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Innovation, Entrepreneurship and CSR: Understanding and Imitating MycoRemedy

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Editor's Note: This article is published as part of the joint [Soul of the Next Economy Forum](#) (SNEF) and *Western Talent & Innovation Review* Special Edition. The SNE Forum is held in Calgary Alberta each fall and is where business, the non-profit sector, government, and educational institutions converge to change the way we do business and impact society. The article below was written by an attendee of the September 2018 Forum.



Abstract

Many environmental and economic problems persist in our world today. However, these problems are often overlooked by many organizations. MycoRemedy is an Alberta-based environmental company that provides a simple solution to a devastating problem: the remediation of contaminated and toxic oil sites. By cross-referencing several interviews/lectures, this article describes MycoRemedy and the journey of Kelcie Miller-Anderson (founder) as it relates to innovation, social entrepreneurship, and CSR.

“Imagination is more important than knowledge.” This quote, attributed famously to Albert Einstein, is a belief by which Kelcie Miller-Anderson, founder of MycoRemedy, identifies with and believes intently in. Kelcie has successfully developed a company that has been able to innovatively solve one of the world’s largest industrial caused environmental problems to date. By attending a session Kelcie spoke at during the “Soul of The Next Economy” forum held at Ambrose University¹, as well as cross-referencing her findings and research with many other seminars/events she has spoken at, I have been able to compile comprehensive research regarding Kelcie and

her company.² This paper will aim to uncover the reason for Kelcie's success as a young entrepreneur as well as distinguish key factors that have set Kelcie and her company apart. Kelcie Miller-Anderson has a positive mindset and resolves that her mindset is not determined by what others may deem as limiting factors. She has revealed a number of personal aspects of her life in her public talks and interviews. Specifically, her age and disability are discussed below. Following that, the unique aspects of MycoRemedy are discussed. I believe that many aspiring entrepreneurs can learn from Kelcie's story.

Kelcie: Age & Disability

Age

At age 13, Kelcie worked in her first lab. At 15, she set sail through the Northwest Passage aboard Canada's Icebreaker as a research assistant. When she was 16, Kelcie developed a novel method of cryopreservation for the treatment of stem cells using completely natural methods. When Kelcie was 17, she spent her summer teaching English in Spain. At age 18, she was recognized as one of Canada's top 20 under 20 for the development of a new process of remediation. When Kelcie was 20, she spent a month as a research assistant on a coral reef monitoring project in Cuba. And finally, at age 21, she was regarded as one of the best and brightest up and comers in her field. Even though Kelcie has been highly successful, it has not been an easy journey for her. But she was still able to accomplish many things at a young age that paved the way for her entrepreneurial success.

To Kelcie, age is not a limiting factor. Often times people see someone who is young and do not think they have the same potential to develop scientific innovations and discoveries. Kelcie firmly believes that age does not equate success. She supports the notion that one's ability to look at something in a unique way is responsible for enabling success. New technologies and ground-breaking environmental innovations will not just come from well-established researchers or professors. Change can come from a diverse group of people, whether scientists or youth, who have a passion for creating change.

Disability

Her whole life, Kelcie has had to battle through illness. In university, she was diagnosed with two rare genetic conditions. The first condition is known as Eller's Downlow Syndrome, a connective tissue disorder. Her second condition is known as Mass Cell Activation Disorder. This disorder causes her to be allergic to almost everything, including the medication that is supposed to help her get better. Due to her illnesses, she requires a minimum of 14 hours of sleep a day to function. Rarely able to spend 8 hours a day awake, she regularly has only four productive hours a day for work. With creative time management, hard work, and dedication, she has been able to do more work in these four hours than most would be able to do in four days.

Because Kelcie has a disability, people often underestimate her ability. However, Kelcie has learned to not let disability dictate her life, but rather, she has chosen to learn to live with it. Kelcie ascertains that she feels a sense of responsibility to speak up and share her story so that others can understand that disability and illness are not limiting factors. Others may deem these factors as inhibitors to success, but they have made Kelcie a stronger entrepreneur, innovator, and person; her disability strengthens these things.

MycoRemedy

For Kelcie, it has never been solely about becoming a great scientist or working in a lab. It has always been about creating change. Everyone has the capacity to create change regardless of obstacles one might be facing or have to overcome. It is largely due to Kelcie's mindset that MycoRemedy, although only a small enterprise, is not only successful, but is building a sustainable and thriving organizational culture.

Beginning

When Kelcie was 15, she noticed a dandelion in her back alley growing through a crack in the asphalt. Knowing the asphalt to be hydrocarbon-based, she began to wonder how dandelions were able to grow almost anywhere. Kelcie soon discovered that dandelions were able to accumulate a fungus and form a symbiotic relationship with the fungus in its roots. It is this relationship that enables dandelions to access the nutrients and things they need to thrive in hostile environments. As an Albertan, Kelcie was and is aware of the large oil industry presence and the environmental problems associated with the industry. Kelcie wanted to see if she could use her research to solve one of the industry's largest environmental problems: the oil sands tailings ponds.

Kelcie then further researched the correlation between dandelions and fungi. She was able to extrapolate fungi from dandelion roots and inoculate the fungi into soybean plants. Although there was some resistance at first, Kelcie managed to obtain toxic tailings waste from various oil companies. She experimented by growing the soybean plants in tailings material to see if the plants could grow in the toxic material as well as eliminate the residual hydrocarbons left in the soil. However, toxins were found to accumulate within the plants; there was still a need to remove the plants and dispose of them in a proper facility. This method would prove to be highly resource intensive; the plants would have to be watered and people would have to take care of them to ensure proper growth.³ As well, for most of the year in Canada, it is not a growing season. Kelcie soon recognized that it was entirely fungi doing the remediation, not the plant. Upon further research, Kelcie found that the main ingredient of the fungus she had been studying is mycelium, which is wholly the vegetative part of a mushroom. She began to seek out cost-effective and environmentally friendly ways to fully remediate toxic landscapes using mycelium.

Development

The creation and development of MycoRemedy came about as a necessity for Kelcie. Due to Kelcie's illness, pursuing further education or working a full-time job was out of the picture for her. As well, Kelcie recognized that the only way for her technology to gain publicity was to commercialize her technology. She recognized that creating a solution did not mean her solution was going to be utilized. Sitting by and watching this solution go to waste was not something she was willing to do. So she established MycoRemedy. In establishing this company, her vision for is to change the way the world remediates.

In Kelcie's presentation at the *Soul of The Next Economy Forum*, she stated that almost every industry operating today has the problem of pollution. Contamination of air, water, and soil is a global concern that is elevated further by the lack of current technology. Much of the current technology is costly and takes a lot of time and effort to implement. 21,000 sites in Canada federally have been contaminated by oil well sites. There are approximately 150,000 abandoned well sites in Alberta alone that need remediation. Another estimated 500,000 sites in the U.S and 3.6 million in the E.U are in need of remediation. One of the biggest environmental concerns that is associated with the oil sands is the tailing ponds. Currently, the tailing ponds cover an area of 77 square kilometres in Northern Alberta. The government and organizations are having a difficult time remediating the affected areas.

Process

Through her continued research of mycelium, Kelcie was able to create a method for remediation that is 90% cheaper, 98% faster, and 100% more environmentally friendly than traditional forms of remediation. In addition, no chemical or energy inputs are necessary for this process to work. Within the fungi, there are enzymes that are released which digest, break down, and transform residual hydrocarbons so they no longer exist in the soil. This technology has been lab validated to show the elimination of hydrocarbons in the soil in as little as 21 days. Kelcie's process includes looking for fallen trees and decomposing trees. She then identifies mushrooms that are naturally breaking the trees down. After taking samples, she identifies the mushrooms, and then clones them. Similar to how mushrooms act in nature, Kelcie uses the mycelium in mushrooms to decompose toxic material. The mycelium releases enzymes underground which then completely breaks apart any hydrocarbons and contaminants into smaller non-toxic components. There is no residual bio-contamination and the mycelium can be left in the soil indefinitely.

The mycelium is actually an integral part of any healthy ecosystem; leaving the mycelium in place helps re-establish local bacterial communities. This led MycoRemedy to the development of the Mycomat.

Mycomat technology is similar in appearance to sod and can be rolled on top of contaminated sites. From there, the mats remediate downward. Unlike competitive different methodologies of remediation, where you have to remove contaminants, Mycomat remediation happens on site. As well, because mycelium needs to be fresh, MycoRemedy manufactures everything within the two weeks leading up to the remediation. All the materials can be locally sourced which they can then bring into that area to manufacture near or around the area where they are going to be using the mats. The mats are not stockpiled, but rather, are made as they have demand. They are able to be manufactured in different sizes as it does not take very long to make the mats.

As MycoRemedy aims to be as environmental as possible, they source their mycelium differently depending on which site they are remediating. MycoRemedy chooses to clone and use indigenous mushroom species. They use native species so as to not introduce any new invasive species. And, although the Mycomat appears to be covered in a layer of plastic, MycoRemedy uses bio compostable plastic; there is no pollution of any kind as a consequence for using the matt.

In analyzing the effects of their remediation on different landscapes, MycoRemedy has discovered a biofilm within the soil. This biofilm is a clustering/community of bacteria which inhibits a healthy environment. Normally bacteria will not grow properly in tailings material. The growth of healthy bacteria is stunted because of different toxins within the material. After reviewing the effect of their process of remediation, MycoRemedy noticed that remediation was taking place to a level where these bacteria communities were reforming on their own. Once the bacteria communities were re-established, the soil began to remediate at a bioremediation level remediating different toxins and components of the material on its own.

The Future

Kelcie's goal for MycoRemedy is for it to eventually be a non-profit. She would like to take it to areas of the world where remediation does not normally occur because of cost and environmental factors. The traditional methods of remediation, like digging up contaminated soil and dumping it in a landfill, will not work in places like rainforests. However, governments in developing countries tend not to take ownership of the contamination and do not force companies to do remediation. Kelcie's goal for MycoRemedy is to have a hybrid company where the sites remediated in Canada will actually fund the remediation of sites in the developing world.

Remediation is an industry that is expected to exceed \$80 billion by 2019. The Canadian government alone has already spent over \$300 million dollars annually on the remediation of federal sites. Remediation is a market that is large and growing. Contaminated sites are a global problem that must be addressed. With Kelcie's mindset to enact change in the world, and because the world is in desperate need of environmentally friendly ways of dealing with pollution, MycoRemedy is likely to thrive in the future.

Kelcie as a Social Innovator

Wendy Philips et al. quotes Geoff Mulgan when they define social innovation as "innovative activities and services that are motivated by the goal of meeting a social need."⁴ Although Mulgan defines social innovation as such, they agree that the concept of social innovation "remains significantly unresearched." However, Kelcie and MycoRemedy's conception of innovation aligns with the idea of meeting a social need.

Currently, the Alberta oil sands remain the third largest known oil sands reserves in the world. 99% of the oil Alberta produces comes from the oil sands. This resource provides billions annually for the province and the world. As well, it provides countless jobs. While most of the information that has been made public surrounding the oil sands tend to be negative, Kelcie recognizes the significance of the oil sands. Through innovation, MycoRemedy aims to assist the oil industry with its pollution while securing an economy that can support and foster further innovation. The Canadian economy depends on the oil sands, but the environmental implications of the oil sands continues to

be hotly debated. Instead of aiming to abolish an industry that supports countless jobs and the economy as a whole, MycoRemedy provides a solution that proactively addresses problems before they arise. This idea aligns with Philips et al.'s ideas when they claim that "the activity of ... social creation is characterized by pattern-breaking change or innovation." However, this process is not easily attained by a single person or enterprise.

Kelcie aims to facilitate the development of hybrid companies and assist other organizations in meeting her goal of transforming the way the world remediates. Social innovation, as quoted by Philips et al., exists within a "social innovation system – a community of practitioners and institutions jointly addressing social issues, helping to shape society and innovation."⁵ Kelcie does not believe that she thinks exclusively different from everyone else. She simply takes more time to focus on the world around her and makes sure she understands and observes things carefully; everybody has the capability to do that. For innovation to come to full fruition, it is in everyone's best interest not to criticize what is going on, but to solve some of the associated problems, together.

Kelcie as a Social Entrepreneur

Social Entrepreneurs within for-profit organizations are able to enact some of the most effective CSR efforts around the world. Haixin and Mengying argue that social entrepreneurs open up "new avenues for opportunity" when they take risks and adapt to new circumstances.⁶ Social entrepreneurs are those who generate both social and economic value by engaging with innovation. It is understandable then, that being a social entrepreneur goes hand in hand with practicing innovation. Social entrepreneurs use innovation to generate profit while being sustainably and economically sensitive at the same time. To back up this claim, Philips et al. ascertains that "both social entrepreneurship and social innovation share common overlaps, significantly in the process of identifying problem-solving opportunities for unmet social needs."⁷ Kelcie, through MycoRemedy, embodies what it truly means to be a social entrepreneur.

CSR and Conclusions

Heledd Jenkins, in her article titled "A Critique of Conventional CSR Theory: An SME Perspective," claims that small and medium-sized enterprises (SMEs) are becoming more prominent "both numerically and economically, a trend that is set to be maintained."⁸ As well as describing the importance of SMEs, Jenkins relates to readers the idea that, because SME's make up close to 90% of business worldwide, these organizations are at the forefront of some of the most prominent CSR efforts. CSR is for all sizes of companies. Jenkins notes the distinguishing differences between SME's and large corporations, but the implications for CSR remain the same.

MycoRemedy gives us a great Western Canadian example that all sizes of companies can focus on CSR. Being environmentally sensitive and enacting positive change in the world should not be limited by how big or small an organization is. Through novel innovation and continued collaborative efforts with other companies, MycoRemedy continues to find new ways of exhibiting CSR within the organization. Many companies are pressured legally into practicing CSR, but MycoRemedy is not doing so for legal reasons. Kelcie has proven herself to be an effective innovator and a successful social entrepreneur. Her company has been able to maintain a profit while it is entirely socially responsible; in fact, profit for her is entirely dependent on being socially responsible.

I conclude with a personal view of Kelcie's research. I believe that Kelcie's process of remediation has far greater implications than being for purely environmental reasons. As Kelcie's technology has been proven to remediate landscapes effectively, it is my understanding that because her technology is so effective, other industries, specifically the farming industry, will benefit greatly. If land that has been for the longest time unusable, is now able to be farmed, the economic implications, I believe, are significant. More available healthy land equates to more growth and production. This is especially beneficial to areas where oil rigs are no longer mining. Kelcie has not explicitly made this claim, however, I believe this to be an area where further research should be conducted.

Disclaimer

The research for this article was conducted independently by the author. All views, unless otherwise stated, have been sourced from interviews, lectures, public speeches, etc. by Kelcie Miller-Anderson.

About the Author

Connor Bayduza is a second-year student at Ambrose University. He is currently pursuing a Bachelor of Arts in English Literature, with a minor in business with the aim of working towards an education degree. Connor has directed summer camps and has also worked within the primary elementary school system as an EA. Connor can be contacted via [LinkedIn](#) or [Email](#).

Endnotes

- ¹ See <https://www.youtube.com/watch?v=IHuXr7Y2VIA&t=2444s> for additional information regarding MycoRemedy.
- ² For example, see <https://www.mycoremedy.com> for additional information regarding MycoRemedy. See also <https://www.thehitch.ca/putting-nature-to-work/>, https://www.youtube.com/watch?v=BF_Ym4CgZ7U, <https://www.ted.com/tedx/events/28544>, <https://www.youtube.com/watch?v=-bsbVIQM5jA>, <http://healthyveg.org/tag/oil-and-gas/>, <https://www.youtube.com/watch?v=ehDfwYdSXSg>, <https://www.youtube.com/watch?v=98N-aVxcFvk> and https://www.youtube.com/watch?v=aKP_hYiv7FM
- ³ Schröder, Peter (2008, November 12). Phytoremediation *Journal of Soils and Sediments*, 3(4), 228.
- ⁴ Phillips, Wendy et al. (2015, June 1). Social Innovation and Social Entrepreneurship *Group & Organization Management: An International Journal*, 4(34) 428-461.
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- ⁸ Jenkins, Heledd (2004, June 1). A Critique of Conventional CSR Theory: An SME Perspective *Journal of General Management*, 29(4) 37-57.