally acceptable manner (Fernando & Lawrence). Corporations, therefore, will pursue strategies in order to appear acceptable to society (Fernando & Lawrence). According to Fernando and Lawrence, Legitimacy theory is often used to explain environmental disclosures and related strategies. For my research, Legitimacy Theory provided the theoretical

framework to explain why managers of organizations would choose to pursue a climate change strategy.

Legitimacy theory is closely related to stakeholder theory and institutional theory, and all three theories are common in explaining CSR (Fernando and Lawrence, 2014). According to Fernando and Lawrence, these theories are not opposing, but complementary. In fact, Fernando and Lawrence integrated these theories to explain CSR behaviors.

Stakeholder theory, a theory related to legitimacy theory, posits that business behaviors result from attempting to satisfy desires of various stakeholders (Prado-Lorenzo, Rodríguez-Domínguez, Gallego-Álvarez, & García-Sánchez, 2009). Stakeholder theory, as opposed to legitimacy theory, explains behaviors resulting from the relationship between the organization and its stakeholders – rather than the organization and society as proposed by legitimacy theory (Fernando & Lawrence, 2014). An organization's stakeholders, according to Lee, Park, and Klassen, (2015) include employees, customers, communities, and governments. According to Prado-Lorenzo et al. (2009), recent literature revolves around the influence of stakeholders, primarily shareholders, in sustainability programs.

According to Harrison and Wicks (2013), an implicit part of stakeholder theory is that for managers, the focus is on other measures besides economic measures. Harmes (2011) explored the level of environmentalism of investors and financial incentives through stock price performance as motivation for companies to pursue climate change initiatives. Harmes determined that these incentives do not function as predicted.

Contrarily, the study conducted by Eccles, Ioannou, and Serafeim, (2014) concluded that companies with sustainability strategies are more engaged with stakeholders and it is reflected in improved stock performance.

Stakeholder and legitimacy theories are used to explain why organizations adopt certain strategies of CSR. Contrarily, Institutional theory, another related theory concerns organizations attempting to fit into the norms of other organizations. According to Fernando and Lawrence (2014), institutional theory is not commonly used to explain CSR. In the few cases where institutional theory has been used to explain CSR, the premise is that strategies of the organization are implemented to appear similar to other organizations (Fernando & Lawrence, 2014).

Transition and Summary

Section 1 included a background of the risks and opportunities available for climate change-based strategies. The general and specific business problems were identified in section 1 and the purpose of this particular study was provided. The qualitative methodology was presented as appropriate for this study. I introduced the legitimacy theory as the theory that grounds this research. The assumptions, limitations, delimitations, and significance of the study were provided. An introduction to a review of available literature to support the research topic was provided.

In Section 2, the purpose of this study is restated, and the role of the researcher and participants is discussed. Section 2 includes the identification of the case study research methodology and design as well as for assuring the reliability and validity of the

data. Section 3 contain a summary of the data, contributions to social change, recommendations for further research, findings from the study, and conclusions.

Section 2: The Project

In this section, I provide an overview of the foundation of the study. The section includes the purpose statement and the role of the researcher. This section also includes a discussion regarding the participant of the research, the methodology, and design of the study. Ethical considerations, method for data collection and analysis, and reliability and validity are also discussed in Section 2.

Purpose Statement

The purpose of this qualitative single case study was to explore climate change-based sustainability strategies that North American corporate farm managers use to improve profitability. I selected a North American corporate farm to analyze using the following criteria: (a) a climate change-based sustainability strategy was available on the Internet at the time of this study, (b) the goal of the strategy was to improve profitability, (c) the strategy was being used to improved profitability, and (d) the highest net income of the companies available with the other listed criteria. I obtained data from the corporate manager responsible for creating and maintaining the farm's sustainability strategy. The study's potential contribution to social change is the promotion of profitability of agricultural businesses with derivative benefits of farms' sustainability to prevent a food crisis in marginalized communities.

Role of the Researcher

According to Ritchie, Lewis, Nicholls and Ormston (2013), a qualitative researcher is the primary instrument for data collection. The researcher collects qualitative data directly from the research participant. As the qualitative researcher for

this case study, I was the main instrument of data collection because I collected data directly using an interview and corporate documents.

For this research, I followed ethical guidelines in my interactions with the research participant. The Belmont Report protocol (Mikesell, Bromley, & Khodyakov, 2013) outlines ethical guidelines relating to interviewing participants. In order to maintain reliability and validity of data in interviewing the participant, I sought to pose neutral and clear questions and provide the participant with ample time to answer each question. Ritchie, Lewis, Nicholls, and Ormston (2013) recommended using unambiguous interview questions and providing sufficient time for participants to respond to interview questions. I followed the ethical guidelines of Walden University and the IRB in conducting this research. I did not have any type of relationship with anyone associated with the corporate farm in this study. I had no business relationship with anyone involved in the agricultural industry, which reflects my lack of bias.

I used an interview protocol to guide the study (see Appendix A). I developed the interview protocol while keeping the research question in mind. The interview protocol entailed asking open-ended questions. I also used a script for the opening and closing of the interview, which included collecting the consent form from the participant. Yin (2014) suggested using a script and interview protocol for effective interview results.

Participants

The main characteristic of the participant besides the geographic location (North America) was that the manager worked for a corporate farm with a successful published (web-based) climate change strategy for improving profitability. Success with financial

results was evident in the financial statements by reviewing the company's income history. The participant was a manager in corporate farming involved in the creation and/or management of the climate change-based sustainability strategy. After ascertaining from the corporate website the existence of a successful published climate change-based strategy for improving profitability, I identified the appropriate manager responsible for this strategy.

To select the participating organization, I identified the corporate farm in North America with the highest net income of organizations with a published climate change-based sustainability strategy. The participant company had also experienced significant profit benefit from its sustainability strategy through cost reduction. The company's water conservation efforts decreased the use of water, thereby decreasing related costs. Similarly, the use of solar panels decreased the cost of energy. Purposeful sampling is implemented in studies in which the researcher wants to identify the participants with a high degree of knowledge relating to the subject (Elo et al., 2014). If the selected participant declined to be interviewed, an alternate corporation would have been selected based on net income. (A high net income also illustrates success with a climate change related sustainability strategy).

In order to identify and gain access to the research participant, I began by exploring the Internet to identify corporate farms in the selected geographic area with a published climate change strategy. According to Askitas and Zimmermann (2015), the Internet is a resource that can be used for a wide range of research topics. The corporate farms had financial data available on the Internet. According to Pinto and Picoto (2016),

Internet Financial Reporting (IFR) is used to disclose financial information through corporate websites. I found multiple corporate farms on the Internet that met the criteria for selection; therefore, I examined the financial information to select the farm with the largest net income and which demonstrated increased profitability from implementing the climate change strategy.

I obtained the name and contact information for the appropriate manager at the participant organization from the information provided on the corporation's website. Building trust and a connection with the interview participant involved a pleasant introduction and conversation. Ritchie, Lewis, Nicholls, and Ormston (2013) advised that these are skills needed in the initial stages of the interview. Also, as Ritchie et al. recommended, I used active listening and note taking. Ritchie et al. also indicated that a positive relationship can be developed with interview participants by allowing the participants to completely answer the question without offering any verbal or nonverbal interruptions.

Performing the interview in a respectful and adaptative manner also allows for better rapport with research participants (Ritchie, Lewis, Nicholls, & Ormston, 2013). During the interview, ample time was provided for the participant to answer each question while also withholding any verbal cues. I strove to conduct the interview in an atmosphere of respect.

Research Method and Design

There are three basic types of methodology for research: quantitative, qualitative, and mixed method (McCusker & Gunaydin, 2015). To achieve the desired results, the

appropriate method is implemented (McCusker & Gunaydin, 2015). The nature of the research problem and objective of the research help to determine the proper methodology (McCusker & Gunaydin, 2015).

Research Method

I chose a qualitative research method for this study. In contrast to qualitative research, quantitative research is a scientific method in which measurement can be made of a phenomenon objectively, without human insight (Ritchie, Lewis, Nicholls, & Ormston, 2013). Qualitative research is useful when attempting to understand the meanings humans associate with a particular experience and in particular situations which have a complex social element (Ritchie et al., 2013). Using a mixed method study requires some level of understanding the nature of an issue, yet also involves a level of measurement (Ritchie et al., 2013).

Due to the complex nature of the topic of this research which involves human perceptions, values, and beliefs in relation to climate change, a qualitative study was the most appropriate (Yin, 2014). The intention behind the research was to explore successful climate change strategies implemented in a case study in order to identify meaning underlying the strategies. According to Ritchie, Lewis, Nicholls, and Ormston, (2013), qualitative research is most appropriate for complex social situations. Soy (2015) indicated that case study research helps explain complex, real-life experiences.

Research Design

The design of this study was a single case, descriptive case study. Other types of qualitative research designs include phenomenological studies, grounded theory, and

ethnography. Ritchie, Lewis, Nicholls, and Ormston (2013) described ethnography as research pertaining to a particular ethnic group and grounded theory as research in which a new theory is advanced. Phenomenological studies are descriptions of a particular human experience, rather than an in-depth exploration of a complex social issue such as my research topic (Yüksel & Yıldırım, 2015).

The intent of my research was to explore successful climate change strategies in a single instance of implementation. According to Yin (2014), specific instances of implementation, especially complex, social issues such as climate change, are ideal for case studies. Researchers use case studies to gain an in-depth view of a contemporary phenomenon (Yin, 2014). Researchers implement single case studies when exploring or examining one environment.

Yin (2014) categorized qualitative studies as explanatory, exploratory or descriptive. This specific case study was a descriptive case study because, as Yin defines it, the purpose is to describe the case in the real world. Descriptive case studies are helpful for studies which involve an area that is not fully understood. This case involving climate change strategies was a complex social issue which is not yet fully understood and lends itself to the descriptive case study.

According to Fusch and Ness (2015), in order to reach data saturation, it is necessary for the researcher to provide the interpretations of the participants, and not involve personal bias. For this research, I presented the interpretations of the participant without personal bias. As Soy (2015) recommended, taking detailed notes regarding my personal feelings helped to prevent researcher bias.

Interviews provide an abundance of data for data saturation, especially when conducted in an organized manner according to Fusch and Ness, (2015). As suggested by Fusch and Ness (2015) proper data collection and interpretation methods can ensure data saturation. Additionally, using data triangulation can establish validity and ensure data saturation (Fusch & Ness, 2015). This research was performed in an organized manner and included data triangulation using member checking and review. Data saturation is reached when no new ideas are presented and the research could be repeated with identical results (Ritchie, Lewis, Nicholls, & Ormston, 2013).

Population and Sampling

I used purposeful sampling to identify a North American corporate farm. According to Elo et al. (2014), purposeful sampling is effective for qualitative research in which the researcher is attempting to identify participants with a high degree of knowledge of the subject. Thomson, and Stew (2012) list purposeful sampling as a method for finding a more profound degree of interpretation. Therefore, using purposeful sampling enabled me to understand the strategies implemented in the case by identifying a corporation with extensive successful strategies in place. Purposeful sampling can also assist researchers to establish structure for the study (Soy, 2015). For this study, the criteria for selecting the participant - a corporate manager responsible for developing and maintaining the sustainability strategy - provided the appropriate and rich data for addressing the research question.

According to Elo et al. (2014), there is not a commonly accepted number of participants for a qualitative case study, partially because the appropriate number largely

depends on the richness of the data collected. The sample size of one corporate farm with an extensive, successful published climate change strategy for improving profitability allows for richness of data involving a semistructured interview and document search. Further depth was provided because the manager participating in the semistructured interview had widespread responsibility for creating and maintaining the elements of the corporate sustainability strategy. Ritchie, Lewis, Nicholls, and Ormston, (2013) posited that the richness of detail provided and resources required in qualitative studies typically translates to smaller sample sizes. Likewise, Robinson (2014) indicated that purposeful sampling of case studies is a determining factor in establishing the proper sample size because the cases are selected based on particular characteristics. In this research, finding one corporate farm in North America with a successful climate change strategy for improving profitability was sufficient to address the research question.

Data saturation was accomplished by performing in-depth, organized research. Data saturation was further assured through methodological triangulation, and member checking. Member checking involved summarizing the interview responses and confirming I had the exact meaning intended by the participant. Data saturation, according to Fusch and Ness (2015), is reached when there is enough data to replicate the study and no new themes emerge (Ritchie et al.).

Ethical Research

I presented the informed consent form (Appendix A) to the study's potential participant as advised by Yin (2014) and Ritchie, Lewis, Nicholls, and Ormston (2013). This form clearly indicated that the potential participant could decline or withdraw from

the research at any time without any negative consequences. If the potential participant did not want to sign the consent form, I would have provided them the study information, the consent form and my contact information in case they changed their mind. Additionally, the participant could withdraw from the study at any time without negative consequences as recommended by Ritchie et al. The participant was informed that they could send me an email or call my cell phone to withdraw from the study.

Prior to beginning the study, I explained to the participant the purpose and plan for the study (Ritchie, Lewis, Nicholls, & Ormston, 2013). As recommended by Kallio, Pietilä, Johnson, and Kangasniemi (2016), I utilized an interview guide in describing the study and providing a narrative of my own background. The participant was asked whether they would like to participate and given a chance to decline. An explanation of the IRB process was provided to the participant.

The participant was informed that the names of the individual and corporation involved in this study would remain confidential. As recommended by Ritchie, Lewis, Nicholls, and Ormston (2013), it is important for confidentiality to be guaranteed by the researcher. All of the data obtained during this research will be stored in a safe deposit box for at least 5 years, according to the IRB requirements. At the end of the 5 years, all data will be destroyed. There was not an incentive offered to the research participant. The Walden IRB approval number for this study is 07-24-17-0398422.

Data Collection Instruments

In this qualitative, explorative, single case study, I was the instrument of data collection. The data were collected through a semistructured interview and

document/artifact review. For the semistructured interview, the research participant was presented with a prescribed set of semistructured questions and allowed ample time to answer each question. I followed up with any queries prompted by answers to the initial questions presented. The listing of questions is provided in Appendix A. According to Ritchie, Lewis, Nicholls, and Ormston (2013), interviews are appropriate for subjects which are complex and involve human motivations. Ritchie et al. (2013) also recommended that follow-up questions are crucial for fully exploring an issue.

The secondary method of data collection was artifact and document review. According to Ritchie, Lewis, Nicholls, and Ormston (2013), the collection of secondary data can assist the researcher to bring in additional valuable information. I used member checking methodology to enhance the reliability and validity of the data collected. Ritchie, Lewis, Nicholls, and Ormston (2013) stated that member checking, in which meaning of the data collected is confirmed with participants, is appropriate for validating evidence.

Data Collection Technique

Data collection for this research was performed via phone interview with one corporate farm manager. I employed open-ended, semistructured interview questions to gather information on climate change sustainability strategies. I used the interview protocol in Appendix A of this study for the interview questions. In-depth interviews are advantageous because they allow the researcher to gain an understanding of a lived experience and the meaning that the participants assign to this experience (Yin, 2014). Phenomena which are rich with human motivation and interpretation are best examined

through human interaction (Yin, 2014; Soy, 2015). Criticisms of in-depth interviews include possible researcher bias and complexities of basic human nature and language (Yin, 2014). Secondary data was collected through archive and document review involving online research and documents provided by the research participant. As suggested by Yin (2014), multiple sources are used for methodological triangulation, which further validates the data.

Once the data were initially collected, member checking of the data was employed to validate meaning as recommended by Ritchie, Lewis, Nicholls and Ormston (2013). Member checking involved summarizing my understanding with the participant for validation as Ritchei et al. suggested. Member checking confirmed exact wording and my understanding of the responses presented in the initial interview.

Data Organization Technique

According to Elo et al. (2014), the organization of qualitative data is an important step in establishing validity. The amount of information can become overwhelming unless it is properly organized (Soy, 2015). For this study, I used extensive field notes and a journal to track intuition, feelings and possible biases. Soy (2015) indicated that field notes assist with accurate interpretation of data. The field notes and journal for this research will be kept separate from the actual data collected, as suggested by Soy (2015).

Data were examined for initial themes, and a code was established and assigned to each theme. Elo (2014) suggested using coding to organize themes. All data obtained in this study will be kept in a safe deposit box for 5 years. After 5 years have passed, all of the data will be destroyed.

Data Analysis

I used multiple data types and sources (an in-depth interview and review of documents) for methodological triangulation for this study. According to Ritchie, Lewis, Nicholls & Ormston (2013), member checking entails bringing the research results to the participant to verify the correct understanding. Member-checking can be a valuable tool for establishing trustworthiness of a study (Ritchie et al., 2013; Yin, 2014). Using multiple sources of data and methodological triangulation adds credibility to case study findings (Yin, 2014).

Content analysis was used, as described by Ritchie Lewis, Nicholls, and Ormston, (2013), in which the interview data and document review were analyzed to identify principal themes. The process for data analysis involved first using the field notes and initial themes identified to define major categories. NVivo software was used to assist in organizing the interview responses, member-checking data, document review, field notes, and journal. According to Yin (2014), the use of computer-assisted qualitative data analysis software (CAQDAS) helps researchers with organizing and analyzing the case study data.

Continually referring back to the research question, I reviewed and compared the themes identified within the literature, and the conceptual framework to stay focused and to find the core meanings of responses. According to Ritchie, Lewis, Nicholls, and Ormston, (2013), it is essential to combine the data to identify and verify key themes. However, the researcher should continually look for new insight into the information (Ritchie et al., 2013) and data should continually be reexamined to avoid reaching

premature conclusions (Soy, 2015). Finding core themes involved manually manipulating the data by continually resorting and reexamining the data into various categories as suggested by Yin (2014). I used a whiteboard to record initial thoughts which then were transferred to my journal and then into a CAQDAS. As mentioned by Ritchie et al. the use of CAQDAS should not preclude the researcher from having a critical role in data analysis. The analysis also included an examination of research published since completion of this study. The examination revealed literature similar to the literature in the literature review. One of the studies published in 2017 by Altieri and Nicholls, provided insight into adaptation and mitigation opportunities for traditional agricultural enterprises. Anandhi (2017) focused on climate change adaptation strategies within the agricultural sector. Wigand et al (2017) examined adaptation measures in coastal marsh areas. Although the studies' authors provided different perspectives of the business problem in my study, none of the studies provided contradictory findings to those from my study.

Reliability and Validity

Reliability

Reliability relates to the dependability of the study according to Ritchie, Lewis, Nicholls, and Ormston, (2013). It is important for the researcher to reflect rigor throughout the study to safeguard reliability (Lee, 2014; Ritchie, Lewis, Nicholls, & Ormston, 2013; Yin, 2014). Keeping extensive notes during the data collection phase helped to ensure the dependability of the research results (Ritchie et al.; Elo et al., 2014). In order to establish reliability in this study, rigor was applied. Rigor, in terms of

reliability, means continuously revisiting and reassessing the data (Houghton & Murphy 2013).

Validity

Validity, according to Ritchie, Lewis, Nicholls, and Ormston (2013) relates to the accuracy (or credibility) of the research findings. According to Yin (2014), ensuring validity can take place during many of the phases of a case study. Methodological triangulation, such as using multiple types of evidence and member checking are methods for establishing credibility (Ghrayeb Damodaran & Vohra, 2013; Yin, 2014; Ritchie, Lewis, Nicholls, and Ormston, 2013). Transferability can be established through sufficient explanation of findings and rich descriptions (Ritchie et al.; Elo et al.). In this research, credibility, transferability, and confirmability were ensured through methodological triangulation, extensive field notes and journaling, as well as thorough research notes, rich descriptions and sufficient explanations.

According to Fusch and Ness (2015), data saturation is reached when there is enough data to replicate the study. Data saturation also depends on the consistency in conducting the interview protocol (Fusch & Ness, 2015). Addressing personal biases through extensive field notes and journaling also contributes to ensuring data saturation (Ritchie, Lewis, Nicholls, and Ormston, 2013 Soy, 2015). Consistency throughout the data collection process, as well as extensive field notes and a journal, was kept throughout this research. Data saturation was ensured through methodological triangulation, employing multiple data sources, and member checking, which are customary methods researchers employ (Ritchie et al., 2013).

Transition and Summary

In Section 2, I provided a synopsis of the features of this study. I presented my role as the researcher - as the primary data collection instrument for a qualitative case study. I specified the participant of the study as a corporate farm in North America with a successful published climate change strategies directed at improving profitability, and with the highest net income. I explained that I used the purposeful sampling method to identify the research participant. I also presented my approach for ensuring data saturation in this section.

An overview of the research method and design were also provided in this section. A qualitative, descriptive, single case study was chosen for this research in order to provide an in-depth look at the climate change-based sustainability strategy in place. Additionally, an overview of the ethical considerations relevant to this research was presented, including the informed consent process. The collection instruments, technique, organization, and analysis were also discussed. Finally, I summarized the methods that were used to ensure validity and reliability in the study. I ensured validity and reliability by conducting the study with consistency, methodological triangulation, member-checking, and note-taking.

Section 3 includes a presentation of the research findings. I identify the relationships between the findings and the theoretical framework and discuss the applications for professional practice and the implications for social change. Finally, recommendations for further action and future research are made, and I provide my overall conclusions.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative single case study was to explore climate change-based sustainability strategies that North American corporate farm managers use to improve profitability. The findings indicate that businesses should implement sustainability strategies that have qualities of CSR, systems thinking, and triple bottom line thinking. The findings from interview data provided by the participant company (hereafter referred to as Company A) and document review indicate that a successful sustainability strategy results from a combination of these qualities.

Mitigation and adaptation were the core themes related to specific climate change sustainability strategies. There were six specific successful approaches identified within the core themes of mitigation and adaptation. Numerous tactics were implemented as approaches to mitigation and adaptation. Reduction of greenhouse gas emissions, reduced use of fertilizer/herbicides, and reduced use of pesticides were all approaches for mitigating the impacts of climate change at Company A. Adaptation approaches at Company A included water conservation, soil enhancements, and diversity in business endeavors. Diverse methods were implemented within these adaptation and mitigation approaches. For example, Company A decreased greenhouse emissions through endeavors such as solar panels, ensuring sustainability within the supply chain, and vertically integrating their operations. Water conservation at Company A involves efforts such as natural waste water treatment, micro-emitters, and water monitoring and scheduling.

Presentation of the Findings

The research question for this study was, what climate change-based, sustainability strategies do North American corporate farm managers use that improve profitability? The purpose of the study was to identify successful sustainability strategies. The principal themes I identified using NVivo software within the basic necessary qualities of successful sustainability strategies included using (a) CSR, (b) triple-bottom-line thinking, and (c) systems thinking. Specific themes in terms of climate change-based sustainability strategies were (a) mitigation-oriented strategies and (b) adaptation-oriented strategies. Distinct approaches identified within the mitigation strategies were (a) reduction in carbon emissions, (b) reduction in fertilizer/herbicide use, and (c) reduction in use of pesticides. Within adaptation type strategies, distinct approaches were (a) water conservation, (b) soil enhancements, and (c) diversity in business endeavors.

As reflected in Figure 1, the basic qualities of a successful sustainability strategy frame and form the aspects of the specific strategies. Thus, mitigation and adaptation sustainability strategies are successful because they reflect these general qualities. Figure 1 also illustrates how mitigation strategies are used to reduce the impact of climate change, while adaptation strategies are used to manage the immediate impacts of climate change.

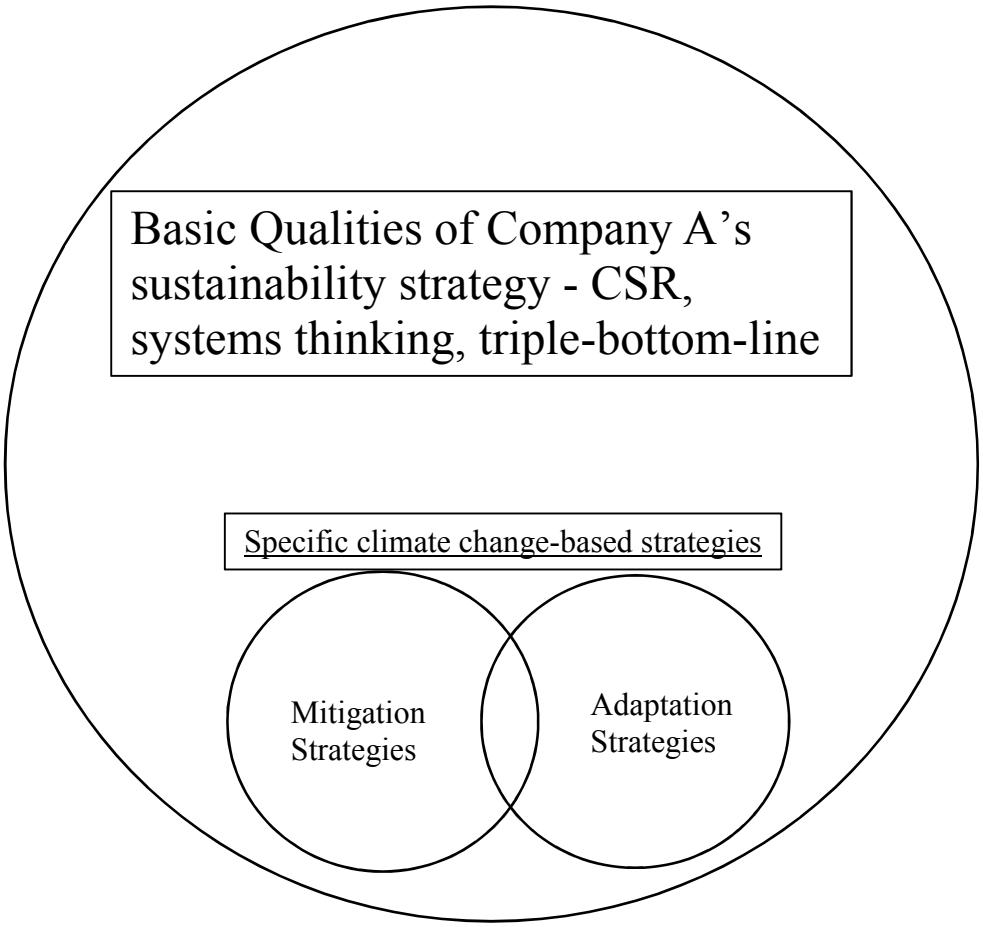

Figure 1. Relationship of core themes.

The themes identified from this study correspond with those identified in the literature review. Legitimacy theory (Dowling & Pfiffer, 1975) was a useful lens for interpreting the data on sustainability strategies for corporate farming as explored in this case study. The findings of this study both supported and contradicted the core concept of legitimacy theory that business behaviors result from the tendency of organizations to display the same or similar values to those of society (Dowling & Pfiffer). While the results did show that the sustainability measures result from affirming the needs of

society, several of the decisions resulted from the various stakeholders' needs and a general desire to make ethical business decisions. The findings confirm the themes presented in the literature review pertaining to effective sustainability strategies, particularly in terms of making decisions that impact the long-term health of the business as well as society (Cooper, 2016; Kolk & Pinske, 2005). Cheng, Ioannou, and Serafeim (2014) noted that success from a long-term focus is driven by relationships with stakeholders such as customers, business partners, employees, and suppliers. Company A has received a global certification related to farming standards since 2010, which according to its annual report provides evidence to stakeholders, particularly customers, of respect for environmental sustainability.

It was evident from interview responses and document review that the management at Company A seeks opportunities to make sustainability a priority while considering the impact on profit. However, Company A's management also recognizes that there are benefits to being sustainable that reach beyond the short-term. Company A's overall sustainability strategy reflects a combination of themes and approaches that include CSR efforts, triple bottom line thinking, and systems thinking.

The findings of the study also indicated there are specific climate change-based sustainability strategies that can be employed in a successful sustainability strategy in corporate farming. I categorized these climate-based strategies as mitigation or adaptation. As noted in the literature review, both mitigation and adaptation are needed to successfully strategize for climate change; this is because mitigation efforts ultimately make adaptation less essential (Cooper, 2016). Mitigation strategies included reduction

of greenhouse gas emissions, reduced use of fertilizer and herbicides, and reduced use of pesticides. Adaptation strategies included water conservation, soil enhancements, and diversity of business endeavors.

Principal Themes

The principal themes identified for Company A's sustainability strategy reflected the basic qualities of CSR, triple-bottom-line thinking, and systems thinking. I identified mitigation and adaptation strategies as themes representing specific elements of climate-change sustainability strategies. Approaches identified as principal themes within mitigation type strategies were reduction in carbon emissions, reduction in fertilizer/herbicide use, and reduction in use of pesticides. Approaches identified within the principal themes as adaptation type strategies were water conservation, soil enhancements, and diversity in business endeavors.

Theme 1: sustainability strategy basic qualities – corporate social responsibility. As McWilliams et al. (2016) stated, once managers understand the trade-offs inherent in making socially responsible decisions, they can implement competitive strategies that make sustainability possible. As acknowledged by McWilliams et al., CSR is critical for successful corporate strategies. McWilliams et al. claimed that CSR is critical partly because society is increasingly requiring businesses to consider their impact on society and larger systems.

CSR thinking was apparent in the interview responses as well as document review at Company A. The findings indicated that the management at Company A considered every opportunity to make socially responsible decisions. Interview responses included

the statements: “It is doing things for your land, doing things for your employees, and working with other associations” and “with the various associations…by making these organizations stronger, they make Company A stronger.” Participant interview responses also included the statement “we collaborate with community and regional stakeholders…All those investments are bringing returns through a stronger community.” The company management’s view of the importance of building relationships with stakeholders was noted throughout the interview, website, and annual report, as shown in Table 2. The theme of CSR directly relates to the conceptual framework of this study because CSR efforts can result from management’s attempts to legitimize its business activities to society.

Table 2

Ideas and Sources for Theme 1: Corporate Social Responsibility

Corporate social responsibility issue	Source
Relationships with stakeholders	Interview responses - IQ1, IQ2, IQ3, website, annual report
Supports needs of society, community	Interview responses IQ1, website
Emphasizes protecting environment	Interview responses IQ1, IQ7, other documents, annual report

As Cheng, Ioannou, and Serafeim (2014) found, better relationships with various stakeholders drive the long-term focus needed for sustainability. Relationships with stakeholders are a key aspect of the sustainability strategy at Company A and compel

their long-term focus which is necessary for a successful sustainability strategy. The interview responses and findings from corporate records indicated that Company A benefits from stakeholder relationships and a long-term focus.

Document review, specifically information gleaned from the company website reflected that Company A provides support and contributes "to all drivers of economic development including education, agriculture, energy, resource management, housing, health care, job creation, tourism, and service organizations." As shown in Table 2, document review and interview responses indicated Company A provides housing for farm workers in part so that these workers can afford housing in an area where affordable housing is scarce. This type of CSR thinking, as noted in the literature review leads to improved transparency, compliance, and long-term focus which ultimately lead to better profits (Cheng, Ioannou, & Serafeim, 2014).

Also as noted in the literature review, companies whose management lacks concern for social issues can face other risks such as boycotts or difficulty attracting quality employees (Friedman & Friedman, 2015). As shown in Table 2, based on specific interview responses from Company A and the company's website, their management is aware that retaining a talented, skilled workforce has real short-term and long-term ramifications to the company. The interview participant explained that "doing things right that are environmentally sensitive and benefitting the community – that is a plus for attracting employees."

Interview responses, other documents, the company's website and the company's annual report, as noted in Table 2, emphasized the ways Company A works diligently to

protect the environment. The company strives to make sustainability a part of their trademark and highlight their environmental efforts throughout their website. According to the website, management at company A attempts to be sustainable through every business practice and put environmental concerns at the center of decision making.

Theme 2: sustainability strategy basic qualities – systems thinking. The idea of CSR is closely tied to systems thinking because within systems thinking the needs of the business must include the needs of society (Friedman & Friedman, 2015). According to Senge et al., (2008), systems thinking involves anticipating any limits in resources that could affect an organization's long-term survivability. It was evident in interview responses and on the corporate website, as shown in Table 3, the management at Company A uses systems thinking in making sustainability strategy decisions. The theme of systems thinking is correlated to legitimacy theory - the conceptual framework of this study – since the system includes the needs of society, which can result from a desire to legitimize business decisions.

Table 3

Ideas and Sources for Theme 2: Systems Thinking

Systems thinking issue	Source
View of all system elements	Interview responses - IQ1, IQ3, website
Employees as a limited resource	Interview responses - IQ1, website
Water as a limited resource	Interview responses - IQ2, IQ7, other documents, website
Land as a limited resource	Interview responses - IQ1, annual report, other documents

Interview responses included a statement indicating that a sustainable community has jobs, healthcare, educational systems and that all of these resources are needed for continued sustainability. Company A interview responses also included the statement: "But the company is not just in a vacuum – you are in a region – all of those people – we want to be working with them and supporting them so that everything is sustainable." Information on company A's website further suggested the understanding of the company's management's role in keeping the overall system balanced. Results of the interview, as noted in Table 3, indicated that management at Company A considers all aspects of the surrounding community as well as the world in their sustainability strategy.

Interview responses emphasized the importance of health and welfare of the employees at Company A in the specific initiatives within their sustainability strategy, such as providing housing for their employees. Review of the corporate website further

revealed the concept that management at Company A understands the company is only as successful as their employees, and they view their employees as essential to their long-term sustainability. Management at Company A regards their employees as a valuable resource which must be cared for as any other resource. As indicated by Anandhi (2016), systems thinking methods include consideration of all the complexities inherent in the system.

System limits can be societal, environmental, or involve basic resources on which a business relies (Senge et al.) The very nature of many of the specific climate change-based sustainability measures used at Company A proves the management's understanding of environmental limits. The company's extensive sustainability program, described throughout the website, interview responses and other company documents (as summarized in Table 3) include measures to reduce the use of water, which is a limited resource in agriculture and many other industries. Other initiatives used by Company A, such as crop rotation - detailed in interview responses, the annual report, the website, and other company documents - show the management's regard for land as a limited resource and an integral part of the overall system. Without systems thinking, the sustainability strategy would not be complete. There must be an understanding of the limited resources and how the limits can affect meeting the future needs of the organization.

Theme 3: sustainability strategy basic qualities – triple-bottom-line thinking. A similar concept to systems thinking is the view of triple-bottom-line. The stance of the interview participant was that sustainability is "doing things for your land, doing things for your employees, and working with other associations." Document review and

interview responses revealed that Company A's sustainability strategy concentrates on the concepts "Resource, Nature, People", as shown in Table 4.

Table 4

Ideas and Sources for Theme 3: Triple-Bottom-Line

Triple bottom line ideas	Source
People, planet, profit	Interview responses -IQ3, other documents
Balancing profit needs with society/environment	Interview responses - IQ3, website, annual report
Acknowledged risk of climate change on survivability	Annual report

Typically, the triple-bottom line view is referred to as People, Planet, Profit (McWilliams et al., 2016). Profit is part of the triple bottom line view since there also must be a concern for the bottom-line. These concepts are well understood at Company A. Results from the interview revealed the typical business planning process at Company A – is one in which revenue and expenses are forecasted and sustainability measures are examined for viability. Management at Company A has learned that sustainability initiatives can save money, but also help people and the planet in the process. Interview responses also included a statement that the sustainability strategy at Company A is always evolving. McWilliams et al. acknowledged that it is not always easy to determine the right balance when it comes to the three elements of triple-bottom line. The website, annual report and interview responses from Company A revealed that

the necessary balance is demonstrated by managements' decisions. The triple-bottom-line balance is also reflected in the longevity and profitability of Company A and attention by its management to beneficially affect the planet and community. The theme of triple-bottom-line thinking is related to the legitimacy theory conceptual framework of this study because concern for people can result from the desire to legitimize business decisions in perceptions within society.

Stuart, Schewe, and McDermott (2012) recognized that several organizations in the agriculture industry have not acknowledged that climate change is a business risk. This lack of acknowledgment has limited the mitigation and adaptation measures taken by these organizations (Stuart, Schewe, and McDermott). This lack of recognition of the risks of climate change can bring threats and wasted opportunities according to Kaesehage, Leyshon, and Caseldine (2014). Simple acknowledgment of the threat of climate change begins the process needed to develop a sustainability strategy encompassing the needs of the environment and the impact the environment has on the sustainability of the company. A review of the annual report of Company A, as noted in Table 4 revealed there is both acknowledgment and action regarding the risks and opportunities introduced by climate change.

Climate-based Sustainability Strategies

Table 5 shows that the mitigation approaches were thoroughly covered in interview responses, the annual report, the corporate website, and other corporate documents. According to Robbins (2015), mitigation strategies are intended to aid in reducing the severity of global warming (Robbins, 2015). The mitigation efforts at

Company A should serve to reduce the impact of their operations on climate change, but also serve to ultimately improve profitability. As Cooper (2016) stated, mitigation efforts help the organization in the long-term since mitigation will ultimately reduce long-term adaptation costs and total operating costs. Although Company A's sustainability strategy concentrates heavily on mitigation strategies, adaptation is a critical part of their sustainability plan. The protection of resources threatened by climate change and managing consequences of climate change are basic qualities of adaptation measures (Busch, 211), as opposed to mitigation efforts which are directed at reducing the impact of climate change. Table 5 shows that adaptation approaches were broadly emphasized in interview responses, the annual report, the website, and other corporate documents.

Table 5

Sources for Themes 4 and 5: Mitigation and Adaptation

Climate change sustainability strategies	Source
Mitigation	Interview responses IQ2, IQ5, IQ7, annual report, website, other corporate documents
Adaptation	Interview responses IQ2, IQ3, IQ5, annual report, website, other corporate documents

In Table 6 all of the mitigation and adaptation measures actively employed by Company A are summarized. Through Table 6, the main categories of mitigation efforts at Company A are displayed. These mitigation efforts are: decreased carbon emissions, decreased nitrogen emissions and a reduction in pesticide and herbicide use. As presented in Table 6, mitigation efforts within these categories are demonstrated through

diverse measures. Key types of adaptation efforts at Company A shown in Table 6 are: water conservation, soil enhancements, and business diversification. Each of these adaptation efforts are demonstrated through numerous approaches, as shown in Table 6.

Table 6

Climate Change Related Mitigation and Adaptation Strategies at Company A

Mitigation efforts	Adaptation efforts
Decrease carbon emissions	Water conservation
-solar panels	-natural wastewater treatment
-production at non-peak hours	-micro-emitters
-certified sustainably built and maintained converter and observation tower	-irrigation water analysis
-building comprehensive communities	-water monitoring/scheduling
-vertically integrated business operations	-groundwater monitoring
-sustainability within the supply chain	-water basin management
	-water transfer
-waste water treatment	-dense crop planting
Decreased nitrogen emissions	-mulch
-green waste recycling	Soil enhancements
-fertilization analysis/scheduling	-crop rotation
-sheep grazing between solar panels	-mulch
Decreased pesticides	-planting region diversity
-Green waste recycling	Business diversification
-integrated pest management	-community development
	-beekeeping
	-sustainability education
	-land leasing

Theme 4: specific climate change-based sustainability strategies – mitigation.

As mentioned in the literature review, sustainability can be defined in its simplest terms as the ability of a business to survive short-term and also maintain resources needed for the future (Senge et al, 2008). Surviving short-term relates to adaptation

strategies while maintaining the resources for the future leads to mitigation strategies (Robbins, 2015). Table 6 reflects that the company's mitigation strategies are manifested in multiple forms throughout the organization. Mitigation approaches at Company A include decreasing carbon emissions, decreasing nitrogen emissions, and decreasing use of pesticides. Carbon, due to its impact on atmospheric temperatures, is a key target for mitigating impacts of climate change. Similarly, Stuart, Schewe, and McDermott (2012) noted that reducing nitrogen fertilizer is a fundamental climate mitigation strategy because nitrogen is a major contributor to global warming and climate change. Hamilton et al. (2016) indicated that pesticide use also contributes significantly to climate change. As noted in the literature review, mitigation efforts - efforts to reduce the impact of a business on climate - have been explained using legitimacy theory (Fernando & Lawrence, 2014). Legitimacy theory is related to implementation of mitigation efforts (Fernando & Lawrence). Findings of this study did not indicate that Company A implemented such efforts to legitimize their business decisions. Company A's manager's interview responses and documents revealed managements' primary objectives were to make ethical and positive environmental decisions.

Reduction in carbon emissions. Carbon (CO2) is the main contributor to the increase in atmospheric temperatures (Senge et al., 2008). Due to the impact of carbon on atmospheric temperatures, it is logical that a significant piece of the climate change-based strategy at Company A relates to a reduction in carbon emissions. As shown in Table 6, measures to reduce carbon emissions at Company A are accomplished through several initiatives including solar panels, production at non-peak hours, a certified

sustainably built and maintained converter and observation tower, building communities in which commonplace destinations are within walking distance, vertically integrated business operations, and ensuring sustainability within the supply chain. The company's solar panel operation is a perfect example of a business decision made with judgment based on profit with consideration for environmental impact. Based on interview responses, the company cleared an area of unproductive crops to use for solar panels. The company's annual report revealed that these panels provide all the electricity needed for packing operations and cold storage. Document review indicated that Company A's solar panel operations sequester 2,560 tons of CO2 annually.

Another key mitigation-related business endeavor at Company A is the creation of communities in which commonplace destinations are within walking distance. Creating comprehensive communities reduces the overall impact on carbon emissions by reducing the need for travel within that community. Other carbon reduction initiatives at Company A, such as vertically integrating operations and ensuring sustainability within the supply chain have a less direct impact but nevertheless mitigate climate change. Each supplier within the supply chain has an influence on the environment, according to Stuart and Schewe (2016). Control over the degree of mitigation along that supply chain can have far-reaching consequences (Stuart & Schewe). Similarly, having planting, packaging, processing, and shipping all in one area reduces carbon emissions that otherwise would occur through transporting crops. Vertical integration and control over supply chain sustainability are initiatives that work as mitigation, yet double as adaptation measures. For example, if the supply chain or a step in the production cycle is out of the

organization's control, climate change can pose a risk to an organization's financial performance (Giannakis & Papadopoulos, 2015). Similarly, diversification of business endeavors protects an organization from negative effects of climate change on the agricultural operations, which also serves as an adaptation measure.

Reduction in use of fertilizer/herbicides. Stuart, Schewe, and McDermott (2012) reported that nitrogen from agriculture fertilization is a major contributor to global warming and that reduction in the use of nitrogen fertilizer is a vital form of mitigation. Reducing use of fertilizer and more efficiently applying fertilizer are extremely effective mitigation techniques, according to Stuart and Schewe, 2016). Reduction in fertilizer use takes many forms at Company A, as shown in Table 6. Interview data and document review revealed that Company A decreases use of fertilizer/herbicides (which decreases nitrogen) through green waste recycling, fertilization analysis and scheduling, and having sheep graze between solar panels (to decrease the need for herbicides). The use of green waste recycling at Company A serves at least two purposes – it diverts green waste from landfills and decreases the need for nitrogen-based fertilizers. The green waste is used to fertilize the crops at Company A. The growth of weeds and grass between solar panels is controlled by Company A by raising sheep where the solar panels are placed. The use of sheep to control weeds is an innovative mitigation strategy which reduces the use of nitrogen-based herbicides and the emission of nitrogen.

Reduced pesticide use. According to Hamilton et al. (2016), climate change is significantly impacted by pesticide use. Therefore, reducing the use of pesticides is a fundamental mitigation technique. In the annual report for Company A, the organization

acknowledged that use of pesticides causes damage to the environment. Company A uses multiple avenues to reduce their use of pesticides as shown in Table 6. Using green waste recycling, in addition to reducing the need for fertilizers, also reduces the need for pesticides. Integrated Pest Management, a method in an interview response referred to as "a very important part of what they do", uses beneficial insects to control the pests which are harmful to the crops. Company A maintains a private insectary for this purpose.

Theme 5: specific climate change-based sustainability strategies – adaptation. Maintaining the resources necessary to conduct business in the short-term is essential (Busch, 2011). Some consequences of climate change on agriculture, according to Anwar, Liu, Macadam, and Kelly (2013), are soil fertility issues, water shortages, and increased weeds and insects (reflecting the need for both mitigation and adaptation strategies). Results from interview and document review for Company A indicated that approaches for adaptation strategies include water conservation, soil enhancement, and diversity in business endeavors. Each of these approaches is an adaptation measure because it is intended to protect the resources threatened by climate change. Results indicated that water conservation efforts are extensive and pervasive pieces of the overall sustainability strategy at Company A (as shown in Table 6). Legitimacy theory is related to the use of adaptation measures (Robbins, 2015), as mentioned in the literature review. Legitimacy theory can be used to explain the use of adaptation measures, since companies often implement such efforts to legitimize their business decisions (Robbins). Findings from this study did not indicate adaptation measures were implemented at Company A to legitimize business decisions. Study findings suggested that adaptation

measures at Company A were initiated through a planning process in which profit and conservation of resources were the main considerations.

Water conservation. Water is a critical resource for agriculture. As climate change impacts the availability of water in this sector, it becomes even more critical to protect this resource (Baldos & Hertel, 2014). In fact, according to Baldos and Hertel, most areas of the world will likely experience increased temperatures and a lack of water due to climate change. Adaption measures will become more important as the impacts of climate change become more severe. As noted in the annual report of Company A, severe weather can cause drought which can devastate agriculture operations. Water conservation efforts at Company A, based on interview responses and document review, include natural wastewater treatment, micro emitters, irrigation water analysis, water monitoring and scheduling, groundwater monitoring and protection, water basin management, and dense planting of crops.

Interview responses indicated that Company A uses a wastewater treatment system in which the use ultraviolet light, gravity, and plant material to treat grey water in ponds. The water is then suitable for irrigation purposes, but otherwise would be wasted. This is an example of an innovative approach to adaptation. Company A manages their access to water in other innovative ways that include the use of technology. The monitoring, scheduling, and analysis of irrigation are examples of incorporating technology into water conservation efforts. Use of micro emitters, a form of drip irrigation technology, distributes water efficiently. Review of the company's annual report also revealed the use of water exchanges and transfers within their water

management program. The annual report indicated that actively managing water supplies for changing conditions has created a low level of risk related to water supply. Dense planting of crops is another method used by Company A to decrease use of water because less water is wasted in the space between crops. Document review indicated that Company A plants crops 4 times the traditional amount per acre. Using mulch from the green waste recycling program also reduces the need for water at Company A, due to the water retention qualities of mulch. Water conservation efforts are a valuable adaptation measure particularly as water becomes more scarce (Baldos & Hertel, 2014).

Soil enhancements. A range of soil enhancement measures is employed by Company A for climate change adaptation. Document review indicated the use of mulch not only reduces the need for water but actually lowers the temperature of the soil. Mulching as an adaptation measure should increase in value for Company A as global temperatures increase. Mulching is an example of an adaptation that also mitigates the effects of climate change because reduction in soil temperature has a direct effect on air temperature. Enhancing the fertility of soil provides a stronger atmosphere for crops to cope with the impacts of climate change (Müller, Bautze, Meier, Gattinger, Gall, Chatzinikolaou, ... & Ullmann, 2016). Company A also uses crop rotation and diversity in planting regions as soil enhancement methods. Crop rotation and crop diversity are common adaptation methods according to Prokopy et al. (2015), and also serve as mitigation efforts. The use of mulch with crop rotation is a recommended agricultural adaptation measure, according to Duda et al. (2014). Planting crops in diverse regions is an important adaptation method as the dangers of climate change can impact some

regions with drought and other regions with flooding (Altieri & Nicholls, 2017). Company A plants crops in different regions in the United States and has partners globally. This adaptation measure as noted on the company website "ensures that if any region is impacted by adverse weather conditions, we are able to maintain a constant source of supply for our customers". Similarly, it has been shown that implementing plant diversity practices reduces vulnerability from severe climate episodes (Altieri & Nicholls, 2017).

Diversification of business endeavors. Both diversity in planting regions and diversity in business endeavors were referred to as contributing to "economic resiliency" by Company A. Economic resiliency (Robbins, 2015) is a concept which is similar to adaptation measures since these endeavors serve to safeguard the company against adverse effects related to climate change. Company A participates in separate but related business endeavors.

Company A has a community development division and provides housing for employees. The company also leases their land, provides sustainability education programs, and bee-keeping operations. The annual report for Company A indicated that their housing and land rental operations "provide a consistent, dependable source of cash flow that helps to counter the volatility typically associated with an agricultural business." These endeavors are ideal as adaptation measures as they counter the risk involved in the impact of climate change on the agricultural operations of the company.

Stuart, Schewe, and McDermott (2012) recognized that several organizations in the agriculture industry have not acknowledged that climate change is a business risk.

This lack of acknowledgment has limited the mitigation and adaptation strategies and process measures developed and implemented by these organizations. This lack of awareness of the risks of climate change can bring wasted opportunity according to Kaesehage, Leyshon, and Caseldine (2014). A review of the annual report of Company A and interview responses revealed there is both acknowledgment and action regarding the risks and opportunities related to climate change. Although both mitigation and adaptation measures are crucial, the best strategy is a combination of both mitigation and adaptation according to Arbuckle, Morton, and Hobbs (2013).

Applications to Professional Practice

As climate change brings risks and opportunities to industries of all types, creating a successful sustainability strategy should become paramount. This is particularly the case for agriculture since the effects of climate change on agriculture are often more severe and the influence of agriculture on climate is direct. The findings of this study should be applicable and relevant for managers wanting to create a successful climate change-based sustainability strategy. The results of this study could also be relevant and useful for organizations which educate members of the agricultural sector on climate change sustainability strategies.

The findings of this research indicated that managers of corporate farms can adopt basic qualities of their sustainability strategy to incorporate elements of CSR, triple bottom line, and systems thinking. These basic qualities translate into maintaining profit mindfulness while considering impacts on society and the environment, and the balance needed in the larger systems. These general findings can apply to every type of

organization – large or small. Managers who make decisions with a mindset which incorporates these basic qualities should more easily identify specific sustainability measures. The results of this study also provide specific mitigation and adaptation measures which farm managers can review, adapt, or incorporate into their sustainability strategy. The findings of this study could be useful in all areas of business and all sizes of agricultural operations – from small farms to corporations and agriculture across the globe.

Implications for Social Change

Through conducting this study, I sought to contribute to the existing body of knowledge on successful strategies for opportunities and risks to agriculture associated with climate change. There is expected to be a direct correlation between contributing to the sustainability of farms and providing food for the future in all areas of the world, particularly to developing and struggling countries. Development of strategies to adapt to and mitigate damage from extreme weather could enable more food production and food security of the global food chain.

Recommendations for Action

The findings from this study are helpful in supporting the needs of other agricultural enterprises similar to Company A. Understanding the results of this study could benefit all types of organizations in addition to agricultural enterprises. Becoming aware of the mindset needed to move into a sustainability strategy is paramount and is evidenced by the results of this study. The awareness of sustainability for all organizations should become apparent by following organizations such as the company

researched in this study. Specific agricultural mitigation and adaptation measures are also modeled here. Adapting or using these measures can help leaders and managers in agriculture find specific elements to change and ultimately develop a comprehensive strategy such as the one shown in this study. I will disseminate the results of this study to organizations who train and educate leaders in agricultural sustainability and to agricultural enterprises through business journals, scholarly journals, and conferences.

Recommendations for Further Research

The key limitation identified in section 1 pertained to the limited number of corporate farms available to research. Since the study did not include all forms of agricultural operations, further research should include privately held and family farms, using multiple case designs. Future research opportunities should include agriculture operations in other countries. Other recommended areas for study include new sustainability technologies such as hydroponic agriculture (in which soil is not used) and vertical agriculture (in which food is grown indoors in stacked layers). I also recommend that future researchers conduct studies identifying and exploring barriers preventing agricultural organizations from pursuing a climate change-based sustainability strategy.

Reflections

Although initially, I encountered difficulty in finding an organization that met the established criteria, I ultimately located an organization and participant meeting all of the requirements to support my study. The wealth of other documents and records available for this study enhanced the richness of the results and assured data saturation. The results of the study affirmed my understanding that climate change is a real threat to agriculture.

The study participant and the data enlightened, informed, and encouraged me after a long period of time spent researching the literature on the topic. My thinking was not altered through conducting the study and analyzing the data, but instead confirmed the potential significance of the study for the agricultural sector.

Conclusion

The results of this study revealed some key elements of a company's successful climate change-based sustainability strategy. The findings revealed that farm managers can begin by viewing their business as a responsible element of society and environment because these relationships can be mutually beneficial. Without a climate change strategy, corporate farm managers risk the impact of climate change on the profitability and survivability of their enterprises. The sustainability strategies which I identified and explored could become more important as the effects of climate change on agriculture become more apparent.

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Appendix A: Interview Protocol Guide

Introductory Information

Country location

Date of incorporation

Number of Shareholders

Types of Crops Grown

Interview Questions

1. Why do you have an environmentally related strategy for your farm?
2. What steps were taken in implementing the strategy you have in place to deal with environmental impacts?
3. How did you determine the components of your strategy for improving profitability that include addressing the impacts to the environment?
4. How did you determine the components of your strategy for improving profitability that include addressing the impacts to the environment?
5. How has your strategy benefitted the profit of your farm?
6. What, if any, do you consider to be other successes of your strategy (besides improving profitability)?
7. What other comments would you like to add about your sustainability strategy?