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# TECHNOLOGY ENABLED SOCIAL RESPONSIBILITY PROJECTS AND AN EMPIRICAL TEST OF CSR'S IMPACT ON FIRM PERFORMANCE

BY

ELIZABETH AMANDA NAPIER

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ACCEPTANCE

This dissertation was prepared under the direction of the STUDENT'S NAME Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

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**ABSTRACT**

# TECHNOLOGY ENABLED SOCIAL RESPONSIBILITY PROJECTS AND AN EMPIRICAL TEST OF CSR'S IMPACT ON FIRM PERFORMANCE

By

Elizabeth Amanda Napier

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Committee Chair: S. Tamer Cavusgil

Major Academic Unit: Marketing

Multinational firms publish annual corporate social responsibility (CSR) reports to signal to stakeholders they are 'doing better by doing good.' However, many firms have not effectively integrated technology with CSR to generate impactful long-term solutions. The era of mindful consumption is about creating hi-tech opportunities to satisfy consumers as well as limit resource use. In this research we examine how CSR is revolutionized by technology. We present research based on in-depth conversations with experts and illustrative case studies on how AI is disrupting the world of CSR. Specifically, we examine how the latest technologies in artificial intelligence (AI) and machine learning (ML) are changing perspectives on CSR for countries, industries, firms, and nongovernmental organizations (NGOs). We present an extended stakeholder framework to display the way technology is fundamentally changing how international business is conducted. This research also quantitatively examines the financial impact that CSR has on tangible returns for multinational enterprises (MNEs). Through the lens of institutional theory, we examine which industries CSR and sustainability yield the most beneficial returns over time.

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It takes a village to raise a PhD. I have been fortunate to be surrounded by a remarkable support system while completing my doctoral education at Georgia State University. There are many people who have earned my gratitude for their contribution to my time in graduate school. I would like to recognize five groups of people, without whom this dissertation would not have been possible: my mentors, my dissertation committee, my surrounding faculty members, my colleagues, and my family.

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"You build on failure. You use it as a stepping stone. Close the door on the past. You don't try to forget the mistakes, but you don't dwell on it. You don't let it have any of your energy, or any of your time, or any of your space." ― Johnny Cash

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# CHAPTER 1
# TECHNOLOGY ENABLED SOCIAL RESPONSIBILITY PROJECTS AND AN EMPIRICAL TEST OF CSR'S IMPACT ON FIRM PERFORMANCE

## 1.1 Motivation of the Study

An increasing number of corporations are devoting company resources to socially responsible activities to satisfy stakeholder demands. Previous research has demonstrated that measuring the direct impact from investment in corporate social responsibility (CSR) has thus far been unquantifiable with unclear outcomes. As globalization continues to intensify, there have been evident changes in our understanding of what ethical business practices are and how companies can remain competitive while also being morally sensitive. Looking to the future, businesses will need to adjust accordingly to account for the dwindling environmental resources and rising stakeholder demands for ethical and sustainable business. The proposed studies look to the past at the orthodox financial results and to the future of devoting firm resources to CSR activities within and outside the firm.

The first essay is a field study examining the effect of the integration of CSR with technology for sustainable business practices. The second essay empirically examines risk through secondary data to determine if investment in environmental, social, and governance (ESG) factors lower fluctuations in the stock market in risky industries as a form of indemnification. Specifically, I quantitatively investigate if firm investment in CSR predicts return on investment (ROI) for multinational enterprises (MNE) and reduces volatility and financial risk.

As the fourth industrial revolution of technological innovation is upon us, the lines between the environmental, digital, and business divisions are merging presenting new opportunities for progress. This will affect humankind unlike ever before as it is predicted to

promote exponential growth of production through technological breakthroughs like three-dimensional printing and artificial intelligence. The World Economic Forum predicts that there will be a deep shift with robots and automation by the year 2021 causing a significant change how firms do business. Subsequently, current research needs to answer: How can firms best utilize resources to account for issues like climate change, dwindling natural resources, increased environmental degradation, and the growing digital divide between those that have access to technology and those that do not?

### 1.2 Significance of Research

MNEs use their credibility and reputation to differentiate their products from competitors. Many firms engage in CSR activities to appeal to consumer preferences via ethical and sustainable products. In this research, CSR is defined as activities that an entity engages in that go beyond legal compliance and to advance the overall wellbeing of society (A. Kolk, 2016). In international business, countries and regulatory environments differ in demographics and economics across borders thus dynamically influencing customer decision making. Examining the moderating role of CSR in different contexts and over time is particularly beneficial to MNEs when implementing marketing campaigns, communicating with stakeholders, and engaging in social initiatives in local communities.

MNE credibility predicts customer loyalty across markets and is mediated by institutional differences that influence the relationship between CSR and firm credibility toward the MNE. Credibility is defined as the validity of a message focused on establishing a match between the intent of a message and the interpretation of that message by stakeholders (Sinkovics, 2008). The credibility-customer (C-C) loyalty relationship examines the investigating role of consumer

preferences based on a knowledge of firm processes and decisions. Extant studies show that the validity of a CSR activity and the message of that activity affects buyer behavior and consumer loyalty towards the firm. Loyalty is defined as the intention and readiness to buy a product by establishing a good relationship with a firm and is a notable predictor of business success (E. Park, Kim, & Kwon, 2017). The higher the credibility of a message, the greater the loyalty of stakeholders.

### 1.3.Research Objectives

The purpose of this dissertation is to: investigate how technology is changing the business landscape and what this means for MNE CSR activities; and to identify the key determinants of risk if investment in CSR activities does in fact lowers stock market volatility. The first chapter takes an exploratory and interview approach to examine how technology is revolutionizing CSR, strategy, and business operations. Technological advancements such as artificial intelligence (AI) are still in its infancy, and its capabilities have not yet been fully defined or measured. Currently, there has not been a significant amount of research assessing how technology is changing how firms engage in social and environmental initiatives. This essay examines insights from top managers. Additionally, it explores how technology is integrated with CSR for best business practices. We note that technology is a key enabler of CSR activities. This essay delineates how technology empowered CSR is fundamentally changing the business cycle and what can be expected in the not so distant future for MNEs.

The fifth chapter investigates CSR and firm risk by looking at secondary financial data from COMPUSTAT and environmental, social, and governance indicators from the MSCI KLD 400 Social Index. We conceive impact of CSR on risk across industries and use archival financial data to empirically examine if total firm risk and stock market volatility is lessened

when firms invest in certain CSR activities; or if it in fact it has a negative impact on stock market value. The results of this investigation demonstrate that if a firm publicly and explicitly state their CSR practices it drives in certain industries stock market value. We compare firms that are most like one another in relation to stock market and CSR investment. We also examine if higher stock market returns offsets risk, if higher risk yields lower returns, and if returns are meaningful, if the cash flow increases.

### 1.4 Contribution of the Essays

The principal contribution of this dissertation is to investigate how CSR is a multifaceted construct with intangible and tangible benefits that have not yet been clearly defined in previous studies. The construct CSR has many definitions that have evolved over time and through disciplines. Extant literature defines and measures CSR in many different ways across disciplines such as anthropology - *the economic, legal, ethical and philanthropic responsibilities of companies, sociology, psychology, and business* (Carroll, 1991); psychology - *activities that improve a company's image when consumer relate there are sincere motives and hurt a company's image when motives are seen as insincere* (Yoon, Gürhan-Canli, & Schwarz, 2006); and sociology – *an embedding of capitalist social relations and a deeper opening of social life that dictates the marketplace* (Hanlon, 2008).This research aims to combine our knowledge of past CSR research to look at how consumers, managers, companies, and investors practice and respond to socially responsible activities.

The gap we address is that many managers thus far have failed to see the benefits of embedding these types of practices throughout entire business operations. With the advent of new enabling technologies, many firms will not be able to survive as they are based on short term quarterly goals and need to develop a sustainable competitive advantage to account for

stakeholder demands and evolving institutional frameworks. As the world continues to change and the availability of resources is limited, managers need to use innovation to come up with sustainable solutions that are in tandem for the betterment of business for society. Simply meeting the basic regulatory standards is not enough. In a world full of volatile politics and unpredictable climate change, firms must set quality standards for how to ethically and sustainably conduct business. If they do not, we will not have a world to conduct business in anymore.

# CHAPTER 2
# THE EVOLUTION OF CORPORATE SOCIAL RESPONSIBILITY

## 2.1 Who Started CSR?

The amalgamation of the physical and digital spheres is transforming the practice of corporate social reasonability (CSR). Technology is evolving quickly and is now equipping managers with new tools that are disrupting how firms engage with society. In particular, leading-edge companies are increasingly deploying artificial intelligence (AI) and machine learning (ML) to streamline operations and reduce their negative impact on the environment and society. As technology knows no limits, AI and ML empowered CSR increases the scope and scale for international businesses to reach new stakeholders across political and physical boundaries.

MNEs launch CSR initiatives to give back to society, improve employee attraction and retention, enhance brand image, mitigate risk and reduce the liability to foreignness for a strategic competitive advantage. When technology is linked with CSR, MNEs are able to adapt and overcome challenges related to country specific contexts. This adaptation allows MNEs to quickly and effectively deploy CSR projects that best fit the host country context in accordance with the surrounding society's needs. Technology empowered CSR enables firms to increase the variety and the magnitude of their social initiatives. This involves collecting and analyzing data for increased efficiency and higher profits. In spite of these tools for better business, most firms have fallen short in regards to concrete and generalizable metrics regarding the impact of their activities. In order for more firms to invest valuable resources into their social and environmental causes, they require better key performance indicators (KPIs) to ensure accurate forecasting and impact measurement.

A growing number of firms are publishing their resource footprints to account for stakeholder demands for more transparency in business operations and sourcing raw materials. An increase in levels of transparency enables firms to optimize their entire value chain with suppliers, partners, operation systems, management, employees, consumers, and product use. As firms invest in optimizing their manufacturing and procurement, they also realize they need to utilize the latest and greatest technology in order to deliver enhanced sustainable business results.

In the current era of big data and technology, we know that everything that can be digitized, will be. Many jobs performed by humans will be lost due to automation in the coming years. Whilst we expect new jobs to be created, the fear is that a large part of society will be left behind in the digital divide due to a lack of education and proper skillsets. This is fundamentally changing the way firms interpret and implement CSR and sustainable business. Sustainable business will depend on the deconstruction of silos, the creation of interdisciplinary partnerships, the sharing of data across domains, and the transfer of knowledge and skills from firms to local communities. When the advancements in technology are paired with the abundance of data and cheap and available computing capacity, we see the that AI is revolutionizing business processes at all levels of the organization across industries. From optimizing workflows to improving customer support, AI and ML based services are enriching business productivity. Thus, it is critical that firms continually develop tools to help managers interlink business with CSR to optimize the entire value chain.

The objectives of this research are to (1) examine how technology is augmenting CSR and (2) offer a process for MNEs to implement social good initiatives through AI and ML platforms. These new platforms offer a way for international firms to increase transparency and

consumer engagement through digital platforms for sales, marketing, distribution, and innovation for shared value (Schwab, 2016). We examine how technology empowered CSR is offering a new way of thinking and doing business across geographical and mental boundaries. Specifically, we examine how MNEs like Hewlett-Packard (HP), Hewlett-Packard Enterprise (HPE), Google, eBay, and NVIDIA are using technology to reinvent CSR to make a better world. This is operationalizing via platforms that: 1) educate employees and society; 2) increase the speed and reliability of transactions; 3) improve relationships with customers and partners; 4) generate gains of efficiency in management; 5) optimize internal processes; 6) dismantle information silos; and 7) enhance the recruitment and selection of employees (Al-Qirim, 2007; Byrd & Marshall, 1996; Fink, 1998; Kannabiran & Dharmalingam, 2012; Ongori & Migiro, 2010; Salmeron & Bueno, 2006; Tso, Yau, & Cheung, 2010). In this way, technology linked with CSR eliminates production inefficiencies, increases access to new markets, and improves brand recognition, which has been shown to indirectly improve the profitability of companies (Malaquias, Malaquias, & Hwang, 2016).

This article is organized as follows. First, we offer an overview of the evolution of CSR, what it meant in the past and where it is now. Next, we provide a theoretical overview and connection of CSR and technology to an extended stakeholder theory. Third, we present our research findings in regards to trending AI enabled CSR platforms from expert executive insights. We then offer an agenda and the promise for a better future through technology enabled CSR, that is not just about producing positive financial returns, but to focus on driving long-term sustainable business growth for future generations. Lastly, we end with a discussion of our findings and opportunities for future research.

## 2.2. An Overview and a Conceptualization of CSR

The concept of corporate social responsibility (CSR) dates back to the late 18th century in Great Britain during the first industrial revolution. At this time, relative issues included poverty, poor working conditions, and the exploitation of child labor. It was noted as the beginning of the social welfare movement (Cochran, 2007). For the first time, the safety and the wellbeing of employees was considered to be the responsibility of the government. This was also the inauguration of human resource management. Employees began to do less manual labor as machine technology was used to enhance productivity and profitability. Moving forward, the second industrial revolution began in the late 19th century with the invention of electricity and the internal combustion engine. Major improvements came when Henry Ford introduced mass production through the assembly line and standardization that enabled economies of scale for production. Since then, CSR has evolved from a narrow-marginalized concept, into a multifaceted paradigm and portfolio of activities fundamental in today's corporate decision making (Cochran, 2007).

The first academics to examine the fuzzy construct of CSR were Columbia professor Adolf A. Berle and Harvard professor E. Merrick Dodd. In 1932, Berle debated that a firm's responsibility is only to the shareholders. In opposition, Dodd argued that the firm is responsible to the public as a whole. This debate has lasted centuries and is still disputed today as to *who* the firm is responsible to and *what* constitutes good business.

Going forward, the modern activist movements of the 1950s and 1960s came with a growing social awareness that would change the business environment forever. The 1950s marks the modern era of CSR with the expansion of how CSR was operationalized in the 1960s

(Carroll, 1999). New players, like nongovernmental organizations (NGOs), entered the game focusing media attention on the unethical or irresponsible business practices, including the mistreatment of employees, exploitation of natural resources, and environmental degradation. Following the promotion of the gold standard of corporate philanthropy for increased trust and integrity, programs and foundations were established by business tycoons such as David Rockefeller of Chase Manhattan Bank and Reg Jones of General Electric. For the first time, firms publicly made humanitarian donations to universities, non-profits, and social causes to improve the overall health of society and firm reputation (McClimon, 2003; Cochran, 2007). As a result, firms were examined more closely by stakeholders where unethical behavior lead to a decrease in public trust resulting in financial risk and serious consequences.

----*INSERT FIGURE 1 ABOUT HERE*-----

Harold Johnson's 1971 book *Business in Contemporary Society: Framework and Issues* defined CSR as "a socially responsible firm is one whose managerial staff balances a multiplicity of interests... instead of striving only for larger profits for its stockholders, a responsible enterprise also takes into account employees, suppliers, dealers, local communities, and the nation" (Carroll, 1999). This was the first time a hint of the stakeholder approach from specific interest groups appeared in academic literature. Shortly thereafter, in 1975 the term corporate social performance was used to usher in the belief that firms do indeed have an ethical obligation to the wellbeing of society (Sethi, 1975).

In the 1980s, Thomas M. Jones proposed that CSR is the notion that corporations have an obligation to constituent groups in society, other than stockholders, and beyond the responsibilities prescribed by law and the union contracts of society (Sethi, 1975). The two facets of this definition are: First, the obligation must be voluntarily adopted; behavior influenced by the coercive forces of law or union contract is not voluntary; Second, the obligation is a broad one, extending beyond the traditional duty to shareholders to other societal groups such as customers, employees, suppliers, and neighboring communities. (Jones, 1980). In the 1990s, the pyramid of CSR proposed by Caroll (1991) enhanced our understanding of CSR. Figure 2 displays the visual representation of the pyramid of CSR that must be built upward from the economic category (e.g. foundation of business) at the base through the legal (e.g. obligation to do what is just and fair), ethical (e.g. , obligation to do what is right) and philanthropic categories (e.g. contribute resources to the community to improve the quality of life). With Carroll's framework, we expect an inverted U-curve of CSR as the subsequent examinations were based on early theoretical research (De Bakker, Groenewegen, & Den Hond, 2005).

----*INSERT FIGURE 2 ABOUT HERE*-----

In the third industrial revolution in the 1990s, a new era of capitalism was introduced via the Internet of Things (IoT) that profoundly transformed business unlike ever before. This was facilitated by mobile communications and the World Wide Web (WWW). The democratization of technology fueled mass consumption and fundamental economic changes as the middle class began to grow and expand indicating the enhancement of life standards and an increase in

purchasing power (Cavusgil & Kardes, 2013). MNEs are guests in host nations and have a greater need to offset the liability of foreignness. MNEs doing business in foreign countries face risks due to the unfamiliarity of the cultural, political, and economic environments and the greater need for the coordination across physical and psychic distances (Zaheer, 1995). The liability of foreignness arises from (1) costs associated with the physical distance such as transportation and coordination across distance and time; (2) firm-specific costs due to a firm's unfamiliarity with the host country environment; (3) expenditures resulting from a lack of legitimacy and authority; (4) costs from the home country such as embargos and trade restrictions on specific countries. Therefore, firms doing business across international borders have a greater need to introduce innovative competitive capabilities in organizational practices and provide a sustained competitive advantage that can be shared with the surrounding communities.

The most significant tipping point in our understanding of CSR ensued with the publication of Michael Porter and Mark Kramer (2002) stating that "in the long run social and economic goals are not inherently conflicting but integrally connected." Porter and Kramer argue that economic investments have social returns and that firms should not see them as distinct units, but instead as integrated assets for sustainable business. The authors used the Cisco Networking Academy to demonstrate how philanthropic activities yield positive financial returns. In this example, Cisco donated networking equipment to local educational institutions, only to find that there was a lack of skills and expertise to operate the new tools. Cisco engineers came in to help and train students that resulted in the fulfillment of over 1 million information technology (IT) jobs worldwide (Cochran, 2007).

As we enter the fourth industrial revolution, we continue to observe fundamental changes in how firms conduct business and communicate with stakeholders across the physical and digital spheres (Schwab, 2016). In the next section, we provide a literature review of stakeholder theory as a theoretical background for the implications regarding technology empowered CSR. Such a conceptualization must explicitly deal with an amalgamated approach to the internal and external stakeholders. The conceptualization includes market strategy, firm performance, and external factors such as geography, culture, and governmental regulations.

### 2.3 Why MNEs Should be Concerned about CSR: Stakeholder Power

When examining stakeholder theory though the lens of CSR, we see that extant international business literature suggests that this perspective (1) facilitates our understanding of CSR; (2) provides a direction for the evaluation of CSR; as well as (3) offers new ways to conceptualize CSR (Freeman, Wicks, & Parmar, 2004). First, stakeholder theory begins with the assumption that values are explicit and are a part of doing business (Framework, 1984). The theory asks firms to articulate a form of shared value and bring stakeholders together as well as deliver purpose (Freeman, Wicks, & Parmar, 2004). The fundamental core of stakeholder theory is that economic value is created by people who voluntarily come together and cooperate to improve society's status quo. In this way, managers must develop innovative ways to generate connections with their stakeholders and design communities for shared value. Shared value opens markets to new players where society is transitioning from a focus on quarterly returns to an emphasis on long-term sustainable benefits for future generations to come. The capitalist system is viewed as a major cause of social, environmental, and economic damages. Thus, firms must generate economic value in a way that also creates positive societal outcomes (Porter & Kramer, 2011).

In the seminal paper on stakeholder theory, Freeman (1984) proposes that firms have many relationships with various groups that affect, and are affected by, the actions of the firm (McWilliams, & Siegel, 2001). This has emerged as the dominant paradigm in CSR research. *Figure 3* displays Freemans original framework of stakeholders that include the company, customers, government, society, and suppliers with associated interconnections. In this paradigm, the social nature of value creation is explicitly acknowledged as it advocates to focus management attention on 'the best that can be created together rather, than avoiding the worst' (Freeman, Martin, & Parmar, 2007). In this research, we define stakeholder engagement as practices a firm undertakes to positively involve stakeholders in organizational activities inside and outside the firm (O'Riordan & Fairbrass, 2014).

----*INSERT FIGURE 3 ABOUT HERE*-----

CSR has been examined interdisciplinary by those who study strategic management (e.g. local firms in domestic markets); marketing (e.g. the influence of CSR on customer loyalty and brand value); as well as finance and economics (e.g. the return on investment of CSR in stock market returns). Nonetheless, scholars have yet to examine how technology is enabling CSR (Park & Ghauri, 2015). With respect to the stakeholder implications of CSR, there are numerous unanswered theoretical and empirical questions with a significant amount of under examined links to technology. Currently, there is a lack of scholarly attention to the phenomenon of how technology is revolutionizing CSR and the associated processes. Therefore, we present a new examination, from the international business perspective, with an interdisciplinary point of view

linking CSR with technology to resolve past discrepancies and contradictory findings associated with measurement and returns on investment. We believe that the inconsistent findings on returns is due the fuzzy nature CSR in relation to its portfolio of concepts.

Although there appears to be an agreement that MNEs should behave responsibly, there is only limited discussion linking CSR with technology, like AI, for the betterment of society. This research is in its infancy as the number of articles connecting social responsibility to AI is limited. Various elements contribute to the current phenomenon, but it has been underexplored in the international business literature. CSR has been examined from the narrow perspective of increasing shareholder wealth (Friedman, 1962), to the broader idea of economic, legal, and discretionary strands of responsibility (Caroll, 1979; Hemphill, 2004; Jamali, 2008). Figure 5 visually displays key stakeholders for each facet of CSR. The most basic aspect of CSR begins with local community benefits for civil society though better working conditions and assistance to disadvantaged groups. The next level is at the level government where responsibilities include compliance, ethics, and philanthropy for the betterment of society in general. Subsequently, MNEs are accountable for producing social innovation for the sustainability of the environment and generating shared value via total integration with stakeholders. Finally, foreign markets and competitors are held accountable for producing projects with tangible benefits facilitated by technology empowered CSR for breadth and depth.

*----INSERT FIGURE 4 ABOUT HERE-----*

The underexplored phenomenon of technology empowered CSR is mainly due to the fact that the use of technology for sustainable business is in its infancy of capabilities. Technology has the potential to fundamentally change how companies design, manage and measure their flagship programs in regards to key areas like the environment, education, healthcare, human rights, poverty alleviation, and ethical sourcing. As the stakeholder framework is expanding with new actors, firms will need to refine how they collaborate internally and externally to create shared value.

Firms are hungry for an integrative framework to be more competitive, thus more interconnected. There is an increasing understanding that we need more open source platforms and collective knowledge across industries and domains. This involves tearing down information silos to radically change how knowledge and skills are transferred and operationalized for innovative solutions. In this context, we present an extended framework for shared value that focuses on the processes of utilizing AI and ML for CSR to bridge the current gap information and goal alignment between firms and society. Figure 4 extends Freemen's stakeholder framework through technology empowered CSR to include the additional internal stakeholders of crowdsourced employees, contingent employees, permanent employees, and supervisory board members. We also extend the external stakeholders to include universities and the arts and humanities sectors of society. One way to look at CSR is within the organizations of MNEs to examine how and why stakeholders get involved as well as the outcomes of their involvement. In sum, outcomes of technology enabled CSR are strengthened reputation, increased markets access, amplified innovation, and stronger relationships with communities. We are adding value to stakeholder theory by integrating technology to look at applications as well as select illustrations of CSR through AI and ML.

*----INSERT FIGURE 5 ABOUT HERE-----*

**2.4 What Stakeholders Are Involved?**

Firms have conventionally engaged in a triangular relationship with NGOs and governments when implementing environmental and social initiatives. Those relationships were often deep with a limited number of external stakeholder partners, rather than broad across domains. AI and ML are however requiring collaboration thus changing this siloed landscape. Industry experts are increasingly expecting new stakeholders to emerge in the CSR space including technology specialists and security experts that help ensure that AI solutions are safe to implement or behavioral coaches that provide valuable input when developing human centric solutions. In the past, CSR objectives and scorecards have focused on categories like market access, product and service innovation, limiting the liability of foreignness in host countries, creating social and environmental impact, driving up brand image and reputation ratings, employee engagement, the hiring and retention of employees, as well as risk mitigation. While these traditional measurements will remain valid and important for MNE´s, CSR projects enabled by ML and AI will enable deeper and more meaningful analyses across the entire spectrum of business and society.

Machine learning techniques are used for data analysis and pattern discovery through statistical models and algorithms based on specific tasks (Bose & Mahapatra, 2001). There is not currently one definition of AI as the technology continues to evolve quickly and shifts depending on the application. Contemporary definitions include the following: (1) a branch of computer

science dealing with the simulation of intelligent behavior in computers; (2) The capability of a machine to imitate intelligent human behavior; (3) systems that think exactly like humans do known as strong AI; and (4) systems to work without figuring out how human reasoning works known as weak AI; In this research we define AI as technological systems that operate like the human brain to build unique capabilities and enhance our world.[1] Building a future that is shaped by AI also requires the active engagement of stakeholders that might not have collaborated before. The field of AI and ethics is a good example as it concerns not only to governments and MNEs but citizens as well. For example, in the United Kingdom, the Royal Society for the encouragement of arts, manufacturers and commerce brings together a new set of stakeholders to explore ways to develop and utilize AI responsibly for the greater good of society through a series of citizens´ juries on the use of AI in criminal justice and democratic debate.[2]

In addition, AI might eliminate a large number of jobs in the future. Conversely, experts anticipate that many new jobs will be created that did not exist before. These include positions like aggregators who act as catalysts on the web by pulling together different experts and industry leaders in generating holistic problem solutions.[3] Industry consultant KPMG talks about other important new roles like that of the AI Architect. This expert ensures that new AI based solutions are sustainable and work in the long term. Also, the role of a data scientist manages the

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[1] Marr, B. (2018, February 14). The Key Definitions Of Artificial Intelligence (AI) That Explain Its Importance. Retrieved March 27, 2019, from https://www.forbes.com/sites/bernardmarr/2018/02/14/the-key-definitions-of-artificial-intelligence-ai-that-explain-its-importance/#a7205974f5d8

[2] Balaram, B. (2017, October 04). The role of citizens in developing ethical AI - RSA. Retrieved March 27, 2019, from https://www.thersa.org/discover/publications-and-articles/rsa-blogs/2017/10/the-role-of-citizens-in-developing-ethical-ai?platform

[3] Werber, C. (2019, March 13). The five most important new jobs in artificial intelligence. Retrieved March 27, 2019, from https://qz.com/work/1517594/the-five-most-important-new-ai-jobs-according-to-kpmg/

huge amounts of available Big Data and designs algorithms to create impact. These all will be critical roles in designing new CSR initiatives that will take advantage of the latest technological developments for long-term and sustainable success.

The future will bring many more partnerships between man and machine. The collaborative robots, or co-bots, enhance processes to ensure work is done more effectively. There are many applications on the shop floor in factories around the world now handling jobs such as pick and place, machine tending or final quality control. [4]When manufacturing companies embrace collaborative robots, they get flexibility, efficiency, and increased production capacity. Amplified manufacturing efficiency leads to reduced maintenance and labor costs. These collaborative robots will increasingly enter white collar jobs where they share the work space with human workers. We expect man-machine relationships to strongly influence the way CSR projects are designed, implemented and measured going forward.[5]

In addition, there will be an increased collaboration between the arts and sciences in order to bring creative talent together with scientific progress to complement skills and develop state of the art solutions. The World Economic Forum published a list of 21st century skills including complex problem solving, critical thinking and creativity to name the top three. These are skills needed in order to augment the capabilities of the machines. At the moment the world is far away from robots that will be sensitive to a coworker's personal needs, or robots that will

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[4] Gonzalez, C. (2018, January 26). 7 Common Applications for Cobots. Retrieved March 27, 2019, from https://www.machinedesign.com/motion-control/7-common-applications-cobots

[5] Strain, C. (2018, May 25). Cobots: The Benefits of Collaborative Robots in Manufacturing. Retrieved March 27, 2019, from https://www.business-opportunities.biz/2018/05/25/robots-cobots-manufacturing/

bring a global community of very diverse experts together to work on a complex problem. It still takes humans to facilitate this teamwork and collaboration for greater good. Stakeholders will increasingly act as agents that focus on melding and mashing human and machine capabilities. These stakeholders will play an increasingly important role in an automated world where roles get redefined. Furthermore, CSR experts expect leading organizations like the World Economic Forum, the Clinton Global Initiative, and/or the United Nation institutions to take the lead in bringing new and emerging stakeholders together to reinvent the way the world collaborates to solve the most pressing issues. They could combine their incredible network of for and nonprofit organizations and utilize AI to match interests, expertise and desired outcomes of the different partners.

Moving from in-depth defined stakeholder partnerships with clearly defined objectives, to a broader model with more diverse global players, will also have implications on the desired outcomes and respective measurements of CSR projects. The involved parties will need to define a common framework or governance model of engagement based on common values and beliefs. This is a critical step given that they need to build trust in settings that will often be characterized by their virtual nature. With widely spread international stakeholder networks it is rather unrealistic to assume that the individual players will be able to build personal relationships with each other. It will be more likely that contributions will be made from remote locations based on clearly defined tasks.

Based on the principle of agile working, project owners will get appointed and will work with the stakeholders on the different stages of the project. From defining the objective, to first ideation cycles including ethical considerations, implementation plans which cover also data, and

security concerns all the way to mutually agreed metrics that should be ideally generated by the AI based system. Rather than participating in all phases of the project most stakeholders will only be part of a specified subtask which contributes to the whole. Therefore, clearly defined feedback loops and progress updates are critical to the success of the project. All of these steps should be fully automated and produced by the system as far as this is possible. At the heart of this technology driven analysis is the desire to use data with purpose so it can help make informed decisions and help achieve the stated objectives.

### 2.5 A Field Study Approach with C-Suite Executives on AI

This study utilizes convenience sampling through informal conversations and expert insights from executives of MNEs as well as case studies by the use of a field study approach. Field studies are a particularly appropriate method when studying a new and emerging phenomenon (in this case: technology enabled CSR). Utilizing an anthropological business approach maintains open-ended and broad questions so that respondents can speak freely, later leading to a structured survey (Jordan, 2011). The semi-structured interview method offers a path to dig deeper along conversational trails leading to a structured interpretive study (Wengraf, 2001; Awate, Larsen, & Mudambi, 2015).This research strategy is especially suitable for the context of our research in examining innovative platforms, such as the use of AI in education, healthcare, and corporate governance, that has not yet been scientifically examined in academic literature.

A field study is particularly advantageous to understanding radical changes in how technology is changing *who* stakeholders are, *what* are the platforms for technology empowered CSR, and *how* collaboration is enhanced across the world. This unique way of observing and

investigating changing business processes increases the rigor through which we infer knowledge from experts and pioneers in international firms. Particularly in the ways AI is applied to social responsibility initiatives and identifying the associated benefits to society as a whole. The overall goal of this research is to analyze the phenomenon of how AI is revolutionizing CSR to generate shared value, and the process of transferring that knowledge to society for future generations. Through examining how AI is transforming the world as we know it, we present a multifaceted understanding of the knowledge flows from MNEs to the communities in which they operate.

Insights were collected from executives of HP, Hewlett-Packard Enterprise (HPE), eBay Incorporated, Eventbrite, NVIDIA, Fujitsu Technology Solutions, PTI Advisors, Steelcase, Talent Alpha, AT&T Incorporate, University of the People, and industry experts from Germany and the United States. The executives were identified from Gabriele Zedlmayer's professional network. We benefited from our conversations from Zedlmayer who has served as Chief Progress Officer for HP and Hewlett Packard Enterprise (HPE). Zedlmayer has been collaborating with numerous global organizations, including nonprofit organizations, governments, customers and partners, on solving social and environmental issues for the majority of her career.

Gaining information on technology enabled CSR led us to focus on key executives who are on the forefront of utilizing AI for CSR in their associated firms. Our small sample sizes are inexorable given the research objective rich and complex information about particular AI platforms with few authorities on the topic who are often difficult to access (Awate, Larsen, & Mudambi, 2015). In collecting the expert insights, we first wrote narratives to examine the connections and commonalities between respondents. Then focused on understanding who, how, and why firms are utilizing AI for CSR. For example, the drivers behind how open technology is

making firms more agile, and an agenda for the forward movement in revolutionizing CSR. To strengthen our narratives data, we also conducted case studies from secondary sources including company reports, industry reports, and news articles.

# CHAPTER 3
# ILLUSTRATIONS OF HOW AI IS REVOLUTIONIZING CSR

At the World Economic Forum in 2019, Mark Benioff from Salesforce spoke about the new digital divide opening between those that have access to AI, and those that do not. Benioff argued that access to AI should be considered a basic human right as a new radical form of CSR. At current, firms are at the very beginning of transforming the CSR space with AI. This presents opportunities to fundamentally reinvent how social and environmental programs are designed, implemented, and measured. For example, AI-Powered Chatbots have reinvented the way consumers obtain financial investment advice by systematically analyzing immense amounts of data, which enables them to swiftly and efficiently provide clients with expert advice. Similarly, in the human resources space, AI enables firms to sort through thousands of job applications to find the best candidate, therefore enhancing the selection process. The same mechanisms could be applied in the CSR space where Bots could advise NGOs how to optimize fundraising or financial processes. Furthermore, instead of sorting through thousands of grant applications, Bots could be used to sort through all of the applicant submissions to select those that best fit the organization's visions and strategy.

AI applications are categorized into two forms: (1) *narrow* AI and (2) *general* AI. Narrow AI technology is generally able to handle one particular task; an AI system has a certain degree of intelligence in a particular field. Examples are Watson, Spotify, and autonomous driving cars. At current, we see forward looking firms already deploying AI, not only in their business operations, but also in their CSR programs. Examples include Google´s call for AI based CSR initiatives totaling 25 Million Dollars. On the other hand, general AI technology is

expected e to process cognitive abilities much like a human. Experts predict that by the year 2045 the technological Singularity will occur in which humans will be able to connect their neocortex to some form of storage system, most likely cloud-based or possibly DNA-connected, and will be able to merge this neocortex with AI-driven amplifiers. This means that AI entities will potentially be able to merge with human consciousness, bringing huge benefits to the cognitive power of humans and an enhanced understanding of the world and business.

AI is redefining the relationship between humans and the environment by facilitating the interaction between firms and the broader society. The future is about open technologies, unrestricted systems, free thinking, and the sharing of resources to enhance transparency and the transfer of knowledge. The traditional Public Private Partnerships (PPP) will no longer be sufficient to bridge the social and environmental gap to adhere to stakeholder's demand for better business. In the past, those partnerships were often limited to the CSR department of a private firm, a specific government agency, and a non-profit organization. Going forward, stakeholders will differ as firms redefine shared value and have access to a more diverse basket of resources. Stakeholder behavior will drastically change as all players need to demonstrate a willingness to share data, and skills to maximize on the possibilities and advantages provided by AI and ML enabled CSR.

There are numerous questions regarding the utilization of AI. Kirk Bresniker (Vice President and Labs Chief Architect, Hewlett-Packard) and Christopher Wellise (Chief Sustainability Officer, Hewlett-Packard Enterprise) state that "we are at the top of the AI hypercycle and many firms currently pile on new applications but they do not know whether they actually may *overinvest* in technology to only receive *under optimized* solutions." The only way to measure

returns is by continuously analyzing and tweaking processes and algorithms to generate more optimized and ecologically aware results. HPE is exploring this space by launching their own AI products and processes. The executives at HPE are concerned that we'll potentially get too far along in the development of AI based solutions and realize that AI as is currently practiced is unsustainable when full costs are accounted for. Like all non-sustainable but very effective technologies that means it could be the primary source of economic division of the next generation." Benioff says "AI should be a basic human right, but it is difficult to ensure that everyone has access."

Another important point made by Bresniker and Wellise is the fact that users need to develop a much better awareness of how to properly manage their data and which methodologies are available to make the correct predictions. ML algorithms fall into two categories: supervised or unsupervised learning. The difference depends on how they "learn" about data to make predictions. Supervised learning can be compared to a teacher-student relationship. The algorithm learns from an existing dataset and is shown the correct answer. As it is fed with data, it continuously makes predictions which get corrected by the "teacher" until the system gets it right. With unsupervised learning, we do not know the outcomes and the system might come up with results that we would never anticipate.

Both methodologies will have useful applications in CSR going forward. Supervised learning can help us in areas like image recognition to better recognize certain diseases or illnesses. Unsupervised learning will provide us with opportunities that we cannot predict at the moment because there are no correct answers and no teachers. When data is not labelled and you keep feeding the machine with information, it is left to its own device and will find more

correlations and interesting structures in the data faster in real time and come up with results that we would probably not have looked for in the first place.

### 3.1 AI Facilitating Education

Education is one of the industries that has not yet undergone a successful digital transformation. Many classrooms are antiquated and still do not utilize technology to augment and enhance education. Universities are often somewhat more advanced when it comes to the use of technology, but very few utilize AI based learning platforms and support mechanisms. Going forward, society needs to provide their citizens with continuous learning opportunities throughout their career. Lifelong learning is a new buzzword that describes the new reality. With many jobs changing or disappearing due to automation, workers and employees need to be constantly retrained and reskilled.

The traditional education system cannot facilitate this need. It will take new collaborations between public and private stakeholders to develop appropriate assessments and training modules that offer accelerated learning opportunities which are financially affordable to the public. This radically different approach includes new partnerships, formats, certifications and training vehicles. This can only be successful if stakeholders embrace transformative technology, like AI, in their efforts to revolutionize education.

*Learning Ovations.* Even today, we unfortunately observe that teachers currently share knowledge with students in a one size fits all learning approach. Technology is often banned from the classroom and not used in a way to enhance education. No two children learn alike, thus learning needs to be personalized for students in order to address their individual cognitive abilities. Technology can play a key role here as an enabler of these learning intense processes.

Learning Ovations is a small company that specializes in training AI to test performance across a set of metrics. For example, the assessment of each child´s ability to read. Once they have the results, they utilize their AI powered recommendation engine to develop a personalized reading curriculum for each student according to the school's overall syllabus. Teachers now have research-based tools to help differentiate their instructions based on their student´s needs (Sahota, 2018; Learning Ovations, 2019, Retrieved February 02, 2019).

*University of the People.* In tertiary education, AI enables educators to be more mindful of individual students. Technology presents the opportunity in making higher education accessible to all. Students are now able to receive a degree that is completely tuition-free. University of the People (UoPeople) is the world's first tuition free and accredited academic institution dedicated to the open access to higher education (University of the People, 2019). UoPeople believes that knowledge is fundamental to world peace and endeavors to provide access to collegiate level studies regardless of geographic, financial, or societal constrains. Through online learning, collaborative peer-to-peer environment, and courses taught by top academics and professionals, students receive personal attention in small classes of twenty-five students. Each student is also appointed an academic mentor that advises him or her in course selection and provides moral encouragement and support. Shai Reshef (President, UoPeople) explains how the educational institution is linking business intelligence with AI capabilities to facilitate learning.

*"We have students from all over the world that study under very different circumstances. Some live-in war-torn countries, others live in Europe or the United States. Going forward we want to individualize our offering even further and look at AI based assessments of our students to develop more personalized offerings to help them succeed."* - Shai Reshef (President, UoPeople)

*AT&T.* Firms now more than ever invest heavily in the training of their employees. Going forward, they will need innovative ways to share learning programs with local communities to support the re-training citizens affected by automation. AT&T is using educational program innovation for an in-depth AI based assessment of the skillset of each individual employee. Through continuous learning and education (CLE), AT&T's determines which skillsets and competencies are needed to succeed within the firm. To help accomplish this, AT&T joined with Udacity in 2014 to co-create Nanodegree programs. Udacity is an online curriculum and credential creator named for its compact and targeted courses (AT&T Job, 2019). Anyone with a broadband connection can be a part of the program. Transferring this competence assessment and corresponding training material to local communities greatly benefits citizens in their effort to get reskilled for new opportunities.

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*IBM.* With more and more tasks performed by machines, humans need to build out their problem-solving skills, creativity, intuition, empathy and other so-called soft skills. IBM recognizes this need and is thus offering free professional skills via training modules to help learners develop in these areas. The modules cover areas like effective collaboration, advanced communication, and presentation skills as well as how to work in a team to solve complex issues. Participants that successfully complete these two-hour courses are awarded with IBM Digital Badges to certify their achievements.

IBM also offers specific information technology (IT) skills training to those that are looking to build their careers. The training spans across industries and geographies to ensure the future IT workforce is more diverse and inclusive. They are targeting students, teachers, veterans, and other interest groups that are planning to change careers. For example, they help high school and early college students to prepare for a career in IT. Also, they offer training programs to veterans to enable them to rejoin the workforce, and help educators to improve their skills and show them ways to spark student interest in the areas of science, technology, engineering and math. IBM also works with colleges and universities to enhance their curricula with skills to help students succeed in finding jobs after graduation (IBM, 2018; AI-Powered eLearning with IBM Watson, 2018).

*The Finish Government.* In Finland, the government has recognized that the digital revolution will leave too many citizens behind if they do not proactively start to train them on future technologies. In a collaborative effort with the University of Helsinki, they have developed a unique curriculum that teaches the broader population about the basics of AI. Their stated goal was to reach one percent of their population. The course offers six modules; (1) what is AI, (2) solving problems with AI, (3) real world AI, (4) machine learning, (5) neural networks, and (6) implications. This comprehensive introductory level overview is a very useful training tool that does not only provide the students with a core understanding of AI, but also encourages them to get involved in future developments (A free online introduction to artificial intelligence for non-experts, n.d. Retrieved February, 2019). As a result, over 250 companies in Finland have pledged their support and planning to offer this curriculum to their workforce (Hao, 2019). Introduced in the spring of 2018 the results are impressive. 142,000 students from 110 countries

have meanwhile completed the course with over 40% being women. Sparked by this overwhelming success, a second advanced course will be launched during the course of 2019.

The example in Finland has also expanded internationally. Dutch citizen Jim Stolze read about the Finish initiative and proposed a similar program in a leading Dutch newspaper. He received overwhelming support from leading Dutch universities and companies like Deloitte, CapGemini, and Intel. In a collaborative effort they are now offering a course that is aimed at making the citizens of the Netherlands more familiar with the AI phenomenon (Amsterdam, 2019).

*NVIDIA.* With the mantra that AI is a national priority, we see firms stepping up more and more. The world leader in visual computing NVIDIA, is committed to preparing the future workforce by equipping employees with the skills to succeed in an AI powered economy. NVIDIA´s AI and education programs are a great example for the type collaborations it takes going forward to make AI a basic human right. Closely aligned with their company strategy to utilize their technology and philanthropic efforts to solve the world´s most complex social and scientific problems, NVIDIA partners with other corporations, research institutions, universities and non-profit organizations to offer comprehensive learning opportunities targeted at different audiences.

Starting at the elementary school level, all the way through post graduate, NVIDIA offers training modules on deep learning based on task specific algorithms. They also feature this content at their Global Technology Conference which presents state of the art AI based applications to tomorrow´s workforce. In addition to offering financial grants in the amount of $50,000 to talented students to pioneer the area of deep learning, NVIDIA also supports teachers.

The NVIDIA teaching kits are complete courses in areas like deep learning, accelerated computing, and robotics that are co-developed with leading universities like New York University. These content rich modules feature both theoretical background as well as real world applications.

The Deep Learning Institute is particularly interesting, offering education to individuals at all stages of their career that seek to learn more about AI and deep learning. They offer online courses, online electives, and instructor led workshops at entry, medium and advanced levels. The curriculum also covers industry specific content specifically in healthcare that equips students with tools to solve real world problems. In addition to collaborating with universities, NVIDIA also cooperates with Microsoft on teaching deep learning for robotics. This is an area where they also have a partnership with the Massive Open Online Course company Udacity to teach robotics to students via their nanodegree program.[6]

### 3.1.a. Case Study: eBay's Retail Revival Program

*Problem.* Today we see a widening economic gap between communities that prosper, and those that get left behind. In the United States, we see an increasing number of distressed cities that are disproportionately impacted by paradigm shifts like fossil to renewable energies or brick and mortar firms to online E-commerce shopping. These communities are generally suffering from high unemployment rates, high poverty, and a lack of economic opportunity.

*Actions Taken.* eBay identified disadvantaged communities and created a platform to help local entrepreneurs start and accelerate their business. eBay looked at the ecosystem of the entire

[6] (NVIDIA Deep Learning, AI, & HPC Classes & Workshops. (n.d.). Retrieved February 02, 2019).

community to create cohorts and partnered with selected cities to identify business owners in Ohio, Michigan, North Carolina, Nova Scotia, Canada, and Wolverhampton to help accelerate their economic opportunity online. As a leader in the e-commerce space, eBay knows how to optimize the construction of catalogues, the promotion of product listings, the classification of sellers, and the delivery and shipping process. All these activities are based on AI and ML and have fundamentally transformed the shopping and selling experience of customers around the world.

eBay´s customer service team is now reaching out to these local communities to teach them how to optimize the selling process and how to list their products so they can be easily found by potential buyers. ebay's experts also show them how to utilize algorithms to position themselves on a global level to extend their reach. In addition, the company's foundation is making local grants to help businesses implement lessons learned. ebay´s mantra is all about creating economic opportunity. This program is tightly aligned with the core philosophy and delivering promise to its customers.

*Results.* eBay was able to report a total of sixty-four participating companies that already reached £1million in sales on eBay. This represents resulted in a forty-one percent increase in sales for these businesses after only two months into the program.

*Transferable Lessons.* ebay presents a large cross functional network of internal and external stakeholders building deep relationships. The impact of the program was far broader than the cohorts involved. In many cases, eBay found that the ecosystem they built when working with these communities was far bigger than originally anticipated. Working with the major sellers led to working with congressmen, senators, thus building and extending the stakeholder network. The success of the program was a result of a huge cross functional effort –

both internally consisting of the CSR team, customer sales support, government relations, senior management; and externally including cities, Universities, and the government sector.

*Spirit of Intervention.* Donating money or simply distributing goods or services does not have a long term positive sustainable impact. What is really needed is an intervention that transfers skills and identifies owners that will assume ownership of the program. In the case of Akron, Ohio, the local University participated in the eBay training (train the trainers) and will pick up the curriculum to coach additional merchants going forward.

*Effective Training Tools.* Going forward, eBay will provide more one-on-one coaching for entrepreneurs, as it proofed more successful than broad-based communication vehicles such as podcasts or webinars.

### 3.2 AI Enhancing Healthcare

*Robotic Doctors.* AI is beginning to revolutionize the last frontier of healthcare as we know it. Technology empowered applications permeate throughout the entire healthcare system, from identifying illnesses to predicting diseases. This is automating the entire administrative cycle and managing patient´s medical records. These innovations bring significant cost savings. Accenture estimates that the top ten AI based health applications could result in medical expense savings of up to $150 billion for the United States by the year 2026. The top three applications from the findings from a study of 379 orthopedic surgery patients are (1) robot-assisted surgery ($40 billion), followed by (2) virtual nursing assistants ($20 billion) and (3) administrative welfare ($18 billion). AI-assisted robotic techniques resulted in a five-fold reduction in the complications compared to traditional operations that were carried out by human doctors without

aid. Furthermore, they learned that AI-assisted robotic surgery resulted in fewer complications and errors and could also shorten patients' length of stay in the hospital following surgery by 21 percent, and thus created $40 billion in annual savings. (Kalis, Collier, & Fu, 2018; How AI for healthcare can overcome obstacles and save lives, 2019, Retrieved February 02, 2019; Booth, 2018).

While still in its early stages, surgeries are beginning to be performed by *robo-docs*. Researchers from the University of Oxford have completed the first successful trial of robot-assisted retinal surgery during the summer 2018. The trial involved twelve patients with half of them randomly allocated robot-assisted surgery, and the other half to standard manual surgery to remove a membrane from the back of the eye. Using the robo-doc, the surgeon was able to perform the procedure with equal or better efficiency compared with the traditional manual approach. In the second phase of the trial, the team used the robo-doc to insert a fine needle under the retina to dissolve blood in three patients who had age-related macular degeneration. All experienced an improvement in their vision as a result. It is new partnerships like the one between Oxford University and Preceyes that are transforming the health sector by consistently achieving precision levels that are beyond human capabilities.

In China, a *robo-dentist* has autonomously implanted two new 3-D-printed teeth into a woman's mouth. The procedure, which appears to have made use of a robot arm from Universal Robotics, was developed by a team from the Fourth Military Medical University and Beihang University. The hardware first orients itself with the patient's head, and is then programmed with the procedure it needs to undertake. Initially it checks that if everything is correct before the patient is given an anesthetic and the robot begins drilling. The team says that the robot works to

tolerances of less than 0.3 millimeters, and can detect and compensate for movements of the person's head.

The robo-dentist's success will go a long way to support the development of other such robotics to reduce the number of issues that arise as a result of mishandled operations. Over the years, AI and robotic assistants have been used to aid dentists with other procedures, like root canal surgery and orthodontic operations as well as training students. In March, a dental assistant known as Yomi received approval from the U.S. Food and Drug Administration, which is also expected to improve the success of dental procedures (Leary, 2017).

Many health experts believe that AI will make healthcare more human again. By automating administrative tasks and standardizing patient pre and post testing doctors and nurses time will be freed up to spend more quality time with their patients. Paul Ellingstad (CSR expert, PTI Advisor) also expects that the quality and safety of AI based healthcare will improve while total costs of treatments will be reduced. AI will increase access to health services, early detection of diseases, and the ability to offer preventive treatments. For example, the early detection of Alzheimer´s disease long before the patient shows first symptoms of dementia. Researchers have discovered that AI based analysis of thousands of brain scans reveals slight signs of Alzheimer´s disease that human doctors were unable to spot in the past. While it is early days, this advancement in early diagnosis illustrates the promises of this new technology.[7]

With more and more data available, we will see rapid progress in the machines´ ability to predict future illnesses. Forecasts predict that the amount of healthcare data will double every

[7] Artificial_intelligence_in_healthcare_0119. (2019). Retrieved March 27, 2019, from http://www.aomrc.org.uk/reports-guidance/artificial-intelligence-in-healthcare/attachment/artificial_intelligence_in_healthcare_0119/

seventy-three days.[8] AI relies on this data including gender, age, medical history, DNA analysis, and more to recognize and find patters to perform analytics that are way beyond what human doctors could achieve in the same amount of time. Automating critical health services this way will enable society to provide better health services to more people including those living in rural areas that so far have had little or no access to good healthcare.

AI helps us already to stay fit and healthy. With fitness activity bands or smart watches, we can track our daily movements and check whether we are on track with the fitness goals we have set for ourselves. They help us monitor our sleep patterns and encourage a healthier lifestyle overall. These AI based tools are also useful to doctors and medical staff when combined with medical devices to remotely monitor people´s heart condition or their likelihood to be affected by a stroke. Many of these applications will benefit large numbers of people like the following example in China highlights.

In China, doctors may see as many as 200 patients each day, making time a precious commodity[9]. AI is being used to collect and advance information from patients to do basic pre-diagnoses, leading to shorter and more targeted consultations. AI-equipped virtual robots can also help with post-hospitalization follow-up by monitoring patients' blood sugar and other health indicators. This is a very good example of how companies like Alibaba, who are at the

[8] Densen, P. (2011). Challenges and opportunities facing medical education. Retrieved March 27, 2019, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3116346/

[9] Artificial_intelligence_in_healthcare_0119. (2019). Retrieved March 27, 2019, from http://www.aomrc.org.uk/reports-guidance/artificial-intelligence-in-healthcare/attachment/artificial_intelligence_in_healthcare_0119/

forefront of these AI based health services, can collaborate with rural communities to improve service levels and patient care.

Across the globe we will see new partnerships and collaborations in the health space to bundle knowledge and expertise to achieve major breakthroughs like curing cancer. IBM Watson Health announced two weeks ago that the company will invest $50Mio in a research collaboration with leading universities to advance the use of AI in healthcare. The project will focus on electronic medical records, access to services, patient safety, precision medicine and health equity. (Spanu, 2019; Hutman, 2019).

### 3.2.a. Case Study: Machine Learning Predicting Zika and Dengue Outbreaks in São Paulo

*Problem Statement.* South America has experienced unexpected outbreaks of arboviruses such as the Zika virus. In Brazil alone, 223,230 probable cases of Zika were reported between 2013 and 2015 with forty-eight percent of them being confirmed (Aguiar, Lorenz, Virginio, Suesdek., & Chiaravalloti-Neto, 2018). Looking specifically at Sao Paulo, there were also approximately 16,500 cases of dengue fever registered between 1991 and 2015. Increased levels of infestation due to rainfall are reflected in incidence rates of the disease. It is fundamental to know the epidemiology of dengue in medium-sized cities. Such information can be extended to diseases such as Zika, which are transmitted by the same vector and were reported in the city. [10]

*Actions Taken***.** In a unique partnership between Telefonica Brazil, the Epidemiological Surveillance Center (CVE), the Vector Control Authority (SUCEN) and Dalberg Data Insights (DDI), stakeholders came together to build a Zika and Dengue Surveillance Tool with advanced

[10] Ferreira, A., Neto, F. C., & Mondini, A. (2018, February 07). Dengue in Araraquara, state of São Paulo: Epidemiology, climate and Aedes aegypti infestation. Retrieved March 27, 2019, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5825120/

epidemiological model[11] which aids the Brazilian public health officials in optimizing targeted public safety information campaigns and resource allocation to areas most at risk for renewed disease outbreaks. This interactive online tool monitors the risk of renewed Zika and Dengue outbreaks across the State of São Paulo and provides the end user with dynamic maps of near-real-time anonymized, aggregated data that predicts the coming evolution of the diseases.

Every stakeholder brought critical elements of the solutions to the play:

- Telefonica contributed their constantly updated stream of call records.
- DDI analyzed human mobility through anonymized mobile phone usage. This told them how groups of people live, work, and how they move around – combining this information with disease incidence data, they were able to accurately predict upcoming outbreaks.
- SUCEN assessed the locations of new incidence reports and plans public health campaigns accordingly. They further collected and centralized disease incidence reports from local health facilities.
- CVE prevented the spread of mosquitos by running prevention and eradication campaigns (such as disinfecting buildings or evacuating standing water), using SUCEN's incidence data to prioritize their work.

[11] Dalberg Data Insights Predicts Zika and Dengue Outbreaks in São Paulo. (2018, June 1). Retrieved March 27, 2019, from http://www.dalberg.com/our-ideas/dalberg-data-insights-predicts-zika-and-dengue-outbreaks-sao-paulo

*Results.* District health officials in São Paulo now have valuable insights that allow them to:

- Act in prevention, where they used to work in response.
- Assess the impact of their actions in order to know how to invest their resources.
- Monitor the key parameters influencing disease incidence.

*Transferable Lessons.* In order to develop such an innovative and useful tool that illustrates how incidences and prevention campaigns are correlated over time you need to bring together a set of stakeholders from the private and public space to develop a sustainable solution. Applying machine learning algorithms takes a lot of data, therefore it is necessary to openly share databases and skills.

### 3.3 AI Improving Processes and Creating New Partnerships

In addition to transforming CSR programs and initiatives, AI and ML will help make the processes behind the flagship programs more efficient and impactful. This includes new and innovative ways to conduct materiality assessments, better ways to match grant donors and receivers, the optimization of fundraising, and new platforms to engage multiple and diverse stakeholders. However, achieving better results by bringing data together from different disciplines is challenging. Chris Wellise (Chief Sustainability Officer, HPE) sees tremendous opportunities here, but also warns that we must fundamentally change behavior to reap the benefits.

*"If we created a massive geospatial dashboard model of what´s happening on the planet. by utilizing data concerning the oceans, forests weather, natural disasters, and biodiversity, we could perform meaningful analyses to better understand the impact of our actions on the planet. At current, this is not happening though, at least not enough. We often have shutters on and just think about our own space (e.g. a biologist) could link data with an environmentalist, a physicist, or a geologist and find patterns and stuff we would not even be looking for."* - Chris Wellise (Chief Sustainability Officer, HPE)

*Hewlett-Packard Enterprise (HPE).* More and more companies hire consultancies and advisory firms to help them understand what is material to their operation and their future success. CEOs and business leaders are increasingly concerned about issues like climate change, human rights, universal access to education, and other issues that are highlighted in the seventeen Sustainable Development Goals (SDGs) agenda set by the United Nations. The SDGs utilize a holistic approach of leaving no one behind and development for all.[12] Some goals might pose risks to their companies; others might actually offer growth opportunities. There is a huge amount of data available on environmental, social, governance (ESG) topics, and oftentimes findings and recommendations in materiality assessments are already outdated by the time they get presented. For example, it is often difficult to keep track of changing or newly emerging regulations. As a result, firms might miss competitive movements or new technological developments that change the playing field. Hewlett-Packard Enterprise (HPE) therefore worked with the Irish company Polecat to scrub news, social media and other outlets to look at issues that could be material to HPE. The goal was to look for signals that could impact their business such as gender, climate change, and energy to use as a basis for their materiality report.

[12] #Envision2030: 17 goals to transform the world for persons with disabilities Enable. (2019). Retrieved March 27, 2019, from https://www.un.org/development/desa/disabilities/envision2030.html

*"We knew that to gain comprehensive, data driven insights into our materiality we needed to utilize an AI technology-based approach. Polecat is a data mining expert that knows how to identify stakeholders, scrub news from social media, and other relevant outlets to look at issues that could be material to HPE."* - Chris Wellise (Chief Sustainability Officer, HPE)

Polecat deploys advanced AI in their service offerings as they analyze thousands of relevant customer topics as well as score up to 30 million global media and social posts every day.[13] Combining the results of their unstructured data analysis with more structured data like traditional stakeholder interviews, as well as qualitative and quantitative assessments, make the assessments more robust. Using AI empowered technology in this context not only produces tangible results, but if handled properly, it can also eliminate or reduce human bias in the materiality assessment. In addition, they deliver faster results that can be continuously updated. Bringing together new stakeholders and combining data pools across domains renders more reliable and actionable results for companies going forward.

*Grant Selection Process.* A commonly shared challenge faced by corporations and foundations is the huge number of grant requests they receive every year from different stakeholders. Although they have utilized technology and database management tools to sort through all the submissions, this still is a very time-consuming effort. AI could transform this space the same way it has transformed the hiring process in major corporations. Optimized AI based processes have significantly reduced the operational burden in the human resource recruitment sector by automating low level tasks and providing better information for decision

[13] Reputation Management Software | Polecat. (2019). Retrieved March 9, 2019).

makers. From scheduling interviews to saving time by automatically finding and ranking candidates, they can deliver immediate value to the company (Seseri, 2018).

Similar to the intelligence applied in online matching or dating services, AI can connect private, family or company foundations to those that seek funding or grants. With optimized grant applicant tracking systems they gain real time insights into the applicants´ specific ideas, motivations, causes, geographical data, expected impact information and other data points to analyze and prioritize the thousands of requests they receive online for their grant program. Nate Hurst (Chief Social Impact Officer, HP) believes that as foundations use these increasingly complex technology applications, they can expect to save valuable time, get better matches, and gain additional insights into future applications through predictive analysis.

*Fundraising.* Fundraising is an important tool for non-profits, education institutions, and multinational foundations to raise the necessary capital to run their day-to-day operations. The success of these efforts depends heavily on how well they know their current and potential donors and their respective motivations. Depending on the size of the donations, the outreach activities range from broad efforts, like mass mailings, to very targeted endeavors, like one-to-one engagements with potential givers. Overall, the process is very tedious and time consuming. There are AI tools available, like popular wealth screening applications, that render predictive insights, but they do not yet provide a holistic approach.

AI can transform this process by using the same techniques in analyzing big data that we know from using Amazon or Netflix for relevant and personalized content, thus making the entire donation process more personal and insightful. Better understanding their potential donors´ passions and interests over a period of time is critical for foundations if they want to remain relevant and worth the investment to the donor. Before approaching key prospects, AI based

systems can make recommendations in priority order of what they are most likely interested in. New companies, like Gravyty, now offer comprehensive services from identifying the best donors at the right time to providing communication vehicles that learn and adapt to your personal style over time. A once very complex process is now easy to use and more effective.

Another example of a company that offers AI based matching services for fundraising purposes is Salesforce. Salesforce is known as a leader in customer relationship management (CRM). Benioff, CEO Salesforce, says "*the business of business is improving the state of the world."* Closely aligned with their business strategy, Salesforce looks for ways to transfer their applications and skills to create social value. In this effort, they have introduced a system called Einstein Prediction Builder, allowing users to create targeted AI models using a person´s giving or volunteering history, interests, relationships as well as data from wealth screening tools. This predicts outcomes, like a donor´s likelihood to give. The tool is very flexible allows for a variety of analyses depending on the specific interest of the user. The predictive insights they gain can help them better guide their marketing campaigns by focusing on areas that are of specific interest to a potential donor (E-book: AI for Good, 2018. Retrieved March 9, 2019).

Combining CRM data hosted in databases with AI algorithms like those offered by Gravyty, will reinvent the way fundraising is done. Foundations, universities, and other organizations that depend on successful fundraising campaigns, will be able to combine their customer relationship data to identify prospective donors and drive engagement with these potential givers. In an experiment, Salesforce applied AI to the CRM data they tested the assumption that within their 54,000 contacts there are many that were currently not on the college´s radar, but that should be assigned and pursued. The project is not designed to replace the fundraising team, but to augment their efforts by gaining additional insights into how their

ambitious goals can be reached. Ideally, the team members learn how to use AI based analysis to identify new donors, build relationships with them, and optimize their communications tools. The returns include a motivational push to energize the team and teach them how to aspire to even higher-level goals (Higher Education Fundraising with Artificial Intelligence, 2018, Retrieved March 9, 2019).

*Digital Social Innovation.* Digital labor platforms are disrupting how work actually gets done today. These new marketplaces have the potential to appeal to their current and future clients by being more than just global platforms that match demand for professional services with corresponding supply. They could expand their mission to include the creation of positive societal impact in addition to business impact. Online platforms could first work with leading companies and non-profits to define innovative flagship initiatives aligned with their overall company strategy. Next, they could break them into smaller tasks so that their user base can sign up for areas where they have specific expertise.

Common values and a shared purpose can also help the platforms to attract new clients. This is especially important for Generation Y and Generation Z, two generations that have clearly stated that they are looking to work with organizations that share their values and actively support social causes. Whilst crowd platforms have been around for a while, they have not been very public about their core values and beliefs. This is quite different from traditional corporations that have understood the role corporate social responsibility plays when it comes to attracting and retaining young talent. In her book, the *2020 Workplace*, Jeanne Meister talks

about focusing on the triple bottom line (e.g. people, planet, profit) as the way organizations attract and retain new hires.[14] This could be a major differentiator for platforms going forward.

Many people are ready and willing to engage in social projects but are not sure how to get started. According to a Deloitte survey, while Millennials feel accountable for many issues in both the workplace and the wider world, it is primarily in and via the workplace that they feel ablest to make an impact. If employers help them to be involved with good causes at the local level, they provide millennials with a greater feeling of influence.

By tapping into the talents of the crowd and bundling their energies and contributions, these marketplace platforms can set their goals for social impact quite high. Many crowdsourcing activities today have demonstrated the power of the intelligence of the crowd. With so many different talents on the platforms, the chosen initiatives could benefit from a vast amount of experience and knowledge from users all around the world. And finally, it would enable the platforms to act as catalysts for positive community impact anywhere in the world. It's a great way to combine technology with human talent to tackle some of the bigger societal issues.

### 3.3.a. Case Study: Smart Citizen Kit

*Problem Statement.* An increasing amount of people are moving from rural areas to the cities. It is estimated that seventy percent of the world's population will live in cities by the year 2050 (ITU, 2015). How do we prepare for this urban population explosion by 2050? The ongoing trend towards smart cities illustrates the sense of urgency city-planners have when

[14]Meister, 2019. Jeanne Meister. Retrieved March 9, 2019.

designing future urban areas with a focus on the wellbeing of their citizens. City-planners are building structures that are resource and energy efficient. Examples include autonomous transport systems and innovative water and waste systems. Many cities are collaborating on sharing findings and best practices with each other and even are turning to their citizens for input on how to best improve urban spaces. Thus, digital engagement platforms are needed to accommodate the growing number of engaged and concerned citizens.

*Actions Taken.* Smart Citizen Kit[15] is an open digital platform that connects citizens with their local communities including developers, researchers, citizen science, universities and other stakeholders. The platform was developed by the Fab Lab Barcelona, the Institute for Advanced Architecture of Catalonia, and crowdfunded via the Goteo and Kickstarter crowdfunding platforms. Smart Citizen Kit provides technological tools that can solve environmental problems such as noise and air pollution. The Smart Citizen Kit project is using open source technologies (e.g. open hardware, software, and data) to share environmental information that was gathered by citizens on the Smart Citizen platform.

*Results.* The result of Smart Citizen Kit is a healthier environment for all stakeholders. The first tangible project outcome was a low-cost set of tools equipped with sensors that enable citizens to collect environmental data on key parameters like sound intensity, temperature, and concentrations of carbon dioxide. This captured data is then transmitted to the microcontroller then to the antenna to share it with the world. The Kit is built on an open hardware platform

[15] Smart Citizen: A Kit and Platform Which Engages Citizens in Solving Local Environmental Problems. (2019). Retrieved March 27, 2019, from https://digitalsocial.eu/case-study/9/smart-citizen

where users can adapt and further develop it with their own sensor boards to measure other additional environmental data points. Shortly after project introduction, the Barcelona Fab Lab had produced over 1,000 Smart Citizen Kits that generated over 300 Million data points.

*Transferable Lessons.* The future is open, collaborative, and diverse. It is about bringing many different stakeholders together and enabling them with open platforms so they can produce unexpected results. This project was designed to improve environmental parameters, but the project leads found the empowerment of citizens to design citizen-led solutions just as important. Providing stakeholders with the proper tools to request more transparency and accountability from government and other institutions really created new social connections. The network is growing in many respects. Universities in London and Glasgow utilize the datasets and so do city authorities like those in Kosovo, Amsterdam, Manchester, and Barcelona. The project also extends to include children, so they learn from an early age about the power of active engagement coupled with innovative technology. Exposing them to concepts like temperature, light sensors, computational analysis, and interdisciplinary partnerships involves them at an early stage in developing citizen led solutions to the most pressing issues that societies face.

### 3.4 Green AI Governance Processes

For a company to reduce its energy bill is not only good for the financial bottom line, it also reduces its environmental carbon footprint. In 2013, HP was the first company to fully disclose their carbon footprint, all the way from their supplier base to their products in use. Tracking their emissions allowed the company to drive targeted approaches to reduce their energy use. In relation, Google used the capabilities of their subsidiary DeepMind to apply an

algorithm that learns how to optimize the cooling systems in their data centers.[16] The algorithm made recommendations to the data center managers and based on their decisions Google was able to reduce the energy use of their datacenter cooling systems by about forty percent. However, deploying this augmented system was not enough. in the meantime. Google has given full control to the algorithm to manage the cooling system on its own.

AI is being applied by energy companies to reduce their environmental footprint in many different ways. Xcel Energy, for example, is a leader in responsible business practices as they use AI in reducing not only their carbon emissions but also deploying neural networks to adjust their plant operations to reduce nitrous oxide emissions which is a dangerous greenhouse gas that contributes to global warming. Xcel also makes considerable efforts in powering their business using clean energy sources such as wind and solar which are natural resources that are erratic in nature and difficult to predict.[17] Again, an area where AI and ML can also help companies to mitigate the risk by improving their forecasts and reducing their margin of error.

To address the issue of intermittency and forecasting error, Xcel Energy has partnered with the National Center for Atmospheric Research (NCAR) to utilize machine learning to provide more accurate wind forecasts, reducing the margin of error. Xcel´s massive amount of data paired with NCAR´s AI techniques have rendered impressive results as they were able to decrease the forecast margin of error by 40 percent and reduce end user costs by $6o million.[18] The new process saved a quarter of a million tons of carbon emissions per year through higher

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[16] Google just gave control over data center cooling to an AI. Retrieved March 9, 2019; Graham, 2017, July 19. Coal-fired power plants getting brains to reduce CO2 emissions. Retrieved March 9, 2019.

[17] Gbadamosi, 2018, February 19. How Artificial Intelligence Affects Sustainability. Retrieved March 9, 2019.

[18] Xcel Energy – Utilizing Machine Learning to Efficiently and Reliably Incorporate Renewable Energy into the U.S. Energy Grid. (2018). Retrieved March 9, 2019).

renewable energy utilization and less re-dispatching of conventional coal and gas generation. Clearly, applying AI based solutions to environmental issues is a game changer and we are just at the beginning of discovering what is possible.

### 3.4.a Case Study: Nisqually River Foundation partners with Gramener and Microsoft AI for Earth

*Problem Statement.* To better protect biodiversity, we need innovative interdisciplinary partnerships that combine science, technology, and expertise. This mixing would significantly improve the speed and accuracy of data analysis when addressing the world´s most complex environmental challenges. For example, to better measure and monitor fish species present in the Nisqually River, the Nisqually Indian tribe received support from the Nisqually River Foundation, a Washington based nature conservation agency. The foundation installed video cameras and infrared sensors in strategically located places around the river that produced approximately 3000 videos. Viewing and analyzing such a huge amount of data captured by cameras or sensors takes a lot of time, involves many people, and is very cost intensive. These are repetitive tasks that could be automated for more accurate and real time results.

*Actions Taken.* The foundation subsequently engaged in a multi stakeholder collaboration to come up with an AI driven solution for fish identification. By partnering with Gramener, a data visualization and data analytics company and the Microsoft AI for Earth program, the team built a web app leveraging deep learning algorithms from Microsoft that was able to capture the video material, automate the detection and identification of fish species and classify the species. They used a Graphics Processing Unit machine to run the deep learning object detection models which are trained to detect the fish and accurately identify the species within the video frames. Microsoft Azure was chosen as the appropriate cloud solution featuring ML capabilities. The

final object detection algorithm chosen was a YOLO V3 video detection algorithm which stands for "you only look once" and is a state-of-the-art, real-time object detection system. The Microsoft solution also supported processing the videos and tagging the fish which used to take up an incredible amount of time. Subsequently this information was then used to train a model using Microsoft Cognitive Toolkit. In order to increase the speed of the enhanced process the Gramener data analytics company moved to video object detection and provided a faster solution with real time capabilities.

*Results.* An enhanced version of the solution has just been rolled out recently and it is predicted to deliver a nearly five times increase in speed of species determination. What would previously take more than one hundred hours in a year could be reduced to about twenty hours of analysis time. The web-based AI solution is projected to save not only valuable time of expert biologists but also infrastructure costs for manually viewing videos. The solution is projected to deliver the Nisqually River Foundation savings of up to eighty percent. Gramener reports that the project was able to augment fish identification by seventy-three percent accuracy through Deep Learning AI models.[19]

*Transferable Lessons.* It takes interdisciplinary teams to share experience and transfer knowledge to advance biodiversity challenges like the one faced by the Nisqually River Foundation. In this case, they shared the local expertise of the Nisqually Indian Tribe and the Nisqually River Foundation and augmented it with technological expertise and technology platforms and applications provided by Microsoft and Gramener to speed up a very inefficient

[19] Gramener: Insights as Sotries . (2019). *Gramener*. Retrieved from https://gramener.com/case-nisqually)

and cumbersome process.[20] This AI based solution can be transferred to many other challenges we face in biodiversity or protecting our environment.

### 3.5 Data is the New Oil

Never before in the history of mankind has there been so much data. Over ninety percent of the world´s data was created in the last two years, and it continues to grow at an exponential speed through the use of smartphones, sensors, and other technological devices that capture more and more data. However, unauthorized data collection interferes with our privacy rights and often times users who participate in the digital economy do not fully comprehend how much of their personal data they are sharing. Big market players like Amazon and Google collect and store user personal data, analyze it, and often share it without consent. Governments around the world are now increasingly protecting their citizens´ personal data by issuing regulations like the General Data Protection Rights (GDPR) in the European Union.

While protecting the integrity of people and their data, firms need to find ways to combine databases across discipline and domain. Data does not drive outcomes, insights turned into action does. So, what does this mean for the future of CSR? If leaders in businesses, governments, and non-profits agree to share their data, it can feed algorithms that aim to create operational and transformational benefits in all ESG related areas. This will redefine the way business gets done. We are entering a new phase of social responsibility, one that is truly shared

[20] Microsoft: Gramener Case Study. (2019). Retrieved January 27, 2019, from https://partner.microsoft.com/en-us/case-studies/gramener.

by a variety and a growing number of stakeholders that are all contributing various resources to tackle the societal challenges we are facing today.

# CHAPTER 4
# AMPLIFYING TECHNOLOGY ENABLED CSR FOR SUSTAINABILITY

We are living in times of exponential change where AI is disrupting the entire value chain. Technology empowered CSR is redefining firm strategy by creating new and innovative tailor-made initiatives from project concept to the design, management, and measurement. Managers now can operationalize CSR via embedded algorithms that assist in the selection of the best partners for international businesses by matching according to a predefined set of dimensions, like geographic coverage, skills, and talent. Figure 6 demonstrates how CSR empowered technology will promote change over time. We see firms engaging in an array of diverse partnerships causing profound changes in ecosystems. As a result of programs using technology to augment lifecycles this allows the open access of knowledge and skills resulting in a radically open exchange and finally an all-encompassing inclusion of stakeholders.

-----INSERT FIGURE 6 ABOUT HERE-----

Executives can no longer rely on past stagnant and linear guidelines to drive incremental change. They must embrace ambiguity, act fast and be willing to disrupt their current business models. CSR empowered technology presents a major disruption of how social programs used to be implemented in the past and innovate new ways to embed social responsibility into the fabric of the organization. In accordance, we present a four step proactive agenda in Figure 7 for practitioners to implement massive changes through open source data sharing, collaboration across disciplines, and suggest new partnerships between organizations of all sizes with local governments and NGOs. Step one recommends that businesses ought to establish the purpose

and objectives to create business and social value to drive sustainable growth, exceed customer expectations, achieve true costs efficiency, and reduce external risks. Step 2 suggests how business can augment their capabilities with technology to improve impact, execute programs and identify a suitable internal and external ecosystem. For all of this to be successful, firms must look forward to Step 3 for open frameworks and data sharing across domains for a radical new approach to business. For this to be sustainable, managers must be refined their ecosystems as visualized in Step 4 in terms of a relationships between the environment, community, firm, and technology.

-----INSERT FIGURE 7 ABOUT HERE-----

Advancing business for the health of society is interconnected with technology and innovation. An educated community with increased purchasing power creates a new demand for products. Previously, a successful firm was dependent upon positive financial returns that only includes short-term benefits. As consumers become more interconnected, competition is intensified as firms are held to a greater accountability. Firms are no longer seen as local entities but are global actors that have the ability to make major changes on society and the environment as a whole.

Our world faces difficult challenges, including climate change, inadequate access to quality education, economic and gender inequalities, and unfair labor practices. The failure to meet fundamental social and environmental needs has weakened value chains and as a result, financial growth. Firms that create economic gains linked with social value are redefining

productivity and building supportive industry clusters. Managers need a new framework to account for these needs. Figure 8 shows how firms must redefine stakeholder members and how they access and share information. This also requires a process of outreach and organizational efficiency through open communication, sharing information, and more efficient resource use.

-----INSERT FIGURE 8 ABOUT HERE-----

There are seven elements to makes CSR succeed through technology. First, managers need to ensure that CSR is embedded within the company strategy, and that it permeates throughout the entire organization. CSR has specific key performance indicators and to be properly measured, it must be operationalized throughout the entire value chain. Second, define what the company will do to live up to a technology empowered CSR strategy. Third, a comprehensive CSR strategy identifies clear goals for the supply chain, operations, and the customers. Define new partnerships to deliver against these goals. This involves identifying what new technologies will enable this strategy, what new skills are needed to deliver against the strategy, and which new partners are needed. This could include new stakeholders that have not been part of the ecosystem before. Fourth, train employees so they can support the strategy and enhance morale. This is similar to standards of business conduct training where all employees are trained on how to embed environmental, social and governance principles in everything they do.. Fifth, review progress at business meetings and define proper KPIs that are measured regularly. Sixth, make it part of the firm narrative when communicating about the firm´s activities internally and externally. Lastly, encouragement through senior leadership. CSR begins

with the board and in the C-suite, if executives don't see the importance in social and environmental initiatives, neither will inside and outside stakeholders.

-----INSERT FIGURE 9 ABOUT HERE-----

### 4.1 Exponential Behavior Driving CSR

Exponential change requires leadership that all begins with a mindset that is open to doing things differently, embracing ambiguity, and ready to trying new things. This requires technological platforms in business that embed CSR. Thinking needs to be more dynamic so that knowledge is free flowing and available to new and old stakeholders. Also, global citizens are no longer just bystanders waiting for governments and companies to shape their future, but actively participating in movements for social change. This will facilitate asset transfer and the of sharing knowledge and skills across communities. A good example is the *Fridays for Future* movement created by 16 year old Swedish activist Greta Thunberg who protested last year in front of the Swedish Parliament against the government´s inability to properly respond to climate change. To gain public attention, Greta Thunberg subsequently called for her fellow students around the world to walk out of their classrooms every Friday to force those in power to start acting responsibly. Meanwhile she has active followers in over 100 countries. (https://www.theguardian.com/education/2019/mar/14/youth-climate-strikes-to-take-place-in-almost-100-countries-greta-thunberg)

CSR needs to cover all levels and domains of business and society. Our findings demonstrate that technology has thus far been underutilized in international business that can reduce the liability of foreignness for MNEs. The creation of shared value through better relationships with suppliers and other stakeholders improves productivity and flexibility and limits unforeseen costs and risks. Our study has demonstrated that collaboration is necessary, and AI is already bringing different domains together for radical changes. Data presents vast amounts of opportunities in the realm of technology and the social spheres. As technology continues to shift economic and societal priorities, firms must adapt to this change by fulfilling unmet needs that prompt innovation. Investing in technology facilitates improvements to the environment, social outreach, and creates efficiencies and quality, thereby increasing financial gains.

As technology is changing how firms conduct business and attract new customers, firms need to consider their environmental and social output. As a result, a growing number of firms are integrating a circular economy model to eliminate waste and generate maximum value. The world is at an inflection point in the midst of a transition to a future that takes on a dramatically different shape from what is known know today. While previous industrial revolutions have severely disrupted societies before, humankind never had to deal with so many profound changes at such an incredible rate. Everything gets digitized and can subsequently be described in zeros and ones, thus entering an exponential growth curve which at first grows deceptively slowly and then takes off in ways we tend to greatly underestimate. These sweeping changes affect all industries, all economies and all institutions, private or public. It is not only government and the non-profit sector that are slow to adapt to the new realities. Many corporations and smaller businesses are also late in facing up to the new ways business now gets done. Products are being replaced by digital services like music streaming replacing physical music. Smartphones are

offering applications and functionalities that used to be offered by a variety of physical products like cameras, Global Positioning Systems (GPS), voice recorders, and more.

-----INSERT FIGURE 10 ABOUT HERE-----

All these rapid changes also remind us that progress comes at a prize. We are currently using more resources than our planet can replenish each year. This is not sustainable. Climate change is upon us, the oceans are warming, the glaciers disappearing and the earth´s average surface temperature has risen about 1.62 degrees Fahrenheit since the late 19th century, a change driven largely by increased carbon dioxide and other human-made emissions into the atmosphere.[21] Furthermore, the 2018 UN Update Report on the state of the SDGs found that "conflict and climate change were major contributing factors leading to growing numbers of people facing hunger and forced displacement, as well as curtailing progress towards universal access to basic water and sanitation services"[22]

[21] NASA. (2019, March 26). Climate change evidence: How do we know? Retrieved March 27, 2019, from https://climate.nasa.gov/evidence/.

[22] SDG Progress Report - United Nations Sustainable Development. (2018). Retrieved June 27, 2019, from https://www.un.org/sustainabledevelopment/progress-report.

While we still have a long way to go to achieve the seventeen SDGs, we face additional headwind. Forecasts indicate that societies will get disrupted due to the fact that many jobs will be lost to robots and automation in the coming years and while the numbers and projections differ, we know that society needs to rethink the social contracts between the public and the private sector. Corporations will need to find ways to share expertise and transfer knowledge and technology to the communities where they operate. It will take the collaboration of leading-edge teams from many different sectors to develop sustainable solutions as those described.

This research illustrates the many ways in which humans and machines can collaborate and augment each other to drive real progress. The rules of how business gets done are changing as well as how the public and the private sector work together to support healthy societies. If firms want to take advantage of the new innovative technology platforms, we must first and foremost change our behavior and thinking. As illustrated in this study, we have to move from linear thinking to exponential thinking, from defined stakeholders and partners, to the world as our sandbox, and from closed and proprietary mechanisms, to open platforms through AI.

AI as a facilitator that will support the global community in achieving sustainability. We see increasing investments in AI to address issues such as climate change, poverty, scarce resources, and more. While we expect many breakthrough innovations in this space, we also need to concern ourselves with potential risks that come with the progress. There is much concern over system security, data privacy, data integrity, human rights and potential job loss. In order to address these concerns in a collaborative effort, companies, think tanks, and other public and private institutions are coming together to form new coalitions.

Partnership on AI was established by companies like Google, Amazon, Deutsche Telekom, McKinsey, and Accenture with non-profit organizations like Unicef, Xprice, and Future of Life. It includes over eighty organizations that aim to educate the public about the implications of AI, to ensure AI applications serves the greater good, and to share best practices on AI technologies. In order to achieve these goals, they engage a variety of very different stakeholders, conduct research and in-depth studies to prepare learning materials that can be shared with the public. Focus areas include safety critical AI, fair and transparent AI, collaborations between people and AI systems, and the social and societal influences AI for social good.[23]

Given the wide set of concerns around the future of AI, we see different kind of alliances on the rise. The AI Now Institute for example focuses on rights, automated labor, bias and inclusion and safety. The AI Ethics lab represents a collaboration across many domains including researchers and the corporate sectors to identify and solve ethical design issues in AI. As the name implies, the AI4ALL group focuses on increasing diversity and inclusion in the space. Open AI offers free software for training, benchmarking and experimenting with AI thus enabling different stakeholder to share tools and knowledge to create a long-term path to safe AI when we reach the age of general AI. Others like the Future of Life Institute support developments that will benefit society at large also by reducing risks from nuclear weapons and biotechnology.[24]

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[23] The Partnership on AI. (2019). Retrieved March 9, 2019, from https://www.partnershiponai.org/

[24] Dand, M. (2018, September 27). 12 Organizations Saving Humanity from the Dark Side of AI. Retrieved March 9, 2019).

Many managers have not yet realized that technology is an agent for sustainability and can create a leaner and more flexible business. Automation is changing the world of sustainable development due to technological change in robotics and digital communities (Norton, 2017). As humans and technology are more and more interconnected, the next wave of innovation will create new opportunities for many disadvantaged humans as more firms are stepping up to take responsibility for their communities. Technology and innovation have the potential to enhance environmental progress from such processes in renewable energy to public transportation systems to build sustainable business. Looking ahead and considering that technology is transforming the way the world works, we expect people to increasingly use AI and ML to create their own business opportunities. It is likely that the majority of these entrepreneurs are part of the millennial generation, that has shown to be more engaged in social causes. There is an untapped opportunity for technology to unite this new workforce for social good.

### 4.2 Limitations and Future Research

This study has looked at promising first steps in this direction but has not yet included quantitative analysis to assess the potential of applying AI and especially ML technology to CSR. It demonstrates how technology is making its way into CSR practices of companies, non-profits, and governments. Processes like employee volunteering initiatives and fundraising are being automated as firms are increasingly using online platforms to collaborate with interested parties in improving the state of the world. Technology empowered CSR is still in its beginning stages. There are further opportunities for the discussion of potential opportunities in areas like global healthcare, education, and/or environmental progress. The aforementioned interviews with key social innovation experts have confirmed this hypothesis. This study has looked at promising

first steps in this direction, but is limited as it has not yet included quantitative analysis to assess the potential of applying AI and especially ML technology to CSR. A quantitative analysis in this context has the opportunity to, for the first time, completely quantify CSR, thus making better business and a better world.

Given the speed of technological progress, we assume that the CSR space is being disrupted like any other industry. Companies that have embedded ESG indicators into the core of their business strategy will be early movers, as AI is currently transforming the way business is done. Future research will be best guided by working with firms and examining how they do business in regard to ethics, employee treatment, resource protection, and the strategic use of AI for CSR. Guided by the philosophy that a firm´s purpose is to provide social and environmental value, in addition to shareholder value, these companies will set examples on how AI is transforming the CSR space. This includes B-corporations, which are businesses that meet the highest standards of verified social and environmental performance, public transparency, and legal accountability to balance profit and purpose. B-corps are accelerating a global culture shift to redefine success in business and build a more inclusive and sustainable economy."[25] It will also include forward looking corporations that embrace the concept of a circular economy, like HP. "By design, a circular economy is one that is restorative and regenerative, and aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles." [26]

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[25] About B Corps. (2019). Retrieved March 27, 2019, from https://bcorporation.eu/about-b-corps

[26] Towards the Circular Economy. (2014). Retrieved January 27, 2019, from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Towards-the-circular-economy-volume-3.pdf

For HP, the idea of the circular economy translates into their design for the environment that covers everything from material selection, material sourcing, production, product use all the way to product disposal.[27] Learnings from the latter then get applied to the design phase again to neutralize the environmental impact of their product offering. Hurst explained that HP focuses on three core areas here: energy efficiency, material innovation, and design for recyclability. It is companies like HP that will likely be the frontrunners when it comes to applying AI and ML to all their ESG related programs and initiatives because those are part of the business cycle of the firm. Rather than complementing the business activities, these firms embed CSR in everything they do. How they manage their supply chain, how they manufacture, go to market, distribute. and how they recycle and dispose of materials, that in the past were considered waste. It would be interesting to run data-based pilot initiatives with forward thinking corporate organizations and other stakeholders to explore how innovative technologies like AI and ML can revolutionize the way social and environmental concerns are best addressed in the future. This could help produce blueprints for firms to follow.

[27] HP Pledges to Make Every Page Printed Forest Positive, Carbon Neutral and Part of a Circular Economy. (2019). Retrieved December 27, 2018, from https://press.ext.hp.com/us/en/press-releases/2019/hp-pledges-to-making-every-page-printed-forest-positive.html

# CHAPTER 5
# RELATIONSHIP BETWEEN CSR AND MNE PERFORMANCE: A DISAGGREGATED APPROACH

## 5.1 Deliberate CSR for Tangible Returns

Standards and measures of corporate social responsibility (CSR) differ across time, industry, and country. Firm investment and marketing of CSR has thus far been unquantifiable in terms of pecuniary returns as efforts in extant research have been incomplete and inadequate in regard to measuring the direct impact of CSR. In spite of this, stakeholders are demanding more from multinational enterprises (MNEs) in terms of CSR projects and their effect on local communities and the global environment. Current research shows that MNEs are increasingly investing in social responsibility initiatives to increase their legitimacy, credibility, reputation, as well as differentiate themselves from competitors. Thus, many firms are engaging in various types of CSR performance to appeal to consumer preferences for ethical and sustainable products. We define CSR performance as "the principles, practices, and outcomes of businesses' relationships with people, organizations, institutions, communities, societies, and the earth in terms of the deliberate actions of businesses toward these stakeholders as well as the unintended externalities of business activity" (Wood, 2016, 1).

To satisfy stakeholder demands and attract and retain investors, MNEs have turned to environmental, social, and governance (ESG) indicators to publicly communicate the ethical impact of an investment. CSR reporting is becoming the global standard to build trust with stakeholders and increase transparency considering the positive and negative externalities of doing business (UNCTAD, 2011). In spite of all of this, the effects of investing firm resources into CSR activities has often been shortsighted in terms of the effect on investor behavior and

firm performance. While some research has examined the direct effects of CSR investment, there are still under investigated questions regarding if certain industries benefit more or less from investment in particular ESG indicators. The principal contribution of this study is to explore how CSR is a multifaceted construct with tangible benefits that have not yet been clearly defined in previous studies. This research also combines our knowledge of past CSR research to look at how companies and investors respond to socially responsible practices due to differences in host country regulatory environments, demographics, and economics which influence investor and consumer decision making. We posit that examining the moderating role of CSR is beneficial to MNEs when choosing where to best invest firm resources for the greatest tangible returns on investment.

MNE credibility predicts customer loyalty across markets and is mediated by institutional differences that influence the relationship between CSR and the firm. Credibility is defined as the validity of a message focused on establishing a match between the intent of a message and the interpretation of that message by stakeholders (Sinkovics, 2008). Extant studies have shown that the validity of a CSR activity and message affects buyer behavior and consumer loyalty toward the firm. Loyalty is defined as the intention and readiness to buy a product by establishing a good relationship with a firm and is a notable predictor of business success (Park, Kim, & Kwon, 2017). Thus, the higher the credibility of a marketing message, the greater the loyalty of its stakeholders. MNEs play a special role in home and host countries due to their global influence (A. Kolk & Van Tulder, 2010). Previous studies have revealed the negative impact that MNEs have in the foreign markets in which they operate and the potential damaging effects on the social welfare and natural environment are due to inadequate safety standards, child labor employment, and pollution (Oetzel & Doh, 2009). However, others have suggested a

more positive view. Specifically, that MNEs have the ability to promote good business practices by raising local standards. There is a notable trend in the increasing importance of using sustainable practices to fundamentally strengthen business (Malnight, Keys, & van der Graaf, 2009). Extant research supposes that firm investment in sustainable and social responsibility does not have an effect on shareholder wealth. Furthermore, it is widely believed in the finance literature that investors do not believe that customer satisfaction has an effect on stock returns. In addition, customer satisfaction has not been shown to move stock prices and there has not been an immediate response to changes in investment behavior (Fornell et.al 2006; Ittner and Larker, 1998). Many studies lack the empirical examination of the long-term effects of CSR; thus, we contribute to present literature by presenting a longitudinal analysis of CSR and the outcomes of such firm investments and predict that a firm's value will increase as investment in CSR increases over time in relation to distinct industries and ESG indicators.

Our goal in this study is to examine a strategic sustainable business approach that enables a firm to gain a competitive advantage that is economically profitable, law abiding, ethical, and socially supportive (Caroll, 1999). Firms engage in many types of sustainability and social responsibility to strengthen relationships with stakeholders. CSR activities that go beyond the basic regulatory standards and advocate for an ecological balance throughout the history, legacy, and culture of the business. Firms across industries share a common difficulty is assessing the tangible returns that CSR activities create for material returns and the communities in which it operates through the lens of institutional theory.

This paper investigates CSR and firm risk by looking at secondary financial data. We examine the impact of CSR on risk by utilizing financial data of firms that are neutral in CSR

activities to companies that are excelling (or failing) across forty-seven industries. We empirically examine if total firm risk and stock market volatility is mitigated when firms invest in CSR activities; or if it in fact it has a negative impact on stock market value. The results of this investigation show if certain investments in, particular ESG indictors drives stock market value. We also compare companies that are most like one another in relation to stock market and CSR investment.

The remaining of this essay is organized in the following way. First, we examine the difficulty of quantifying CSR in extant research. This is a huge problem in business. We are not the first to address this issue. Our solution addresses these features on reasons why it is difficult to measure the financial returns of CSR. There are confounding drivers and variables of performance. For example, we cannot say reputation is increased solely due to investment in CSR. Next, we present the theoretical background of the study and present our hypotheses. We then describe the research methodology and the results of the empirical study followed by the contributions, limitations and future research directions.

### 5.2 MNE's Observational Error in Measuring CSR

The context of this study examines MNEs since they operate on a global scale with goods or services in one or more country, other than the home market. MNEs manage processes through various legal jurisdictions and social norms, thus presenting a challenge in remaining socially responsible and financially stable on a global scale. The notion of CSR is related to ethical and moral issues concerning decision-making and behavior (Branco & Rodrigues, 2006). MNEs encounter intricate challenges when entering a foreign market due to the need to adapt to local, cultural, economic, institutional and geographic conditions (Dahan, Doh, Oetzel, & Yaziji, 2010).

International business ethics can be problematic for MNEs due to differences in norms and business practices in an array of foreign markets. MNEs must navigate through political labyrinths by choosing whether or not to adopt certain cultural and ethical norms. The corporate dilemma set before the company is to decide how to successfully follow ethical business practices while also increasing financial gains. MNEs walk a fine line between the decision to follow local business practices, that may be easier to profit from but morally wrong (e.g. sweatshop labor, bribery, corruption, and environmental resource degradation); or practice sustainable development that may have a null or small effect on the bottom line.

De George (1993) proposed the following ethical guidelines for MNEs operating in less developed countries: avoiding harm, doing good, respecting human rights, respecting the local culture, cooperating with just governments and institutions, accepting consequences for one's actions, and making hazardous plants and technologies safe. However, adopting these practices may risk a loss in competitive advantage if the company is unable to sustainably implement CSR initiatives. Hence, MNEs must piece together the puzzle of how to execute socially responsibly corporate practices while utilizing a competitive corporate strategy.

We suggest a CSR strategic business approach enables a MNE to gain a competitive advantage in such a way that is collectively economically profitable, law abiding, ethical, and socially supportive (Caroll, 1999). There is much deliberation if it is the choice to implement CSR practices or a result of societal pressure, or due to a passing fad. Nonetheless, there is a notable increasing importance of using sustainable practices to fundamentally strengthen business and social issues (Malnight, Keys, & van der Graaf, 2009). When CSR is implemented into a company's strategy it enables it to reach a new customer base and reap reputational benefits in the foreign market. Kolk (2016) suggests that social responsibility conveys the idea of

legal liability where the company is collectively accountable for its behavior in an ethical sense, something that is connected charitable contribution, or a paradigm set for businesses to have a higher standard of conduct. In this essay, CSR is defined as activities that an entity engages in that go beyond legal compliance and advances the overall wellbeing of society (Kolk, 2016).

### 5.3 Institutional Theory

We draw on institutional theory and the literature on MNEs and CSR to examine how global strategy privileges at the industry level in regard to the macroenvironment, the increasing appreciation that formal and informal institutions, commonly known as the rules of the game; the co-evolution of MNE activities and institutions external and internal to the firm; integration and local responsiveness with respect to CSR issues as their organizational strategies that respond to pressures of integration and responsiveness markets (Buckley & Lessard, 2005; North, 1990; Cantwell, Dunning, & Lundan, 2010; Gnyawali, 1996; Arthaud-Day, 2005; Husted & Allen, 2006). North (1990: 3) more formally defines institutions as ‘‘the humanly devised constraints that structure human interaction.’’

A firm’s processes and capabilities provide a competitive advantage to link fitness and capability with approaches to best organize transactions that lead to better performance (Verbeke, 2003). By applying institutional theory to CSR and the MNE as a logical and self-interested actor that responds to incentives, this research examines the decisions to invest in ESG indictors to relate to the pro-social interest of stakeholders outside the firm, thus influencing formal and informal institutions (Stephan, Uhlaner, & Stride, 2015). Furthermore, linking institutional theory with CSR in regards to the game-theoretic view, proposes that a firm that digresses from a stable set of rules within a social system generate maximum returns as long as

they play by the established norms – or they will be punished or sanctioned (Grief, 2006; Orr & Scott, 2008)

We build on international business research examining if MNE investment in CSR initiatives generate financial returns, or if it is a sunk cost with a null or negative effect due to the violations of the rules of the game. Firms must decide what initiatives to invest in, and if they are the right ones that can generate positive returns for CSP. CSP is generated through activities such as cause-related marketing, corporate philanthropy, green marketing, and minority support programs (Luo & Bhattacharya, 2009). CSP is a company's overall performance in diverse corporate prosocial programs in relation to those of its leading competitors in the industry (Brown & Dacin, 1997; Luo & Bhattacharya, 2006; Varadarajan & Menon, 1988). CSP promotes customer-company identification that leads to favorable customer attitudes and behaviors toward the company.

### 5.4 Measuring Strategic CSR

Implementation of strategic CSR provides benefits for the environment and society. We examine the firm's investment and returns to discover how businesses can excel in social initiatives. This essay explores stock volatility in a changing world to account for stock risk and the marketing variables that influence financial gains. Higher volatility indicates a greater risk and more vulnerable cash flows, thereby decreasing a firm's chance for survival. Investors are looking for long-term strategies that can generate positive gains for society and the economy. Idiosyncratic risk is related to a firm's value and volatility is measured by the return on assets.

Firm risk can be analyzed using measures of accounting risk and market risk (Orlitzky & Benjamin, 2001). Accounting risk is quantified by the coefficient of variation of return on

invested capital (ROIC) or the standard deviation of the firm's long-term return on assets (O'Neill, Saunders, & McCarthy, 1989). The relationship between CSP and risk is important to examine in order to forecast corporate mortality and solutions to prevent such events. From a managerial perspective, finding the predictors of possible financial downturns can make a difference to the wellbeing of the organization and employees. CSP is a multidimensional construct that has been measured in extant studies as principles of social responsibility, processes of social responsiveness, and policies, programs and observable outcomes that relate to a firm's societal relationships (Orlitzky & Benjamin, 2001).

> **Hypothesis 1**: Higher levels of CSR are negatively related to idiosyncratic risk and stock market volatility.

### 5.5 Economic Value and CSR

Extant quantitative research has measured CSR in three different ways: (i) portfolios of environmentally socially proactive and reactive companies; (ii) event studies investigating market responses after CSR-related events; and (iii) multiple regression studies (Weber, 2008). Thus far, the results have been inconclusive as there has been an inconsistent use of variables and methodologies used to examine this relationship. This research attempts to fill this research gap by empirically examining the financial benefits of CSR activities. Advancing business for the health of society is interconnected through technology and innovation thus raising education within the community and creating a new demand for products and raising purchasing power. A successful firm is dependent upon positive financial returns. However, this only includes short-term benefits into the equation. As consumers become more interconnected through technology,

competition is intensifying. Firms are no longer seen as local entities but are global actors that have the ability to make major changes that can be positive or negative. The failure to meet fundamental social and environmental needs has weakened value chains and as a result, financial growth. Firms that create economic value linked with social value create shared value through reconceiving products and markets, redefining productivity in the value chain, and building supportive industry clusters in operation locations (Porter & Kramer, 2011).

Societal gains are much larger when businesses invest in CSR programs since they are often more effective at creating incremental change through marketing. This motivates customers to purchase their products that create positive financial gains. Customers are increasingly interested in purchasing products that improve health, housing, nutrition, financial security, and less environmental damage (Porter & Kramer, 2011). New opportunities are untapped in nontraditional communities in advanced economies where poor urban areas where purchasing power has been disregarded and ignored. Providing new products to those who are disadvantaged can provide huge financial gains. As technology continues to shift economic and societal priorities, firms must adapt to this change by fulfilling unmet needs that prompt innovation. By investing in technology that facilitates improvements to environmental and social performance creates efficiency and quality thereby increasing financial gains. The creation of shared value through better relationships with suppliers improves productivity and flexibility and limits unforeseen costs and risks.

It is unrealistic to expect that CSR activities will result in positive outcomes using all of the ESG indicators. There are many convoluting factors; partial evidence of theoretical relationship of ESG and ROI, and limitations of proper measurement. CSR can have some positive outcomes, but these impacts are better measured in narrow and specific areas separating the

environmental, social, and governance indicators as separate entities. Thus, some impact will be short term versus long term. In addition to searching for a direct relationship by industry, age, employees, and competitive intensity (e.g. if competition is not forcing the firm, then it lacks investment), the relationship between CSR and performance is more pronounced for ESG firms versus non-ESG. We hypothesize we will find a higher and more pronounced relationship for firms in certain industries.

**Hypothesis 2:** The prevalence of CSR is positively related to tangible financial returns.

### 5.6 Industry Effects on CSR

CSR differs between industries due to culture, institutional contexts, and the history and legacy of the firm. Firms require predictable behavior for forecasting appropriate finances and lowering risk. Because of this, the stock market is one of the most important sources of information for how well the firm is doing and accountability to investors. The nature of the firm is "the degree to which private hierarchies control economic processes, the degree of discretion owners allows managers in running the company, and organizational capabilities to respond to changing differentiated demands" (Matten & Moon, 2008). The organization of market processes is "the extent of long-term cooperation between firms within sectors, the role of intermediaries in establishing market transactions, the role and influence of business associations, the role of personal relations, and trust in establishing market transactions" (Matten & Moon, 2008). Explicit CSR communicates social responsibility from societal interests. Implicit CSR refers to the norms and values that address stakeholder issues in regard to the collective. The social responsibility of business has become prevalent in the last decade. More importantly, reporting and measuring the outcome of CSR activities has yet to be standardized. Firm investment in CSR

has been increasing across industries as stakeholders are more aware of how firms conduct business. It has become customary for firms to publish annual reports to communicate to stakeholders their business practices. However, the language used often varies between companies and industries alike. CSR remains a broad and complex concept as it is ambiguous, subjective, unclear, amorphous, intangible, and fuzzy (Sweeney, & Coughlan, 2008).

Annual reports to stakeholder contain information about how the firm is adhering to social responsibilities as well as financial information from directors and auditors. These reports aim to increase transparency and legitimacy by communicating social accounting. However, these reports vary in readability and concepts across industries and countries. There are two levels of stakeholders these types of reports target: primary and secondary stakeholders. Primary stakeholders are those who the firm need for survival; secondary stakeholders are those who influence or are influenced by the firm (Sweeney, & Coughlan, 2008). The target audience varies due to an industry effect. For example, the medical industry targets the community as a whole while the automobile industry focuses on attributes such as environmental performance. For this reason, we use the type of industry as a control variable in our analysis.

**Hypothesis 3:** The prevalence of CSR in specific industries influence MNE investment in CSR and market value.

----INSERT TABLE 2 ABOUT HERE----

## 5.7 Variables and Measures

*5.7a. Dependent Variable.* Financial brand equity is examined using market data from the financial market such as Tobin's Q defines as the market value of assets divided by their replacement values estimated by the book value, and/or a combination of tangible and intangible components. Simon and Sullivan (1983) suggest replacement costs and included assets such as plant and equipment and net receivables; intangible components are broken down into industry-wide cost, and brand factors derived from a market share equation using and instrumental variable approach (Keller et. al. 2006). This approach suggests measurements form extant literature on managing the measurement of the brand value of a firm. To measure firm risk and market value, we calculated Tobin's Q, or the q ratio, of the market value of a firm's assets divided by the replacement costs of the firm's assets (Kim & Lyn, 1987). Financial performance includes overall profitability (indicated by ratios such as return on investment, return on sales, return on assets, and return on equity), profit margin, earnings per share, stock price, sales growth, growth of foreign sales (Hult, Ketchen, Griffith, , B. R., Hamman, Dykes, Polittee, & Cavusgil, 2008). Tobin's Q has been used often in extant research as a proxy for firm growth opportunities (Faccio, Lang, & Young, 2010). In addition, an Altman-Z score for each firm was calculated indicating firm risk for the CSR-shareholder wealth relationship. Altman's Z score has been tested formula for bankruptcy prediction and it has been demonstrated to be quite reliable in a variety of contexts and countries (Eidleman, 1995). These measures have been utilized to yield more precise and clearer conclusions when there are contradictory results, have less nuisances between individual measurements, and higher statistical reliability.

----INSERT TABLE 3 ABOUT HERE----

*5.7.b Independent Variables and Controls.* This study uses the ESG measures the dependent variable to look at competitors in the same industry across time. Our research will inform mangers of the pros and cons of CSR and where they can find, and measure return on investment in CSR initiatives and contributes to extending the existing international business literature by setting guidelines for firms to use alternate measures to risk and be able to acknowledge up front the flaws in the measures and predict financial downturns. As CSR is a multidimensional construct, there has not been a consistent measurement of its outcomes on firm finances. Our goal is to empirically examine the differences in stock volatility between firms that excel in CSR and firms that are neutral in in their CSR activities. This will provide mangers with a clear framework of where and when to implement CSR into their value chain and measurable outcomes that can curtail stakeholder attitudes and stock market volatility.

For each year beginning with 1997, KLD STATS provides a table of data with a collection of approximately 650 companies that comprise the FTSE KLD 400 Social Index and S&P 500 firms with one record for each company. Beginning in 2001, KLD expanded its coverage universe to include the largest 1,000 US companies by market capitalization. In 2003, KLD expanded that coverage to the largest 3,000 US companies by market capitalization. Global Socrates ESG Research KLD STATS is based on proprietary research profiles of corporate ESG factors. KLD STATS Presentation Format KLD STATS presents a binary summary of positive and negative ESG ratings. In each case, if RMG assigned a rating in a particular issue (either positive or negative), this is indicated with a 1 in the corresponding cell. If the company did not

have a strength or concern in that issue, this is indicated with a 0. If data is unavailable for a given category, KLD STATS indicates this with "NR", meaning "Not Rated." In the case that the index membership was not covered, KLD STATS indicates this with "NA", meaning "Not Available." We examine what is going on in Fortune 500 companies using financial data. Our proposed data sources are COMPUSTAT and KLD ESG measures. We will examine the environmental, social, and governmental (ESG) aspects to find activist shareholder data and index inclusion and exclusion criteria. In addition to the secondary data analysis, a text analysis will be performed to analyze firm annual reports to create a bad of words for proxies of ESG indicators. We then measure how they change over time and identify trends over two decades for Fortune 500 companies while controlling for financial year, firm age, and number of employees.

----INSERT TABLE 4 ABOUT HERE----

## 5.2 METHODOLOGY

*5.2.a Sample and Data.* The model was tested on a sample of MNEs of the largest Fortune 500 firms in the United States by total assets between the years 1997 and 2016. Firms are ranked by total revenues for each fiscal year including private firms and cooperatives that file a 10-K or a comparable financial statement. Excluded are private companies that do not file such

financial statements and companies that failed to report for three-quarters of the fiscal year. [28] This population is appropriate for this study because it includes MNEs with extensive internationalization experience in multiple countries and contexts with significant exposure and demand for CSR investment and performance (Tashman, Marano, & Kostova, 2019). Further, the data comprises of MNEs across forty-seven industries operating globally across distinct institutional contexts. Table 1 shows the descriptive statistics of the sample across industries for the key variables in the model. We aggregated from two data sources for the study. The CSR performance data was collected from KLD Research & Analytics – Wharton Research Data Services. The KLD database provides CSR performance ratings on ESG performance for MNEs over the period of interest for the study. For the financial data and the control variables statistics were collected from the Compustat database on active global companied throughout the world. After merging the data, the sample contained an unbalanced panel dataset of about 30,000 observations across forty-six industries from 1997 to 2016.

----INSERT TABLE 5 ABOUT HERE----

[28] Fortune 500 Companies 2018: Who Made the List. (2019). Retrieved February 1, 2019, from http://fortune.com/fortune500.

Investors are expected to react positively to CSR if they anticipate that the positive stakeholder associations resulting from CSR cause (1) firms to benefit from more customers buying their offerings, (2) existing customers to buy more from these firms, (3) customers to pay premium prices for these firm's products and services in future years (Mishra & Modi, 2016). Investors like to reward firms for CSR if they believe employees are more motivated to work toward the firm achieving strategic objectives and regulators will hold a favorable view of the firm (Shankar, 2012). Data sources are an aggregation of proxy measurements from KLD and COMPUSTAT. The KLD database is published annually including measures of environmental, social, and governance (ESG) performance indicators. Previous studies have used this dataset to determine firm risk and potential future opportunities (MCSI ESG KLD, 2015). COMPUSTAT provides market financial information to assess firm portfolio investments.

### 5.3 Empirical Results and Contribution

Tables 4 and 5 presents the correlation matrix and the OLS estimations. To calculate positive CSR we aggregated the ESG indicators of clean technology (e.g. if the report includes information on firm's initiatives take advantage of opportunities in the market for environmental technologies); climate change (e.g. if the report includes information on firm's investment in low-carbon technologies and increase the carbon efficiency of their facilities); green buildings (if the report includes information on the firm taking advantage of opportunities to develop or refurbish buildings with leading environmental design features, including lower embodied energy, recycled materials, lower energy and water use, waste reduction, and healthier and more productive working environments); renewable energy (e.g. if the report includes information if the extent to which a firm is taking advantage of opportunities linked to the development of

renewable power production), energy efficiency (e.g. if the report assesses how the firm manages the risks of increased or volatile energy costs across their operations)l carbon footprint (if the report assesses how the firm manages the risks of higher input or production costs for their carbon-intense products due to increased energy costs); community engagement (e.g. if the report identifies that a firm that has notable community engagement program concerning local communities in which the firm has major operations); and board diversity (e.g. if the report includes a firm has a strong gender diversity on their board of directors).

----INSERT TABLE 6 ABOUT HERE----

Negative CSR indictors were calculated by aggregating non-compliance (e.g. if the firm has paid a settlement, fine or penalty due to non-compliance with US environmental regulations); supply chain management (if the report includes a history of widespread or egregious environmental impacts in a firm's supply chain, legal cases, resistance to improved practices, and criticism by NGOs and/or other third-party observers); community impact (e.g. if the report includes that a firm has a history of involvement in land use and/or development-related legal cases, widespread or egregious community impacts due to the company's operations, and criticism by NGOs and/or other third-party observers) workforce diversity (e.g. if the report includes factors of the firm's history of involvement in discrimination-related legal cases, widespread or egregious instances of discrimination on the basis of sex, race, or ethnicity, resistance to improved practices, and criticism by NGOs and/or other third-party observers):

structure (e.g. if the report identifies controversies related to a firm's executive compensation and governance practices. Factors affecting this evaluation include, but are not limited to, a history of involvement in compensation-related legal cases, widespread or egregious instances of shareholder or board-level objections to pay practices and governance structures, resistance to improved practices, and criticism by NGOs and/or other third-party observers); and controversial investments (e.g. if the report includes information on financing projects that are controversial because of their actual or anticipated environmental or social impact, as well as criticism of mining companies, REITs, and similar companies that receive royalties or own shares in a particular project that they neither own or operate).

In Models 1 and 2, the main effects were estimated for all years (1997-2016). We see that the positive CSR effects on firm risk are more prevalent in certain industries than others. For example, compliance with positive CSR indicators results in lowered firm risk in agriculture, aircraft manufacturing, biotechnology, candy and soda, environmental services, fabricated products, precious metals, and tobaccos products offering support for the first and second hypotheses (H1 and H2). Models 3 and 4 yield results for the effect of CSR investment on firm market value. We estimate the main effects for all years (1997-2016) evidencing that CSR is stronger in certain industries that others on market value. In particular, we see that the indicators are more prevalent in agriculture, automobiles and trucks, beer and liquor, biotechnology, candy and soda, environmental services, fabricated products, finance, manufacturing, and tobacco products presenting support for hypothesis 3 (H3).

As globalization continues to intensify, there have been evident changes in our understanding of what ethical business practices are and how companies can remain competitive while being morally sensitive (Buckley & Ghauri, 2004). Looking forward to the future,

businesses will need to adjust accordingly to the dwindling environmental resources and rising stakeholder demands. This study was motivated by the prevalence of MNEs investing valuable resources into CSR activities. Prior research has shown mixed results in regard to the intangible and tangible returns of CSR. As firms strive to be more socially responsible to satisfy stakeholder demands, our goal was to find what type of industry effects there are on firm risk and market value across ESG indicators.

This study research utilized financial data as the dependent variable to examine the outcomes of investment in CSR. Our research informs mangers of the pros and cons of CSR and where they can find, and measure return on investment in certain CSR initiatives. Our research also contributes to extending the existing finance and marketing literature by setting guidelines for firms to use alternate measures to risk and be able to acknowledge up front the flaws in the measures and predict financial downturns. As CSR is a multidimensional construct, there has not been a consistent measurement of its outcomes on firm finances. Our goal is to empirically examine the differences in stock volatility between firms that excel in CSR and firms that are neutral in in their CSR activities. This will provide mangers with a clear framework of where and when to implement CSR into their value chain and measurable outcomes that can curtail stakeholder attitudes and stock market volatility.

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**Appendix of Figures and Tables**

*Figure 1*: The Evolutionary Phases of Corporate Social Responsibility

*Figure 2*: The Pyramid of CSR (Caroll, 1991)

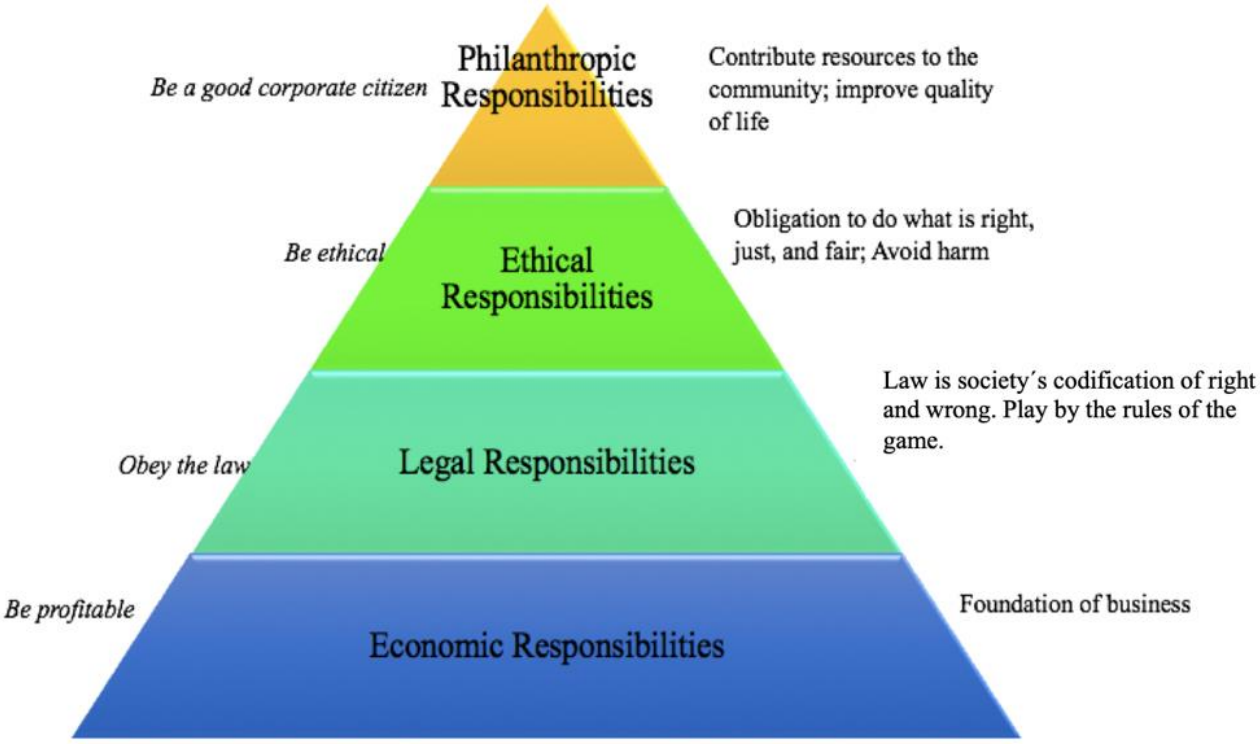

*Figure 3*: Freeman's Stakeholder Framework (1984)

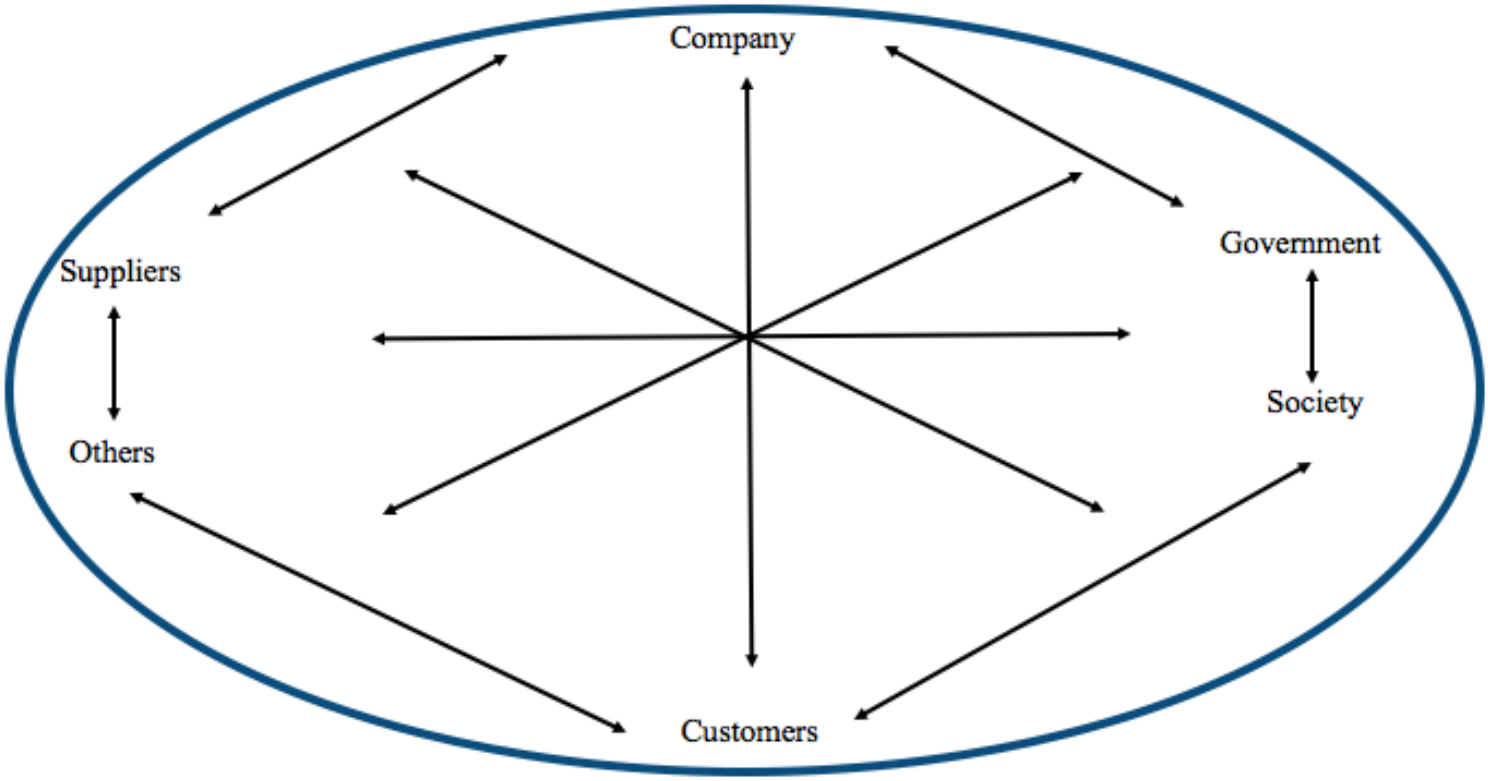

*Figure 4*: Conceptualizing Corporate Social Responsibility and Stakeholders

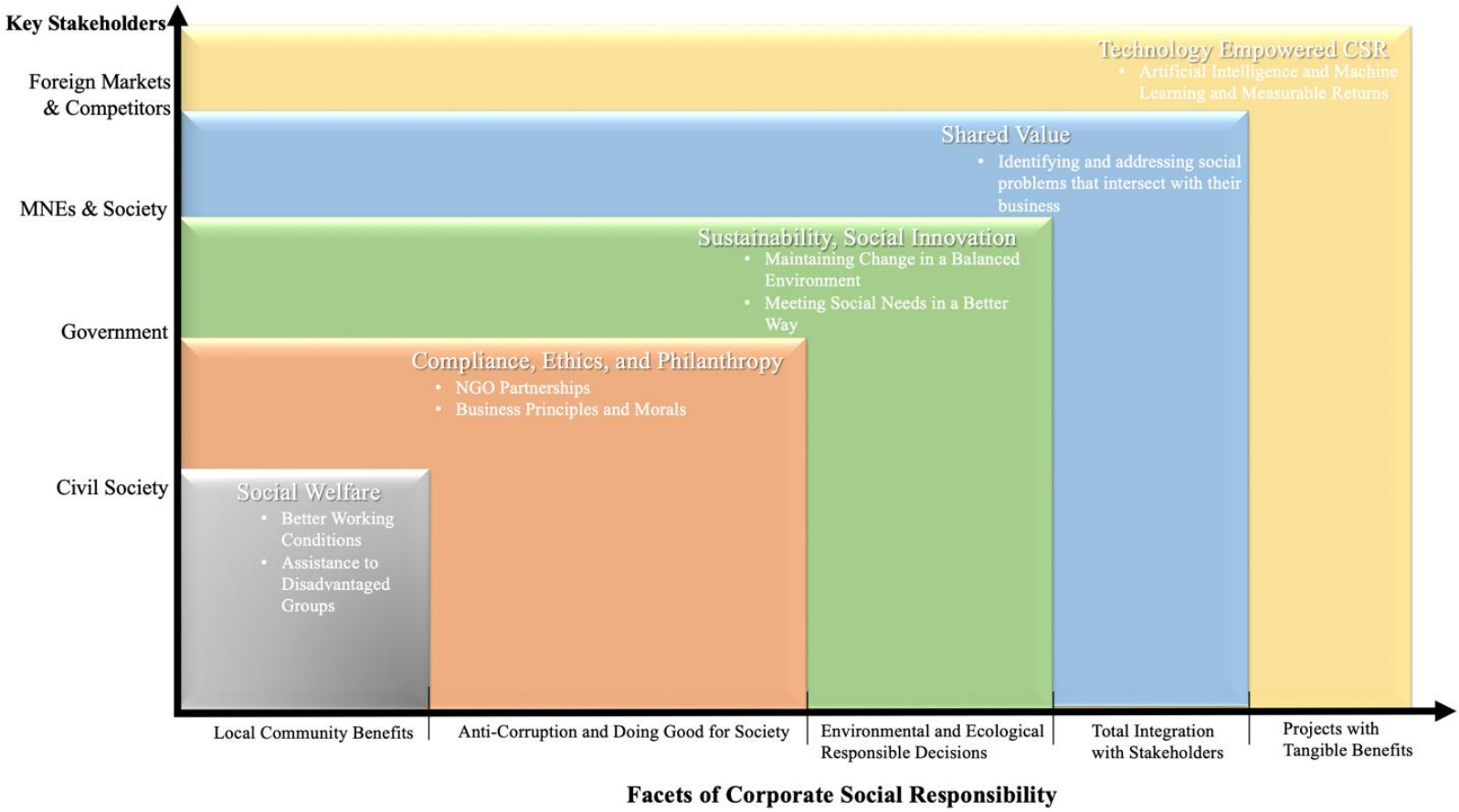

*Figure 5*. An Extended Framework of Stakeholder Theory via Technology Empowered CSR

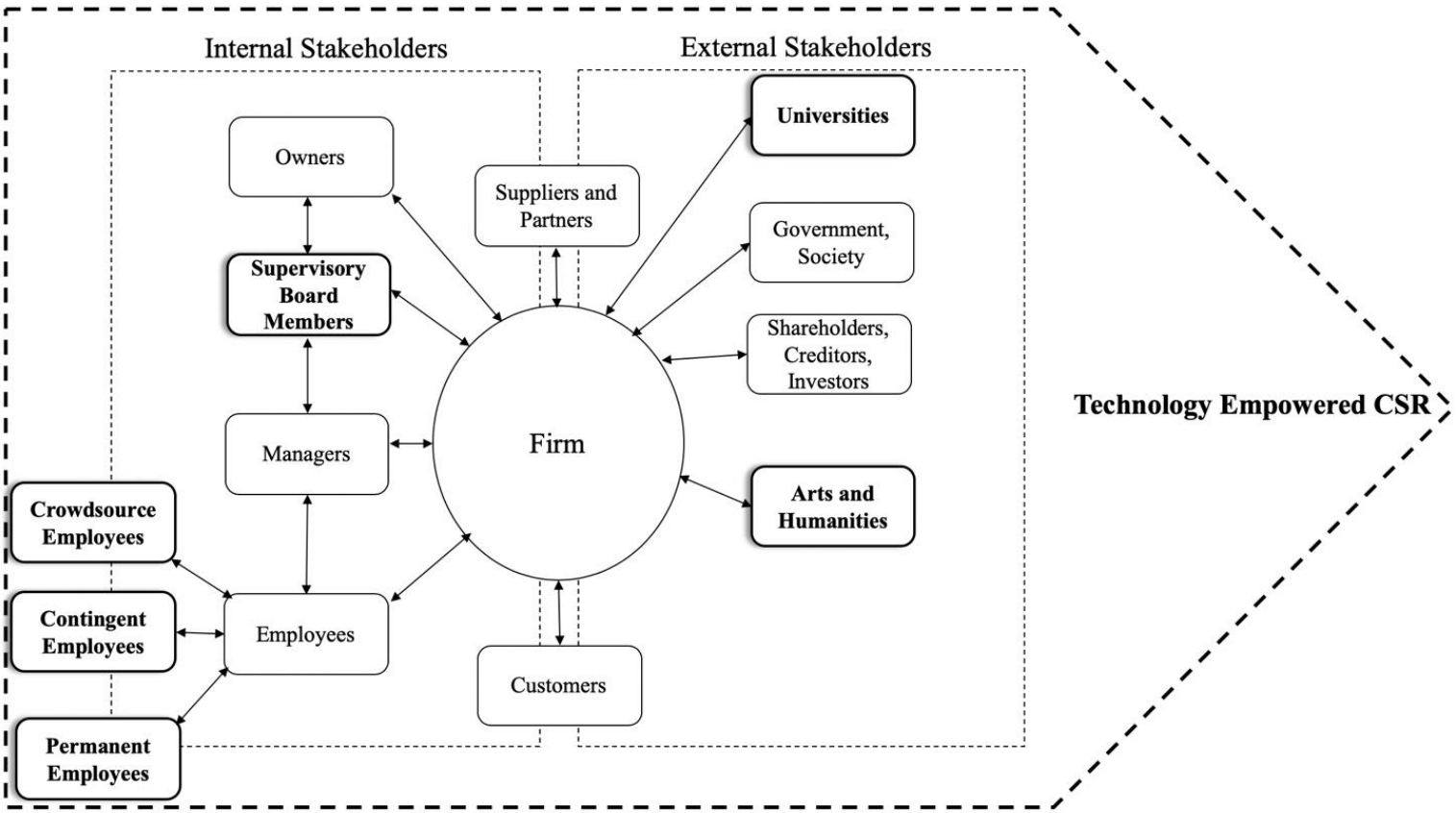

**Table 1** AT&T Nanodegree Credentials Focus on Entry-Level Industry-Relevant Software Skills

| | |
|---|---|
| Front-End Web Developer | Design of internal and/or external user-facing applications |
| Data Analyst | Analyze and solve real-world problems with data science skills |
| Full Stack Web Developer | Design functionality of applications including system interfaces |
| iOS Developer | Designs applications designed specifically for use with iOS |
| Introduction to Programming | Develop skills that all programmers use whether they program mobile apps, create web pages, or analyze data |
| Android Developer | Develop basic fundamentals and advanced development skills, as well as Google Play services and Material Design |

*Source*: AT&T (2019)

*Figure 6*: Technology Empowered CSR Over Time

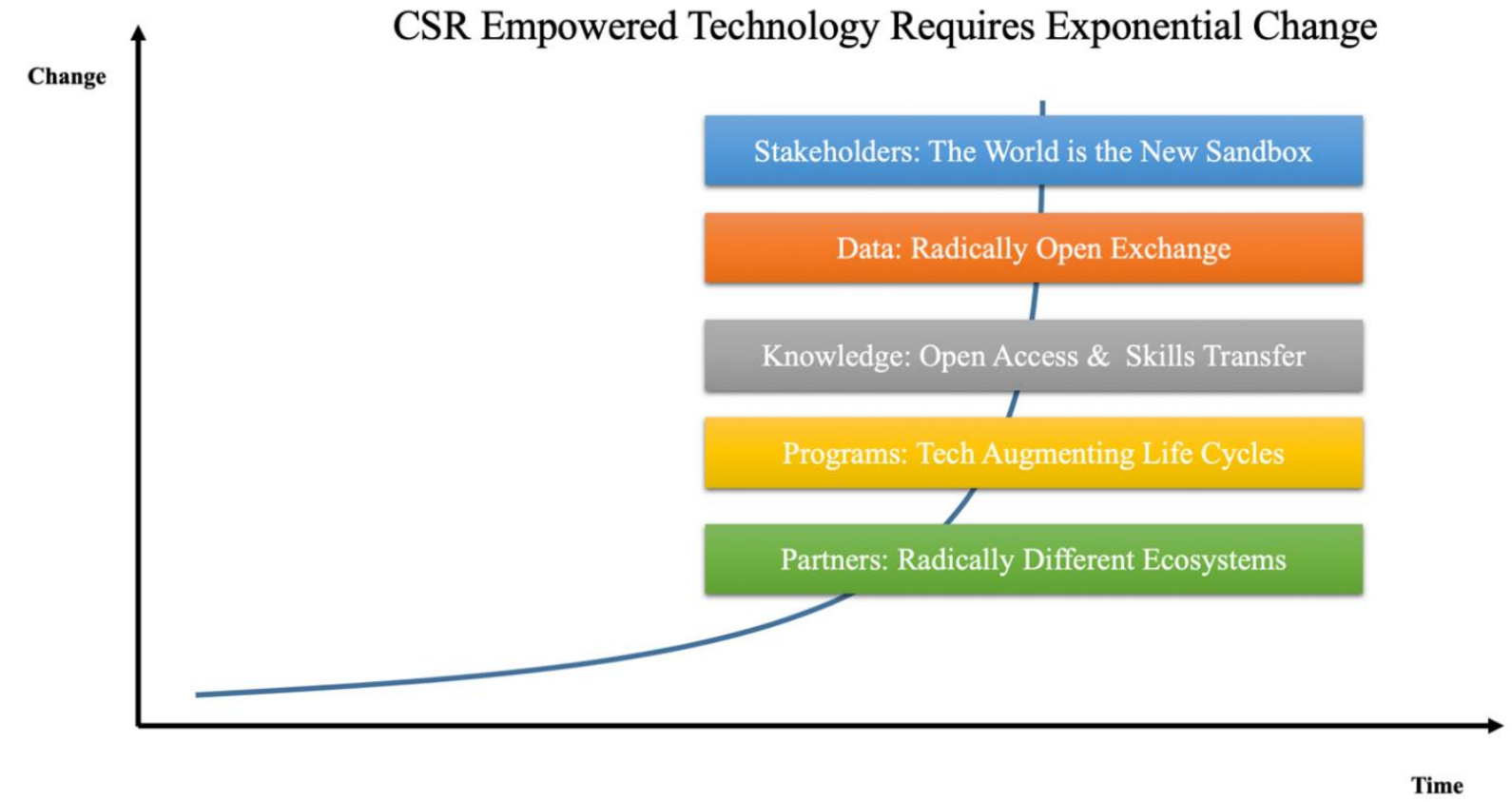

*Figure 7*: Operationalizing AI for Sustainable Business

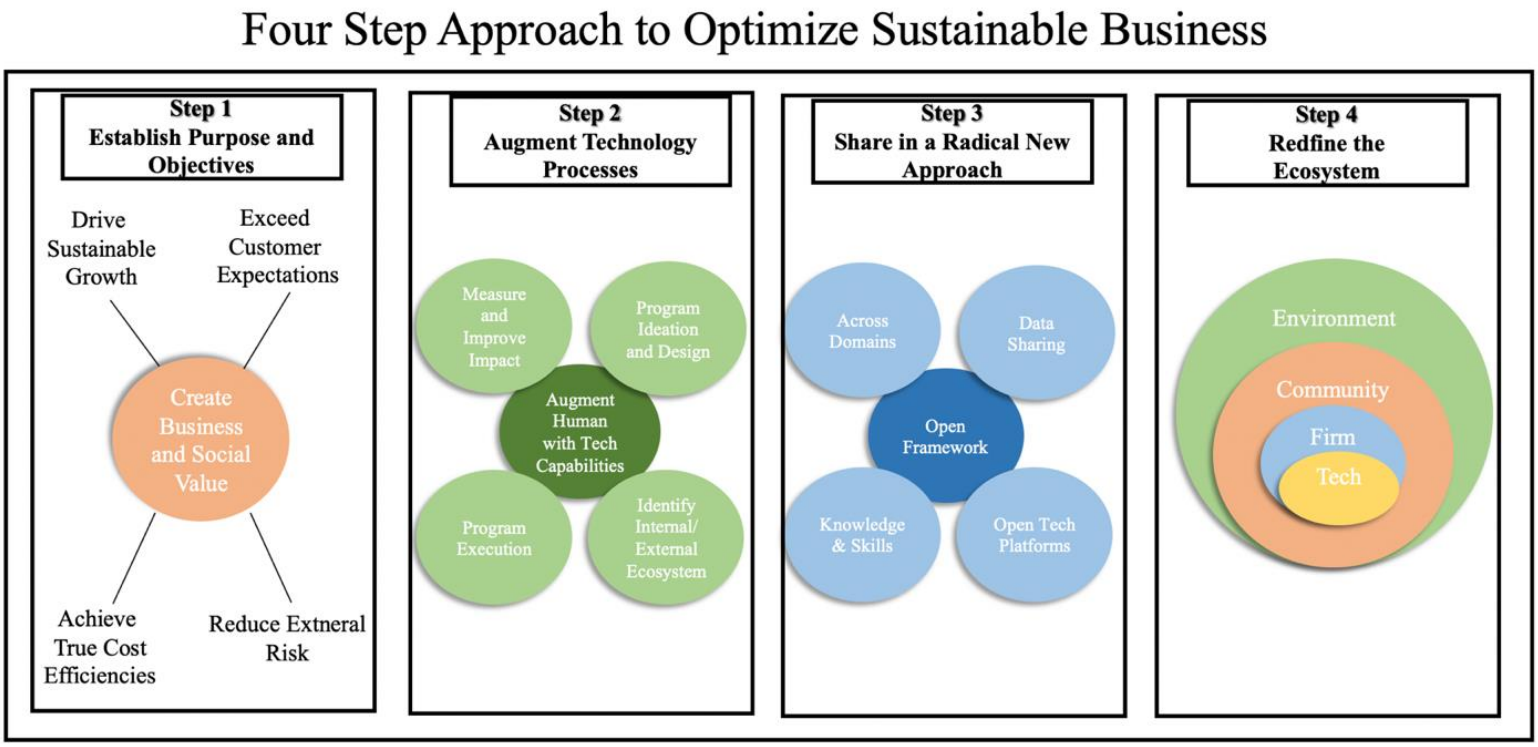

*Figure 8*: A New Cycle for Technology Empowered CSR

*Figure 9.* Seven Elements of Optimizing Technology Powered CSR

*Figure 10.* Technology Enabled CSR for Exponential Change

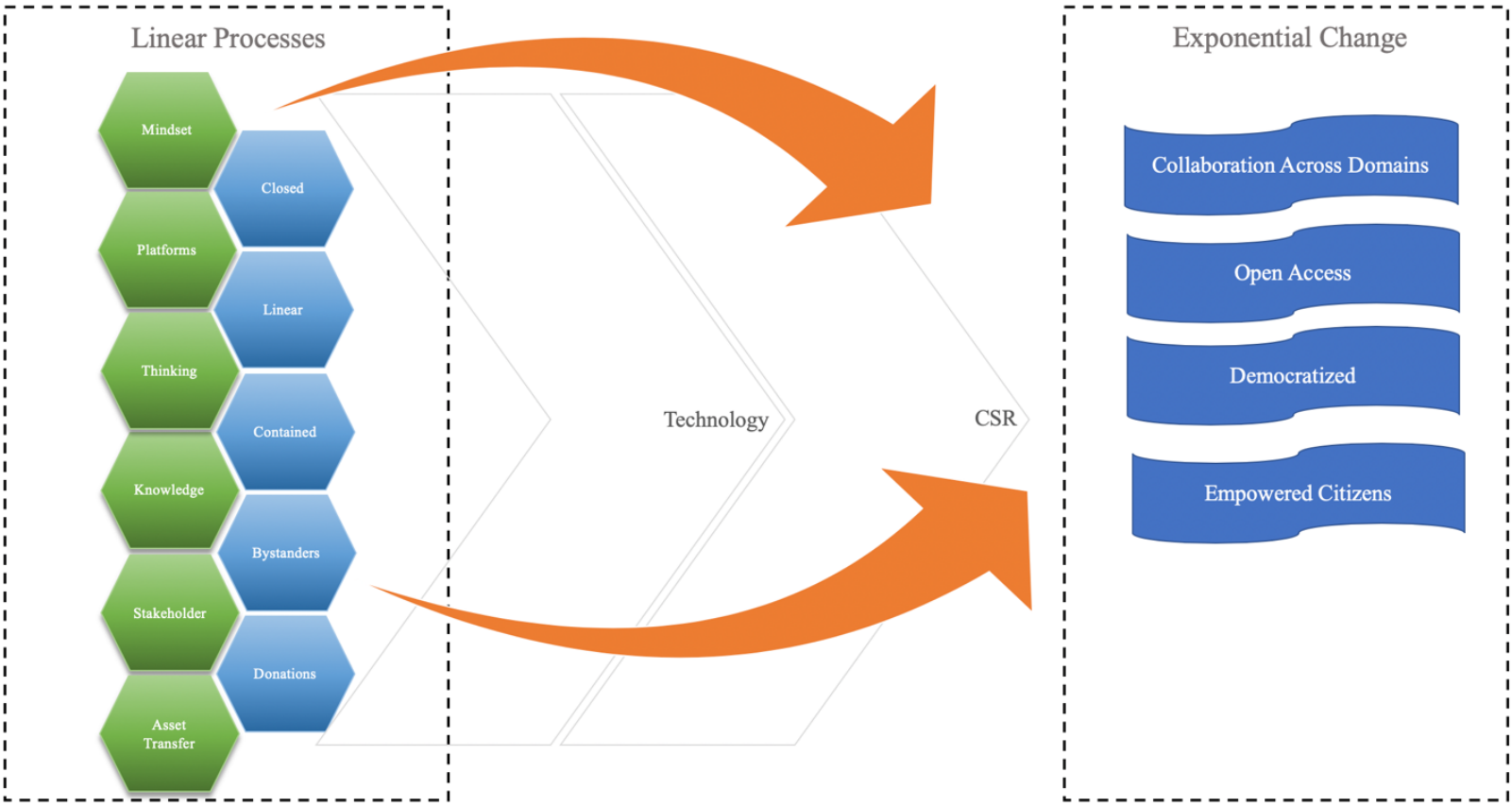

**Table 2** Descriptive Statistics

| Variable | *n* | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| 1. Financial Year | 32,400 | 2008 | 4.68 | 1997 | 2016 |
| 2. Firm Age | 16,857 | 12.54 | 9.35 | 0 | 141 |
| 3. Industry | 32,367 | 25.38 | 14.62 | 0 | 47 |
| 4. Employees | 31,363 | 7.89 | 1.82 | 0 | 11.95 |
| 5. Total Assets* | 32,390 | 13759.85 | 83,950.21 | 0.8 | 2671318 |
| 6. Market Value* | 29,973 | 7100.44 | 25244.37 | 3.40 | 615336.4 |
| 7. Tobin's Q | 27, 076 | 2.06 | 1.54 | .47 | 20.93 |
| 8. Altman Z | 31,718 | 4.13 | 4.41 | -7.25 | 31.03 |
| 9. Positive Environment | 31, 946 | 0.08 | .24 | 0 | 2.33 |
| 10. Negative Environment | 32,400 | 0.05 | .18 | 0 | 2.3 |
| 11.Positive Social | 26,380 | 0.07 | .23 | 0 | 3 |
| 12. Negative Social | 32,400 | 0.03 | .15 | 0 | 1.2 |
| 13. Negative Social Performance | *26,380* | 0.05 | .23 | 0 | 3 |
| 14. Positive Employee Relations | 31,780 | 0.13 | 0.33 | 0 | 5 |
| 15. Negative Employee Relations | 32,400 | 0.09 | 0.20 | 0 | 2 |
| 16. Positive Performance, Diversity | 30,499 | 0.13 | 0.27 | 0 | 2 |
| 17. Negative Performance, Diversity | 32,400 | 0.19 | 0.31 | 0 | 2 |
| 18. Positive Product Relations | 28,125 | 0.06 | 0.22 | 0 | 3 |
| 19. Negative Product Relations | 32,400 | 0.07 | 0.20 | 0 | 1.6 |
| 20. Positive Governance | 26,980 | 0.09 | .24 | 0 | 2 |
| 21. Negative Governance | 26,380 | 0.27 | 0.42 | 0 | 3 |

*n* = observations for 46 industries. *Size as revenues in millions of dollars

**Table 3** Variables and Sources of Data

| Variables | Definition | Value | Source |
|---|---|---|---|
| CSR | Activities that go beyond the basic regulatory standards and advocate for an ecological balance throughout the history, legacy, and culture of the business | 0 or 1 | KLD Stats: 1991-2014, ESG Measures |
| Environmental management | Measures whether a firm has an environmental management system in place. | 0 or 1 | KLD Stats: 1991-2014, ESG Measures |
| Social responsibility | Social finance promotes new ways of making grants, social responsible investing (Duuren, Plantinga, & Scholtens, 2016), credit lending activities through sustainability credit score (Zeidan, Boechat and Fleury, 2015; Attig, El and Omrane, 2013) and social ratings (Birindelli et al., 2015; Cellier and Chollet, 2016) in order to assess the impact of sustainable practices on investments. | 0 or 1 | KLD Stats: 1991-2014, ESG Measures |
| Corporate governance | The statement that value creation depends on the corporate governance (system seems evident given the performance variations that exist between the firms from various nations. | 0 or 1 | KLD Stats: 1991-2014, ESG Measures |
| Market Value | Measured as an outcome variable; Tobin's q, or the q ratio, is the ratio of the market value of a firm's assets (as measured by the market value of its outstanding stock and debt) divided by the replacement cost of the firm's assets (book value). | Continuous | Compustat |
| Firm Risk | Moderates the role of marketing capability in the CSR-shareholder wealth relationship considering CSR and CSR types (Mischa & Modi, 2016). | Continuous | Compustat |

**Table 4** Description of CSR indicators

| Indicators | Description |
|---|---|
| *Environmental* | |
| Clean Technology | 1 if the report includes information on firm's initiatives take advantage of opportunities in the market for environmental technologies; otherwise 0 |
| Climate Change | 1 if the report includes information on firm's investment in low-carbon technologies and increase the carbon efficiency of their facilities; otherwise 0 |
| Environmental management | 1 if the report includes information on firm's information on environmental management systems in place; otherwise 0 |
| Green buildings | 1 if the report includes information on the firm taking advantage of opportunities to develop or refurbish buildings with leading environmental design features, including lower embodied energy, recycled materials, lower energy and water use, waste reduction, and healthier and more productive working environments; otherwise 0 |
| Renewable energy | 1 if the report includes information if the extent to which a firm is taking advantage of opportunities linked to the development of renewable power production; otherwise 0 |
| Energy efficiency | 1 if the report assesses how the firm manages the risks of increased or volatile energy costs across their operations; otherwise 0 |
| Carbon footprint | 1 if the report assesses how the firm manages the risks of higher input or production costs for their carbon-intense products due to increased energy costs; otherwise 0 |
| Non-compliance | 1 if the firm has paid a settlement, fine or penalty due to non-compliance with U.S. environmental regulations; otherwise 0 |
| Supply chain management | 1 if the report includes a history of widespread or egregious environmental impacts in a firm's supply chain, legal cases, resistance to improved practices, and criticism by NGOs and/or other third-party observers; otherwise 0 |
| *Social* | |
| Community engagement | 1 if the report identifies that a firm that has notable community engagement program concerning local communities in which the firm has major operations. Metrics include community impact assessments and support for local economic and social infrastructure development; otherwise 0 |
| Community impact | 1 if the report includes that a firm has a history of involvement in land use and/or development-related legal cases, widespread or egregious community impacts due to the company's operations, and criticism by NGOs and/or other third-party observers; otherwise 0 |
| Board diversity | 1 if the report includes a firm has a strong gender diversity on their board of directors; otherwise 0 |
| Workforce diversity | 1 if the report includes factors of the firm's history of involvement in discrimination-related legal cases, widespread or egregious instances of discrimination on the basis of sex, race, or ethnicity, resistance to improved practices, and criticism by NGOs and/or other third-party observers; otherwise 0 |
| Board of directors | 1 if the indicator identifies companies with no women on their board of directors; otherwise 0 |
| *Governance* | |
| Structure | 1 if the report identifies controversies related to a firm's executive compensation and governance practices. Factors affecting this evaluation include, but are not limited to, a history of involvement in compensation-related legal cases, widespread or egregious instances of shareholder or board-level objections to pay practices and governance structures, resistance to improved practices, and criticism by NGOs and/or other third-party observers; otherwise 0 |
| Controversial investments | 1 if the report includes information on financing projects that are controversial because of their actual or anticipated environmental or social impact, as well as criticism of mining companies, REITs, and similar companies that receive royalties or own shares in a particular project that they neither own or operate; otherwise 0 |

**Table 5** Correlation Matrix

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Firm Age | 1 | | | | | | | | | | | | | | | | | | | |
| 2. Industry | 0.278 | 1 | | | | | | | | | | | | | | | | | | |
| 3. Employees | 0.211 | -0.028 | 1 | | | | | | | | | | | | | | | | | |
| 4. Total Assets* | 0.015 | 0.040 | 0.134 | 1 | | | | | | | | | | | | | | | | |
| 5. Market Value* | 0.066 | 0.000 | 0.262 | 0.348 | 1 | | | | | | | | | | | | | | | |
| 6. Tobin's Q | -0.131 | -0.042 | -0.194 | -0.061 | 0.115 | 1 | | | | | | | | | | | | | | |
| 7. Altman Z | -0.061 | 0.018 | -0.116 | -0.080 | 0.052 | 0.615 | 1 | | | | | | | | | | | | | |
| 8. Positive Environment | 0.111 | 0.022 | 0.196 | 0.058 | 0.177 | -0.035 | -0.038 | 1 | | | | | | | | | | | | |
| 9. Negative Environment | 0.066 | 0.001 | 0.131 | 0.039 | 0.094 | -0.074 | -0.082 | 0.172 | 1 | | | | | | | | | | | |
| 10. Positive Social | 0.085 | -0.021 | 0.195 | 0.181 | 0.268 | -0.018 | -0.026 | 0.301 | 0.097 | 1 | | | | | | | | | | |
| 11. Negative Social | 0.041 | 0.006 | 0.116 | 0.139 | 0.148 | -0.050 | -0.071 | 0.110 | 0.376 | 0.115 | 1 | | | | | | | | | |
| 12. Negative Social Performance | 0.044 | -0.017 | 0.131 | 0.203 | 0.100 | -0.036 | -0.006 | 0.030 | 0.046 | 0.067 | 0.115 | 1 | | | | | | | | |
| 13. Positive Employee Relations | 0.102 | 0.000 | 0.161 | 0.103 | 0.260 | 0.039 | 0.006 | 0.289 | 0.102 | 0.269 | 0.096 | 0.0058 | 1 | | | | | | | |
| 14. Negative Employee Relations | 0.047 | 0.043 | 0.168 | 0.015 | 0.052 | -0.065 | -0.079 | 0.106 | 0.191 | 0.068 | 0.152 | 0.0899 | 0.0113 | 1 | | | | | | |
| 15. Positive Performance, Diversity | 0.051 | -0.036 | 0.191 | 0.129 | 0.214 | 0.017 | 0.011 | 0.176 | 0.052 | 0.276 | 0.075 | 0.0666 | 0.173 | 0.091 | 1 | | | | | |
| 16. Negative Performance, Diversity | 0.051 | 0.020 | -0.093 | -0.031 | -0.053 | -0.029 | -0.024 | -0.006 | 0.005 | -0.013 | 0.006 | -0.0403 | -0.0383 | -0.0459 | -0.2239 | 1 | | | | |
| 17. Positive Product Relations | 0.099 | -0.001 | 0.125 | 0.041 | 0.162 | -0.056 | 0.007 | 0.238 | 0.033 | 0.171 | -0.005 | 0.0029 | 0.2385 | 0.0423 | 0.1235 | -0.0206 | 1 | | | |
| 18. Negative Product Relations | 0.049 | 0.000 | 0.228 | 0.270 | 0.203 | -0.061 | -0.079 | 0.077 | 0.159 | 0.159 | 0.185 | 0.1472 | 0.0451 | 0.2022 | 0.131 | -0.0704 | 0.0616 | 1 | | |
| 19. Positive Governance | -0.004 | -0.027 | -0.025 | -0.001 | 0.011 | 0.012 | 0.0.53 | 0.124 | 0.015 | 0.138 | -0.004 | 0.0078 | 0.0217 | 0.0522 | 0.077 | -0.0656 | 0.016 | -0.009 | 1 | |
| 20. Negative Governance | 0.100 | -0.018 | 0.160 | 0.083 | 0.125 | -0.050 | -0.054 | 0.061 | 0.101 | 0.085 | 0.096 | 0.0471 | 0.00189 | 0.078 | 0.1237 | 0.1834 | 0.0118 | 0.158 | -0.1284 | 1 |

n = 10, 443 observations for 48 industries; $p < 0.05$ when $p > |0.11|$. *Unstandardized data.

**Table 6** OLS Regression of CSR Effects on Financial Outcomes

| Industry | | Model 1 Positive CSR effect on firm risk | | Model 2 Negative CSR effect on firm risk | | | Model 3 Positive CSR effect on firm market value | | Model 4 Negative CSR effect on firm market value | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | β (Standard Error) | Adj $R^2$ (Prob > F | β (Standard Error) | Adj $R^2$ (Prob > F | n | β (Standard Error) | Adj $R^2$ (Prob > F | β (Standard Error) | Adj $R^2$ (Prob > F |
| Agriculture | 52 | 1.43 (0.67) | 0.34 (0.001) | 2.31 (0.76) | 0.39 (0.000) | 45 | 1.52 (0.38) | 0.47 (0.0000) | 0.89 (0.54) | 0.30 (0.0000) |
| Aircraft | 40 | 7.93 (4.01) | 0.34 (0.012) | 2.22 (3.82) | 0.14 (0.0532) | 34 | ~0.28 (0.93) | 0.10 (0.1334) | 0.08 (0.83) | 0.09 (0.1377) |
| Apparel | 183 | 7.40 (1.76) | 0.29 (0.00) | ~2.90 (2.49) | 0.22 (0.000) | 174 | 3.27 (1.14) | 0.07 (0.0029) | ~3.74 (1.58) | 0.06 (0.0084) |
| Automobiles and Trucks | 111 | 0.95 (3.07) | 0.27 (0.00) | 2.50 (2.50) | 0.28 (0.000) | 107 | 9.14 (2.00) | 0.23 (0.0000) | 0.73 (1.84) | 0.08 (0.0151) |
| Banking | 801 | 0.69 (0.62) | 0.09 (0.00) | 2.42 (0.75) | 0.10 (0.000) | 181 | 1.96 (0.67) | 0.16 (0.0000) | 0.42 (0.89) | 0.12 (0.0000) |
| Beer and Liquor | 36 | 36.19 (12.68) | 0.14 (0.065) | ~1.26 (8.18) | ~0.08 (0.8379) | 37 | 9.44 (3.49) | 0.41 (0.0003) | 0.44 (2.22) | 0.27 (0.0061) |
| Biotechnology | 5 | 14.66 (15.18) | 0.74 (0.32) | ~9.20 (1.18) | 0.99 (0.0572) | 5 | 29.34 (2.06) | 0.99 (0.0277) | ~6.98 (10.88) | 0.73 (0.3282) |
| Business Services | 1,863 | 6.00 (1.20) | 0.04 (0.00) | ~1.78 (1.64) | 0.11 (0.275) | 1,783 | 3.37 (0.42) | 0.09 (0.0000) | ~0.63 (0.48) | 0.06 (0.0000) |
| Business Supplies | 63 | 0.34 (1.02) | 0.09 (0.04) | ~1.78 (1.64) | 0.11 (0.0275) | 63 | 0.24 (0.45) | ~0.03 (0.6805) | ~1.35 (0.70) | 0.03 (0.2263) |
| Candy and Soda | 22 | ~1.23 (1.86) | 0.91 (0.00) | 3.27 (2.55) | 0.92 (.0000) | 21 | ~.93 (1.39) | 0.70 (0.0001) | ~0.29 (2.08) | 0.69 (0.0001) |
| Chemicals | 215 | 1.38 (1.83) | 0.15 (0.00) | ~1.76 (1.68) | 0.15 (0.000) | 202 | 0.86 (0.45) | 0.05 (0.0065) | ~0.38 (0.41) | 0.04 (0.0215) |
| Coal | 43 | ~1.46 (1.76) | ~0.05 (0.44) | .12 (1.13) | ~0.02 (0.5513) | 42 | ~1.02 (1.05) | 0.13 (0.0537) | 0.42 (0.68) | 0.12 (0.0679) |
| Communication | 371 | 1.85 (1.34) | 0.06 (0.00) | ~2.61 (1.32) | 0.06 (0.000) | 361 | 0.83 (0.43) | 0.07 (0.0000) | ~0.40 (0.43) | 0.07 (0.0000) |

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Computers | 514 | 2.82 (1.66) | 0.06 (0.00) | 0.39 (2.56) | 0.06 (0.000) | 467 | ~0.49 (0.59) | 0.07 (0.0000) | ~1.05 (0.90) | 0.07 (0.0000) |
| Construction | 324 | ~1.16 (2.17) | 0.05 (0.0002) | ~2.44 (1.74) | 0.06 (0.0001) | 306 | ~0.18 (0.45) | 0.16 (0.0000) | ~0.39 (0.37) | 0.16 (0.0000) |
| Consumer Goods | 136 | 0.81 (1.13) | 0.12 (0.0005) | 3.59 (2.03) | 0.13 (0.0001) | 119 | 1.30 (0.61) | 0.15 (0.0013) | ~0.41 (1.14) | 0.08 (0.0086) |
| Defense | 21 | 0 (omit) | 0.24 (0.0557) | 24.30 (12.12) | 0.35 (0.252) | 21 | 0 (omit) | 0.29 (0.0306) | 9.19 (4.77) | 0.39 (0.0163) |
| Energy | 43 | ~8.74 (4.34) | 0.24 (0.0062) | ~.72 (2.52) | 0.16 (0.0326) | 41 | ~1.09 (1.49) | 0.07 (0.1574) | 0.03 (0.81) | 0.05 (0.1932) |
| Entertainment | 161 | 1.95 (2.40) | 0.25 (0.000) | 1.75 (1.97) | 0.26 (0.000) | 165 | 0.42 (1.09) | 0.09 (0.0005) | 0.53 (0.96) | 0.09 (0.0005) |
| Environmental, Energy and Industrial Services | 10 | ~.78 (3.39) | 0.81 (0.004) | 0.39 (1.32) | 0.81 (0.0044) | 5 | ~2.43 (4.08) | 0.74 (0.3202) | ~1.60 (2.55) | 0.75 ( 0.3157) |
| Fabricated Products | 18 | 4.28 (3.68) | 0.76 (0.0001) | 0.73 (1.78) | 0.73 (0.0002) | 18 | 1.92 (1.95) | 0.54 (0.0062) | 0.62 (0.92) | 0.52 (0.0078) |
| Finance | 26 | ~1.72 (14.16) | 0.32 (0.0145) | 0.35 (13.27) | 0.32 (0.0146) | 27 | ~0.31 (0.33) | 0.74 (0.0000) | ~0.07 (0.31) | 0.73 (0.0000) |
| Food Products | 110 | 2.49 (1.66) | 0.06 (0.0638) | ~5.59 (2.39) | 0.12 (0.0097) | 108 | 2.28 (0.65) | 0.09 (0.0075) | ~2.12 (0.97) | 0.03 (0.1490) |
| Healthcare | 238 | 3.09 (2.34) | 0.26 (0.000) | ~1.78 (2.56) | 0.27 (0.0000) | 229 | 1.62 (0.72) | 0.30 (0.0000) | 0.22 (0.79) | 0.29 (0.0000) |
| Insurance | 513 | ~3.77 (1.16) | 0.03 (0.0005) | ~2.85 (1.48) | 0.0180 (0.0102) | 469 | ~0.99 (0.28) | 0.03 (0.0404) | ~0.79 (0.37) | 0.01 (0.0193) |
| Machinery | 344 | 3.52 (2.92) | 0.05 (0.0005) | ~0.81 (2.16) | 0.04 (0.0009) | 317 | 0.96 (0.77) | 0.06 (0.0000) | ~0.35 (0.58) | 0.06 (0.0001) |
| Manufacturing | 22 | 4.56 (2.66) | 0.89 (0.000) | 6.54 (4.21) | 0.88 (0.0000) | 12 | 3.44 (1.64) | 0.7914 (0.0034) | 1.89 (1.67) | 0.71 (0.0101) |
| Measuring and Control Equipment | 284 | 1.33 (2.03) | 0.09 (0.000) | ~2.80 (3.75) | 0.09 (0.0000) | 252 | 0.99 (0.59) | 0.06 (0.0012) | 0.60 (1.19) | 0.04 (0.0037) |
| Medical Equipment | 437 | 4.18 (3.18) | 0.11 (0.000) | 0.16 (3.41) | 0.12 (0.0000) | 432 | 2.66 (0.99) | 0.13 (0.0000) | 1.19 (1.10) | 0.11 (0.0000) |
| Non-Metallic and Industrial Metal Mining | 57 | ~14.75 (4.73) | 0.32 (0.0001) | 16.20 (5.92) | 0.30 (0.0002) | 55 | ~0.84 (0.744) | 0.07 (0.0970) | 0.76 (0.91) | 0.06 (0.1221) |
| Personal Services | 216 | 7.89 (4.67) | 0.17 (0.000) | ~.17 (2.75) | 0.16 (0.0000) | 217 | 2.79 (2.10) | 0.14 (0.0000) | ~0.31 (1.30) | 0.14 (0.0000) |
| Petroleum and Natural Gas | 382 | ~3.19 (1.64) | 0.02 (0.0385) | 2.36 (1.58) | 0.01 (0.0720) | 385 | 2.78 (2.10) | 0.14 (0.0000) | 1.37 (0.54) | 0.07 (0.0000) |
| Pharmaceutical Products | 905 | 2.78 (2.85) | 0.001 (0.2725) | ~3.83 (2.97) | 0.002 (0.2101) | 932 | ~0.37 (0.57) | 0.06 (0.0000) | ~1.65 (0.93) | 0.02 (0.0000) |

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Precious Metals | 8 | 5.79 (15.99) | ~0.84 (0.92) | ~34.156 (37.04) | ~0.50 (0.7908) | 9 | 1.88 (2.52) | ~0.17 (0.6288) | 0.11 (6.97) | ~0.34 (0.7434) |
| Printing and Publishing | 56 | 5.56 (2.58) | 0.46 (0.000) | ~5.44 (4.18) | 0.43 (0.0000) | 53 | ~0.04 (0.82) | 0.16 (0.0156) | ~0.94 (1.34) | 0.17 (0.0126) |
| Real Estate | 51 | 3.44 (4.23) | 0.09 (0.0813) | 1.82 (6.68) | 0.08 (0.1030) | 53 | 0.95 (0.73) | 0.07 (0.1105) | ~0.29 (1.18) | 0.04 (0.2071) |
| Recreation | 90 | ~12.74 ( 3.55) | 0.15 (0.0014) | ~2.44 (2.32) | 0.03 (0.1499) | 78 | ~1.63 (1.05) | 0.07 (0.401) | ~0.76 (0.59) | 0.06 (0.0558) |
| Restaurants, Hotels, Motels | 246 | 2.11 (1.68) | 0.03 (0.0101) | 3.00 (2.56) | 0.04 (0.0110) | 223 | 1.88 (0.60) | 0.06 (0.0009) | 0.92 (1.00) | 0.02 (0.0425) |
| Retail | 773 | 1.15 (1.14) | 0.01 (0.0121) | ~0.96 (1.23) | 0.01 (0.0144) | 735 | 1.24 (0.45) | 0.05 (0.0000) | 0.23 (0.48) | 0.04 (0.0000) |
| Rubber and Plastic Products | 266 | 1.49 (1.55) | 0.14 (0.000) | ~0.11 (1.13) | 0.14 (0.0000) | 253 | 0.37 (0.39) | 0.02 (0.0479) | 0.22 (0.28) | 0.02 (0.0542) |
| Technology | 940 | 9.06 (1.63) | 0.16 (0.000) | ~3.43 (1.84) | 0.14 (0.0000) | 922 | 2.34 (0.47) | 0.15 (0.0000) | ~1.04 (0.53) | 0.13 (0.0000) |
| Tobacco Products | 10 | 3.82 (1.08) | 0.76 (0.0080) | ~0.47 (0.66) | 0.33 (0.1597) | 10 | 2.65 (0.79) | 0.85 (0.0021) | ~0.46 (0.45) | 0.63 (0.0290) |
| Trading | 1,087 | ~1.08 (1.33) | 0.04 (0.000) | 1.46 (1.37) | 0.04 (0.0000) | 1,016 | ~0.334 (0.52) | 0.01 (0.0035) | 0.06 (0.50) | 0.01 (0.0042) |
| Transportation | 290 | ~1.95 (3.06) | 0.03 (0.0195) | 5.10 (2.50) | 0.04 (0.0039) | 251 | 0.71 (0.84) | ~0.0008 (0.4403) | 2.11 (0.71) | 0.03 (0.0194) |
| Waste | 41 | ~0.29 (0.36) | 0.06 (0.1835) | ~0.70 (0.73) | 0.07 (0.1680) | 25 | 0.03 (0.17) | 0.40 (0.0057) | ~0.52 (0.32) | 0.45 (0.0025) |
| Waste Management | 54 | ~.48 (2.23) | ~0.06 (0.9281) | ~2.41 (1.12) | 0.03 (0.2504) | 47 | ~1.19 (1.14) | 0.07 (0.1261) | ~0.68 (0.73) | 0.06 (0.1393) |
| Wholesale | 343 | 2.64 (2.32) | 0.06 (0.0001) | ~0.05 (1.91) | 0.05 (0.0002) | 306 | 0.39 (0.61) | 0.01 (0.0771) | ~0.16 (0.53) | 0.01 (0.0878) |