

The Place of Technology in Social Entrepreneurship

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## Abstract

This thesis explores the place of technology in social entrepreneurship. Unlike other related fields such as entrepreneurship and innovation, research into the space technology has in social entrepreneurship has largely been neglected. To this effect, a systematic review of existing literature was carried out along with an analysis of fifty rigorously selected real-world social entrepreneur cases. The findings, among other things, revealed (i) the positive outlook on technology within social entrepreneurship literature (ii) (ii) The degree to which technology is applied to wicked problems (mapped using the UN's Sustainable Development Goals) (iii) the role social entrepreneurship plays in introducing technology – particularly high technology – to the Global South.

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# CHAPTER 1

## INTRODUCTION

This chapter reveals the background, purpose and structure of the present research. The research topic as stated in the title is “The place of technology in social entrepreneurship”. The following sections reveal more details on how this research will be carried out.

### **1.1 Background and Purpose of Study**

The purpose of this study is to explore and increase understanding on the place of technology in social entrepreneurship. Social entrepreneurship is a form of entrepreneurship that is concerned with not only the generation of economic value, but also the creation of social value (Steyaert & Dey, 2010). Social entrepreneurs have a mission to improve environmental, social, educational and economic conditions, to this end, they work to create scalable innovative solutions to problems (Balachandran & Sakthivelan, 2013). The activity of social entrepreneurs is important for a variety of reasons, a major one being its focus on finding solutions to ‘wicked problems’ (Westley & McGowan, 2014). Wicked problems are social and cultural challenges that are difficult to solve. These problems are complex due to their scope, interconnectedness and the number of stakeholders involved (Kolko, 2012). These problems range from environmental to educational and affect both developed and developing nations. The United Nations, in a bid to create a common global vision, developed the Sustainable Development Goals to embody solutions to these problems and challenges (Osborn, Cutter & Ullah, 2015).

Technology has been identified as a vital resource which possesses the capability to transform ideas into operational endeavours, the opportunities afforded by technology allow for the



development of new enterprises and ventures, and the scaling up of existing ones (Gopalkrishnan, 2012). Research has been done to understand the role technology plays in domains ranging from entrepreneurship (Dahlstrand, 2007) and innovation (Hoffman et al., 1998) to national economic growth (Malecki, 1997) . Nevertheless, the space technology has in social entrepreneurship has been largely neglected (Mulloth, Kickul & Gundry 2016). Consequently, there is a need to understand how social entrepreneurs leverage technology to solve wicked problems. As the Sustainable Development Goals were created to embody solutions to many of these complex problems (Osborn, Cutter & Ullah, 2015), this study uses the SDGs to map out the activity of these social entrepreneurs and enterprises that leverage technology. The study also reveals the activities of these type of social enterprises in the developing context, contributing to the growing body of literature that studies social enterprises and technological capability-building in developing economies (Peerally et al., 2018). A literature review in Chapter 2 will further explore the definitions and related concepts around social entrepreneurship and technology.

## **1.2 Methodology**

This research is two-fold – a systematic review of academic literature on technology and social entrepreneurship, and a qualitative analysis of social entrepreneurs involved with technology in a specified capacity. A systematic review addresses a specific topic, utilizes specified and clear methods to perform a thorough literature search and critical appraisal of individual studies, and reveals what is known and what is not currently known about the topic in question (Briner & Denyer, 2012). The social entrepreneurs analyzed for the purpose of this study will be selected, using a clear and precise criterion, from the database of three reputable social entrepreneurship organizations – Ashoka, the Skoll Foundation and the Schwab Foundation for Social

Entrepreneurship. These three large and formal organizations have been highly effective in defining and influencing the meaning of social entrepreneurship (Hervieux & Voltan, 2018; Bravo, 2016).

Analysis of both the academic literature and the social entrepreneur cases will be carried out thematically using the ATLAS.ti coding software. The analysis of the academic literature will be inductive i.e. codes and concepts will be derived from the data (Braun & Clarke, 2012). The resulting codebook and concepts will then be used to deductively analyze the social entrepreneur cases, i.e. using a set of codes and concepts to interpret data, while making allowance for the discovery of new codes and concepts – a hybrid approach (Fereday & Muir-Cochrane, 2006). Chapter 3 will explain the methodology in detail.

### **1.3 Results and findings**

The results and findings from both the systematic review and the social entrepreneur cases will be high-level. Codes developed during the coding process will be used to establish categories and discover themes explaining insights revealed during the systematic review and analysis. Chapters 4 and 5 will reveal the results and findings from the academic literature and the social entrepreneur cases respectively.

### **1.4 Reflections, recommendations and limitations**

In the final section of this thesis – Chapter 6, reflections and lessons learned over the course of the research will be detailed. The implications of the research will also be revealed and used to recommend further research topics and questions on the relationship between technology and

social entrepreneurship. Lastly, the limitations of the study will be detailed, along with a conclusion.

## **CHAPTER 2**

### **LITERATURE REVIEW**

The purpose of a literature review is to introduce context and current thinking (Robinson & Lowe, 2015). Literature reviews are general and cover many aspects of a topic. As this present research is concerned with research into social entrepreneurship and technology, this literature section covers related concepts and aspects on social entrepreneurship and technology. Specifically, it looks at the definitions of both social entrepreneurship and technology, social entrepreneurship concepts such as wicked problems and social value, and technology concepts such as technology transfer and technological capabilities. The literature review also goes a step further by covering existing literature that intersect both social entrepreneurship and technology – these include papers on inclusive innovation and low technological development.

#### **2.1 Social entrepreneurship**

Although the idea behind “social entrepreneurship” is not novel, the term itself is a fairly recent construction; the earliest use of the term has been traced to a publication by Waddock & Post, (1991) titled “Social entrepreneurs and catalytic change” (Moss, Lumpkin & Short, 2005). There is no universally accepted definition of social entrepreneurship (Seelos & Mair, 2004). This said, there is a consensus that social entrepreneurship has for priority its social purpose, it is imbedded into its activities (Austin, Stevenson, & Wei-Skillern, 2006), the mission being central and above other considerations of the business (Hervieux, Gedajlovic and Turcott, 2010). Alvord, Brown and Letts (2004) notably define social entrepreneurship as a driver of social transformation, they further describe it as a concept that creates innovative solutions to social problems and mobilizes

resources, ideas and social structures for persisting social transformations. In this definition, they characterize issues such as poverty and marginalization to be key examples of persistent social problems. Another relevant definition of social entrepreneurship was put forward by Mort, Weerawardena and Carnegie (2002; p. 76), in this definition, they describe social entrepreneurship as “a multidimensional construct involving the expression of entrepreneurially virtuous behaviour to achieve the social mission, a coherent unity of purpose and action in the face of moral complexity, the ability to recognise social value-creating opportunities and key decision-making characteristics of innovativeness, proactiveness and risk-taking.” Steyaert and Dey (2010; p.91) present a narrative of social entrepreneurship that merges ‘doing well’ (economic value) and ‘doing good’ (social value) under the notion of a twofold bottom line. The underlying theme in the above definitions, and most definitions of social entrepreneurship is a primacy of social or environmental outcomes and value over profit maximization (Huybrechts & Nicholls, 2012).

At the center of social entrepreneurship are social entrepreneurs and social enterprises. Bornstein (2004) defines social entrepreneurs as relentless individuals who aim to address major problems with novel and innovative ideas. Thompson, Alvy and Lees (2000) identify social entrepreneurs as people who gather resources to make a difference by satisfying unmet needs that the state cannot or will not meet. Dees (1998) sees social entrepreneurs as change agents dedicated to creating and sustaining not only private value, but also social value. On the other hand, social enterprises are private organizations focused on solving social problems and providing socially relevant offerings that are not adequately provided by existing organizations – both commercial and public (Dees, 1994). The concept of the social enterprise comes from a long history of organizations created to contribute to the common good and/or tackle socio-economic problems (Kay, Roy & Donaldson,

2016). Social enterprises can be also be described as social ventures social entrepreneurs use to effect social change (Teasdale, McKay, Phillimore & Teasdale, 2011).

Social entrepreneurs are actors that identify wicked problems and seek to solve them by creating viable and often commercial solutions. A key characteristic of wicked problems is revealed in their definition. Wicked problems are social and cultural problems that are complex to solve for a variety of reasons which include – an incomplete understanding of the problem itself, the actors, networks and people involved, the sizeable economic burden the problem represents, and the interconnected nature a problem has with other problems (Kolko, 2012). An example of the interconnected nature of wicked problems is the multi-dimensional relationship between poverty, education and nutrition (Kolko, 2012). As most social problems are wicked, social entrepreneurs are required to take a strategic approach to delivering value. The complexity of wicked problems is a reflection of the complex systems from which they emerge from – “systems in which cause and effect relationships are unknown or highly uncertain, and have multiple stakeholder with strongly held and conflicting values related to the problem” (Dentoni, Bitzer & Pascucci, 2015). Wicked problems include climate change, food insecurity and environmental degradation. Opportunities in social entrepreneurship arise from the identification of solutions to these problems; social value creation, which is the aim of social entrepreneurship, is about tackling these social problems and creating viable solutions to them (Corner & Ho, 2010).

An effective way to look at how social entrepreneurship achieves its aim is to take a look at existing social enterprises, the issues and social problems that seek to solve, and how their innovative solutions address the said problems.

**Table 2.1.** Social enterprises and how they address wicked problems to create value

| <b>Social Enterprise and Location</b> | <b>Social problem(s)</b>  | <b>Offering</b>   |
|---------------------------------------|---|---|
| Khan Academy, United States           | High cost of education and lack of access to education                          | The website – Khanacademy.org, reaches millions of students and individuals by providing videos that educate users and show them how to solve various problems. They have simultaneously increased access and improved the quality of education for millions around the world at no cost (Gopalkrishnan, 2013)  |
| Fairphone, Netherlands                | Unsustainable consumption and production  | The company aims to build a movement for fairer electronics with its offering – Fairphone. The company adopts a transparent approach in the production and distribution of this mobile phone by adopting sustainable, eco-friendly and responsible methods in the entire value chain – mining, design, manufacturing and life cycle (Patrignani & Whitehouse, 2015) |
| SELCO, Denmark                        | Lack of access to power and electricity and pollution/environmental degradation | SELCO puts solar power technology in the hands of disadvantaged populations in India. It provides lamps, cooking appliances and charging systems and its offerings have not only generated profit but also provided social value in adjacent problems such as health and education (Rao, 2012)  |

Sources: (Gopalkrishnan, 2015; Patrignani & Whitehouse, 2015; Rao, 2012)

In leveraging entrepreneurial and business-based models, the companies above have provided innovative solutions to wicked problems. In other words, social entrepreneurship presents a new way of directly tackling social problems. It synthesizes the principle of economic value with social value and therefore, provides a solution to social issues that are ignored or regarded as less profitable commercial ventures (Duvnäs, Stenholm, Brännback & Carsrud, 2012). It is ultimately through this the bold union of disparate ideas that social entrepreneurship aims to solve wicked problems and create value.

### **2.1.1 Critiques, limitations and barriers to social entrepreneurship**

To provide a holistic picture of social entrepreneurship, it is imperative to look at critiques, limitations and barriers. A first point to highlight is the tensions that arise as a result of the dual mission of social entrepreneurship, that is, social-economic tensions (Michaud, 2013). These tensions, described as a clash of principles or actions (Stohl & Cheney, 2001), are evident in the relationship between economic and social objectives. An over focus on market objectives has the potential to squeeze out and narrow the creation of social value while conversely, an excessive focus on social value can affect the financial aspects – which can in turn affect the survival of the enterprise (Michaud, 2013). Secondly, resource mobilization represents a key limitation to social entrepreneurs and social enterprises. The social purpose of social enterprises limits these organizations from adopting the same approaches as commercial organizations e.g. increasing profit through wide margins. Consequently, this means that compared to commercial enterprises, social enterprises often have reduced financial resources, this in turn makes it difficult to compensate staff as competitively as their commercial counterparts (Austin, Stevenson & Weiskillern, 2012).

Another critique of social entrepreneurship stems from the image and discourse propagated by influential organisations and actors within the space. The propagation of dominant discourses in social entrepreneurship – a field with disagreements on ideologies and practices – poses a number of risks, a key one being the flow of resources into organizations that fit this narrative regardless of actual performance or impact (Hervieux & Voltan, 2018). Two identified dominant discourses are (i) the ones that place a focus on the hero and business attributes of social enterprises and (ii)



the ones that focus on the networking and community aspect of social enterprises (Nicholls, 2010). Unsurprisingly, in a bid to secure available resources, this has led to social entrepreneurs tactically modelling their discourse to fit the dominant narrative within the space (Dey & Steyaert, 2012). Finally, performance measurement stands out as another critique of social entrepreneurship. While there are quantifiable indicators of performance for economic value, the measurement of social value poses a challenge due to several factors including non-quantifiability and multicausality (Austin, Stevenson & Wei-Skillern, 2012).

Despite all these critiques, the numerous benefits of social entrepreneurship – which include (i) its ability to leverage a strategic, innovative market-based approach to solving social problems (Dees, 2012), (ii) its ability to ‘meet social needs in a sustainable manner’ (Busenitz et al., 2016; p. 27), (iii) its ability to accelerate technological innovation (Crean, 2010), and (iv) the ability of the social mission aspect to improve the competitive advantage of a business (Muñoz & Kimmitt, 2018) – ensure that it remains a viable approach to addressing wicked problems.

### **2.1.2 The Sustainable Development Goals (SDGs)**

The Sustainable Development Goals (SDGs), which officially came into effect on January 1, 2019, were formed during the meeting of High Representatives and Heads of State and Government at the 2015 General Assembly (United Nations, 2015). During this meeting, the 70<sup>th</sup> General Assembly, 17 Sustainable Development Goals with 169 targets were announced as successors to the Millennium Development Goals (MDGs) – to build on what was achieved and to complete what was not achieved. They were developed and adopted as part of the 2030 Agenda for Sustainable Development – “a plan of action for people, planet and prosperity” that seeks to

“strengthen universal peace in larger freedom” (United Nations, 2015; p. 3). These goals and indicators were created by the Open Working Group of the General Assembly on Sustainable Development Goals in conjunction with a multitude of stakeholders from government, civil society, business and the scientific community (Littlewood & Holt, 2018). In a historical context, the previous formation of the MDGs marked a significant method of global mobilisation to establish a set of pressing social priorities (Sachs, 2012). The MDGs addressed pressing social problems including poverty, hunger, disease and gender inequality. Nevertheless, it had its shortfalls, particularly that; (i) it expressed targets mainly for poor countries (ii) it had insufficient emphasis on environmental objectives (Sachs, 2012). The SDGs were positioned to overcome these shortfalls by setting goals that were inclusive of all countries, emphasizing the need for environmental sustainability without reducing the focus on others, and promoting the need for a global partnership for sustainable development (United Nations, 2015).

The SDGs and their targets are “the result of over two years of intensive public consultation and engagement with civil society and other stakeholders round the world, which paid particular attention to the voices of the poorest and most vulnerable” (United Nations, 2015; p. 5). The table below shows each of the individual goals and their objectives.

**Table 2.2.** SDG numbers and objectives

| <b>Goal No.</b> | <b>Objective</b>   |
|-----------------|--|
| SDG 1           | “End poverty in all its forms everywhere”  |
| SDG 2           | “End hunger, achieve food security and improve nutrition and promote sustainable agriculture”                          |
| SDG 3           | “Ensure healthy lives and promote well-being for all at all ages”  |
| SDG 4           | “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”                 |
| SDG 5           | “Achieve gender equality and empower all women and girls”  |
| SDG 6           | “Ensure availability and sustainable management of water and sanitation for all”                                       |
| SDG 7           | “Ensure access to affordable, reliable, sustainable and modern energy for all”   |
| SDG 8           | “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all” |
| SDG 9           | “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”            |

|        |  |
|--------|--|
| SDG 10 | “Reduce inequality within and among countries”   |
| SDG 11 | “Make cities and human settlements inclusive, safe, resilient and sustainable”   |
| SDG 12 | “Ensure sustainable consumption and production patterns”   |
| SDG 13 | “Take urgent action to combat climate change and its impacts”  |
| SDG 14 | “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”   |
| SDG 15 | “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss” |
| SDG 16 | “Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels”            |
| SDG 17 | “Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development”   |

Source: (United Nations, 2015; p. 16)

### *2.1.1.1 SDGs – Targets and indicators*

Each of the 17 sustainable development goals has a list of targets and indicators. Targets, compared to goals, are a more micro list of objectives. Accomplishing each of a goal’s targets is essential to accomplishing the goal itself. There are 169 targets for all the 17 goals (United Nations, 2015). An example of this is target 1.1 for Goal 1 – No poverty which is revealed below (Osborn, Cutter and Ullah, 2015; p. 12):

“1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day”

Each target is measured using indicators, with an average of 1 to 3 indicators per target (UNSC, 2015). There are 232 approved indicators used to measure progress towards reaching the targets (MacFeely, 2019). Following from the previous example, the indicator for target 1.1 is revealed below (UNSD, 2018; p. 1):

“1.1.1 Proportion of population below the international poverty line, by sex, age, employment status and geographical location (urban/rural)”

Ultimately, the targets and indicators provide a more micro-level, detailed and nuanced roadmap for accomplishing the 17 sustainable development goals.

#### *2.1.1.2 Critique of Sustainable Development Goals*

The Sustainable Development Goals, like the Millennium Development Goals, have also been subject to criticism by scholars and other stakeholders. Hickel (2015; p. 2) expressed the opinion that the positioning of GDP growth as the main solution to poverty was misguided, he advocated for a new, ‘saner measure of human progress’ that doesn’t rely on increased extraction and consumption – both activities he viewed as counter to the SDGs’ goal for environment sustainability. Holden, Linnerud and Banister (2017; p.1) theorize that by attempting to cover all the desirable objectives, the SDGs end being as ‘vague, weak, or meaningless’, he goes on to advocate for the need to prioritize – distinguish between primary, critical goals, and secondary goals. Battersby (2017) offers a more focused critique by arguing that the food goal – SDG 2- is flawed, due to its neglect of the peculiarities of food insecurity – particularly the urbanization food insecurity in Africa and the nutrition transition. She objects against the dominant framing of food insecurity as one of rural scarcity by presenting evidence of nutrition transition – revealed in increasing rates of obesity in Africa due to the reduced availability of healthy, traditional, unprocessed food, and urban food insecurity – caused by weak market structures, food safety challenges and structural poverty (Battersby, 2017).

These critiques represent alternate viewpoints and are necessary in developing a more holistic view about the SDGs and the challenges they seek to address. Even so, there are many benefits to derived from the Sustainable Development Goals, these include – (i) the establishment of an aspirational and non-legally binding global governance strategy that aids and stimulates governments, private companies and other stakeholders in creating unique strategies for implementation (Stevens & Kanie, 2016) and (ii) a renewed focus and research into sustainable development and sustainability (Filho et al., 2018).

#### *2.1.1.3 The role of social entrepreneurship in actualizing the SDGs*

Finding solutions to wicked problems is a major aim of social entrepreneurship – particularly with its part focus on the creation of social value (Westley & McGowan, 2014). Vasseur et al. (2017) identify how the SDGs not only signal the presence of “unavoidable wicked problems”, but also encapsulate two particularly pressing ones – climate change and land degradation. Consequently, this implies that the presence of a link between social entrepreneurship and the sustainable development goals. A 2015 report by Social Enterprise UK made this link by advancing the argument that social enterprises have a crucial role to play in the achievement of the SDGs (British Council & Social Enterprise UK, 2015). Additionally, while there are several frameworks that utilize the SDGs to measure impact across different types and categories of businesses, there is a limited presence of academic literature exploring the link between social entrepreneurship and the SDGs (Littlewood & Holt, 2018). Select findings from a portion of the available literature exploring this relationship include: (i) the potential for social entrepreneurial tourism to contribute to the SDGs (Buzinde et al., 2016), (ii) the potential for cooperatives to contribute to the

sustainable development goals – particularly SDG 8: Decent work and economic growth (Wanyama, 2015), and (iii) the potential for social entrepreneurship to contribute to the actualization of SDG 6: Clean water and sanitation in India (Ramani, SadreGhazi & Gupta, 2017). Littlewood and Holt (2018), exploring this relationship further, developed a conceptual framework to understand the contribution of social entrepreneurship to the SDGs. The framework illustrates the connection between social entrepreneurship and the sustainable development goals by providing dimensions to map the number of value chain activities in a social enterprise that contribute to the SDGs, and the number of SDGs these contributions focus on.

#### *2.1.1.4 The role of technology in actualizing the SDGs*

The role of technology in the actualization of the sustainable development goals is, to a very large extent, encapsulated within the original United Nations agenda document (United Nations, 2015). A large number of each individual goal's targets express the need for science and technological innovation in different forms. A few examples include; (i) target 5.b for SDG Gender Equality which is to “Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women” (United Nations, 2015; p. 20), (ii) target 8.2 for SDG Decent Work and Economic Growth which is to “Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors (United Nations, 2015; p. 21), (iii) target 9.b for SDG Industry, Innovation and Infrastructure which is to “Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities” (United Nations, 2015: p. 23) and (iv) target 17.7 for SDG Partnership

for the goals which is to “Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed” (United Nations, 2015; p. 29).

Sachs (2012), talking during the early conception days of the SDGs, posited that technological change is crucial to meeting goals for sustainability. He expressed the idea that fulfilling the goals would require both the need to expand the reach of key technologies, and the need to create entirely new technologies. Imaz and Sheinbaum (2017; p. 9) buttress this point by highlighting that “the paths to a low-carbon economy to reduce GHG emissions are highly related to the access of more efficient and renewable energy technologies”. Finally, Sachs et al. (2015; p. 9) reveal, in addition to others, following five powerful ways in which information and communications technology could be a tool to accelerate action on the SDGs: “(i) accelerated upscaling of critical services in health, education, financial services, smart agriculture, and low-carbon energy systems, (ii) reduced deployment costs addressing urban and rural realities, (iii) enhanced public awareness and engagement, (iv) innovation, connectivity, productivity and efficiency across many sectors, and (v) faster upgrading in the quality of services and jobs”.

#### *2.1.1.5 The United Nations perspective on technology*

The United Nations recognises the ability of technology to transform economies, increase productivity and ultimately improve living standards (UNCTAD, 2018). The organization also identifies the role of new and emerging technologies in accelerating the achievement of its 2030 Sustainable Development Agenda (Guterres, 2018). Beyond the identification of technology as a critical resource within the SDG’s targets and indicators (United Nations, 2015), the United

Nations and its numerous subsidiary organs have developed reports on how technology can play a vital role in fields ranging from peacekeeping (Lute et al., 2014) to trade and development (UNCTAD, 2015). These reports, which present a broad view on the role of technology in development, are not included in the first portion of this research – the systematic review. This is chiefly because the reports are beyond the scope of the systematic review – which is intended to focus on academic literature.

### **2.1.3 Potential benefits of technology to entrepreneurship and economic growth**

The implications of technology on the economic growth of a nation or firm are numerous and often varied – depending on contextual factors, technological innovation, either through technology transfer or development of new technologies, could lead to increased productivity and employment, or reduced employment (Naudé, 2019). In a favourable context, technological advances lead to the development of new innovations, and the formation of new enterprises (Ulijn & Brown, 2004). A favourable context is one in the which the opportunities presented by technology are used to drive growth through the creation of new effective solutions. Entrepreneurs have a vital role to play in “the development of technological structure” (Hussain et al., 2011; p. 45). They do this by introducing new products and services based on breakthroughs in scientific research, Gione and Brem (2017) tag this category of entrepreneurs as technology entrepreneurs. The innovation capabilities brought about by technology even allow small entrepreneurial firms to challenge big companies (Hussain et al., 2011). Technology also facilitates existing business activities by improving access to information and increasing a firm’s ability to reach new consumers and serve broader areas (West, 2012).



Technological gaps both within and between countries are a major issue, resulting in a “divide between those who have access to technology and those who do not have access to it” (Nora et al., 2011; p. 3374). One step to empowering the have-nots is to provide them with access to these technologies. As with most wicked problems, the interconnectedness with other issues is a major source of complexity (Kolko, 2012). The implications of providing technology to the have-nots are often unpredictable and far-reaching. An example is the introduction of information and communication technologies to the marginalized Zapatistas in Mexico, this introduction of this technology equipped them with the power to fight oppression (Gelsomino, 2010). ICT usage e.g. access to internet, gave the Zapatistas a platform “build a trans-national solidary network among human rights groups” (Gelsomino, 2010; p. 2) and advocate for more favourable deals in issues concerning resource extraction and land rights.

Technology also serves as a tool to involve marginalized groups in commercial and economic activity. Naudé (2019) identifies the Youth for Technology Foundation as a social enterprise dedicated to empowering marginalized youth and women by instructing them in the entrepreneurial use of technology. One of the foundation’s projects is a 3D-printing academy for girls in Nigeria, Kenya and Uganda.

#### *2.1.2.1 Limitations of technology*

Despite the numerous advantages and benefits technology offers, in order to escape the trap of technological optimism (Huesemann, 2003), it is important to look at its limitations. The first is that technological solutions and projects require more capital compared to others, Bateman and Chang (2012) imply this while identifying how the microfinance sector diverts scarce resources

from technology projects to simple microenterprise solutions. Another very important limitation is the fact that technology and technological solutions depend on a limited biosphere – non-renewable resources, and often have unavoidable negative environmental consequences (Huesemann, 2003). An example to illustrate this point is the use of synthetic plastics – which while enabling mass production of goods, has led to environmental pollution due to the non- or slow degrading nature of plastics.

While more technological limitations potentially exist, this does not subtract from the proven and potential benefits of technology as a resource to address wicked problems (Gopalkrishnan, 2013). In order to proceed to a more in-depth understanding of technology's place in social entrepreneurship, it is imperative to take a look at technology – its definitions, the definitions used for the purpose of this present research, and other important related concepts.

## **2.2 Technology**

The word technology is composed of two words of Greek origin – *technē*; meaning craft or technique, and *logos*; word or science (Kačerauskas, 2015). Taken together, the modern use of these two separate words communicates a concept that describes an activity involving the skillful creation of things or objects.

There are many cotemporary definitions of technology, McOmber groups these definitions of technology into three categories; technology-as-instrumentality, technology-as-industrialization and technology-as-novelty (McOmber, 1999). The instrumentality definitions position technology to be the use of knowledge for practical reasons, that is, the creation of tools for specific uses, this

category does not adequately highlight the social significance of technology. By suggesting the value-neutrality and amorality of technology, instrumental definitions paint a one-dimensional view of the relationship between technology and culture – technological advancements create new opportunities and factors that lead to the reordering of existing structures. The instrumental definitions do not take a broad look at how social and cultural factors might affect technology and technological advancement. The technology-as-industrialization definition describes technology in a cultural and social context – the product of industrialization, by this standard, it categorises pre-industrial societies as communities that do not possess technology. It therefore takes a very limited view of what technology is as tools created before the industrial age would not be conceived as technology according to the terms of the definition. The third category defines technology as the “latest instrumental products of human imagination” (McOmber, 1999; p. 144). It limits the term technology to new devices and tools developed with the use of modern and often cutting-edge knowledge and science. This category highlights the ability of technology to reorganize society – social values, structures and priorities (McOmber, 1999).

The table below presents more definitions of technology.

**Table 2.3. Technology definitions**

| <b>Author(s) &amp; Year</b>    | <b>Definition</b>   |
|--------------------------------|---|
| (Kline, 1985)                  | Kline presents four common usages of the term technology:<br>Usage 1: All non-natural objects, hardware and artifacts manufactured by people.<br>Usage 2: The sociotechnical system of manufacture – the elements, that is, the complete working system – people, resources, processes and economic, legal, political and physical environment needed to manufacture a certain kind of hardware.<br>Usage 3: The know-how – information, skills and techniques for accomplishing tasks<br>Usage 4: The sociotechnical system of use – that is a system that combines people, hardware and other elements to extend human capabilities (perform tasks that can't be performed without the system). |
| (Dean & LeMaster, 1995; p. 19) | “Technology is defined as firm-specific information concerning characteristics and performance properties of production processes and product development”  |

|                         |   |
|-------------------------|---|
| (Maskus, 2004; p. 9)    | <p>“First, a technology may be defined as the information necessary to achieve a certain production outcome from a particular means of combining or processing selected inputs.”</p> <p>Technology can be further classified into embodied – which is the information in the form of an actual product, and disembodied – which is know-how.</p>  |
| (Volti, 2009; p. 6)     | <p>“A system created by humans that uses knowledge and organization to produce objects and techniques for the attainment of specific goals”</p>   |
| (Carroll, 2017; p. 18). | <p>“Technology is (a) something that is always inherently intelligent enough either to function, to be used to function, to be imbued with, or to be interpreted as having, a function that only intelligent beings (human or otherwise) have the ability to comprehend; (b) something devised, designed (i.e., primary intention), or discovered (i.e., secondary intention) that serves a particular purpose from a purely secular standpoint, without requiring that mankind be responsible for it, though he may be (i.e., the aspect of reflexivity through purpose in that salt doesn’t inherently “elevate” or do anything deliberately, but it does “elevate” the boiling point of water, which it has been found to do and can be considered to serve a purpose); (c) a significant beneficiary of rationally-derived knowledge that is “used for” a purpose, without itself necessarily being translated into something physical or material that “does” (e.g., instructional methodologies in education, processes, ideas).”</p> |
| (OECD, 2018)            | <p>According to the fourth edition of the Oslo Manual (2018), The Organisation for Economic Co-operation and Development defines technology as “the state of knowledge on how to convert resources into outputs”.</p>   |

Evidently, and as the above definitions show, there are many ways to present technology, from the manufacture of tools and objects to the application of knowledge to produce objects and techniques. For the purpose of this present research, technology is described as (i) the use of knowledge and organization to produce objects and technique for the attainment of specific goals (Volti, 2009) and (ii) cutting-edge tools, techniques and products developed using advanced knowledge – science and related fields (McOmer, 1999).

### 2.2.1 High and low technology

There are varying degrees of technology, from low technology (low tech) to high technology (high tech). Hatzichronoglou (1997), in the OECD Science, Technology and Industry Working Papers, uses two approaches in the classification of technology into high and low – sectoral and product. The sectoral approach uses the R&D intensity of industries as an indicator for classification; R&D intensity can be direct – concerned with degree of technology production, or indirect – concerned with degree of technology use. The paper recognizes some measure of arbitrariness in the classification of industries. The table below shows the grouping of industries based on the OECD’s sectoral approach:

**Table 2.4.** Sectoral classifications of high and low technology

| <b>Low-technology</b>   | <b>Medium-low-technology</b>  | <b>Medium-high-technology</b>  | <b>High-technology</b>  |
|---|---|--|---|
| 1. Paper printing<br>2. Textile and clothing<br>3. Food, beverages and Tobacco<br>4. Wood and furniture | 5. Rubber and plastic products<br>6. Shipbuilding<br>7. Other manufacturing<br>8. Non-ferrous metals<br>9. Non-metallic mineral products<br>10. Fabricated metal products<br>11. Petroleum refining<br>12. Ferrous metals | 13. Scientific instruments<br>14. Motor vehicles<br>15. Electrical machinery<br>16. Chemicals<br>17. Other transport equipment<br>18. Non-electrical machinery | 19. Aerospace<br>20. Computers, office machinery<br>21. Electronics-communications<br>22. Pharmaceuticals |

Source: (Hatzichronoglou, 1997)

The second approach is the product approach. The technology content of products is considered in this approach – which is solely concerned with the high-technology classification. Medium-high, medium-low and low technology products aren’t identified. The product approach supplements the sectoral i.e. some products classified as high-technology arise from the medium-high sector i.e. motor vehicles from the automobile industry.

Steenhuis and Bruijn (2006) propose two dimensions for differentiating high, intermediate (medium) and low technology, these dimensions are complexity and newness. According this definition or method of differentiation, complexity is revealed through two measures – product and process complexity – which are concerned with how complex the product itself is, and how complex the process of creating the product is – while newness is revealed through product development rate, which measures the intervals between new product generations or the rate of introduction of new technology products.

### **2.2.2 Technological capabilities**

Developing countries commonly exploit existing technology from more developed countries in the process of development, exploiting this technology efficiently and leveraging it to maximize growth requires technological capabilities (Bell & Pavitt, 1995). Technological capabilities are essentially “the resources needed to generate and manage technical change” (Bell & Pavitt, 1995; p. 78), with technical change being the introduction of new technology, particularly in the form of products, equipment and machinery. These capabilities comprise the knowledge, skills and institutional structures required to not just use technology, but also create and improve it. Technological capabilities range from basic – which includes adapting the new technology to market needs, to advanced – which includes product innovation and research and development (Bell & Pavitt, 1995).

Technological capabilities are a major factor that in the ability of developing countries, and firms in developing countries, to ‘catch up’ to their developed counterparts. To catch up essentially

means for a developing economy or firm to close the gap that exists between its technological capabilities and that of a more developed economy or firm (Bell & Figueiredo, 2012). Two kinds of gaps exist between the technological capabilities of two economies and firms (Bell & Figueiredo, 2012):

- i. Gaps in production capabilities: Production capabilities, also known as operational capabilities (Peerally et al., 2018), being the technologies and processes used in the production of goods and commodities. The gaps influence how close the products manufactured in a developing economy match those at the technology frontier i.e. the economy that originated the process
- ii. Gaps in innovation capabilities: Innovation capabilities are the factors that enable a developing economy or firm to generate and manage change in technologies i.e. to move from a point of technology imitation to that of technological innovation. The gaps influence the degree of technological innovation in one firm or country compared to another.

Peerally, De Fuentes and Figueiredo (2018) present a real-world illustration of technological capabilities by looking at the activities of Grameen Danone Foods Limited (GDFL), a social business in a developing economy. GDFL was the first company to produce and sell sealed yogurt in Bangladesh. The study carried out by Peerally, De Fuentes and Figueiredo (2018) reveal how the company built its operational and innovative capabilities – in project management and equipment related activities, process and production organization, product development and the development of linkages within the community – from basic to intermediate levels. The company did this by technology acquisition and learning mechanisms. Learning covers the intentional and costly processes through which additional technical knowledge and skills are acquired by firms and individuals (Bell, 1984). Learning can be internal or external. GDFL learned by doing through

the acquisition and repurposing of a used ammonia compressor to feed the company's cold room; this low-cost innovation served as a learning process on how to organize and deploy resources to minimize costs (Peerally et al., 2018). The company learned by interacting through the external acquisition of knowledge on process organization from the Industrial Director of Danone Asia Pacific (IDDAP) and an integrator based in China. Learning through internal training and knowledge codification was made possible by the Senior Quality Control Executive training a junior Quality Control Executive and seven laboratory technicians (Peerally et al., 2018).

Through these learning processes, the GDFL was able to build its operational capabilities and innovate effectively, consequently improving its ability to deliver value to its consumers in Bangladesh (Peerally et al., 2018).

### **2.2.3 Technology product offerings**

Technology could also serve as a commercial offering or solution, and technology companies primarily develop, manufacture and provide technology as a product or service. This concept is the foundation of technology entrepreneurship; entrepreneurship focused on the transformation of technological innovation and research to economic and social value (Jakšić, Marinković & Rakićević, 2014). Technology entrepreneurs search for both existing problems and new applications for technology, in other words, they seek to create and deliver value by capitalizing on opportunities that rely on scientific and technical knowledge (Bailetti, 2012). Offering technology as a product often leads to a number of factors. A lot of technology products are innovative and fairly new products that require some form of market education, in other words, technology products often require unique marketing strategies. In Moore's book – Crossing the



Chasm (1991), he advocates for a unique form of marketing that takes into account the chasm that exists between the early users of technology products and the majority that require education and proof of usefulness. Technology companies and entrepreneurs also need to ensure they stay competitive through strategic knowledge acquisition and product development (Friesl, 2012). Easingwood and Harrington (2002) talk about three stages in taking technology products to market – Launch, which is focused on delivering the product to the market and convincing technology enthusiasts and early adopters to try it out; Development, which is focused on building the whole product and the final stage – Relaunch; which involves delivering the product to the mainstream market.

#### **2.2.4 Absorptive capacities**

The technological capabilities of a unit – either firm or country, determines its ability to exploit technological innovation efficiently. These capabilities can be developed and improved through internal and external learning. Learning, in the external sense, means exploiting outside knowledge, this is particularly crucial to an economic unit's innovative capabilities (Bell, 1984). Cohen and Levinthal (1990) argue that the ability to utilize external knowledge is largely a function of the level of prior knowledge. The ability to recognize the value of new information and utilize it appropriately and commercially is determined by this prior related knowledge – this ability is known as absorptive capacity (Cohen & Levinthal, 1990). Absorptive capacity has been studied at the individual level (Cohen & Levinthal, 1990), the firm level (Cohen & Levinthal, 1990), and the national level (Narula, 2004).

On a national level, it involves “the search for available alternative technologies and the selection of the most appropriate technology; the mastering of technology, that is, its successful use in the transforming of inputs into outputs; the adaptation of the technology in order to specific production condition; the further development of the technology as the result of minor innovations; the institutionalised search for more important innovations with the development of R&D facilities; the conducting of basic research.” (Narula, 2004; p. 7). In this context, absorptive capacity reflects a country’s ability to incorporate existing resources – technological opportunities into its production chain, and the foresight to predict and leverage relevant and potential technological flows. A nation’s absorptive capacity is its ability to learn, incorporate and use technology from developed and more technologically advanced nations (Narula, 2004).

In terms of firms and organizations, absorptive capacity is the ability to identify, incorporate and exploit knowledge and know-how from the environment (Narula, 2004). Companies with high absorptive capacities are able to leverage knowledge and technology generated by other companies more effectively (Nieto & Quevedo, 2005). Escribano, Fosfuri and Tribó (2008) show the positive relationship between absorptive capacity and competitive advantage in firms – enhancing the absorptive capacity of a firm increases its performance in innovation. Also, they revealed that government policies facilitating the increase in absorptive capacities across companies is likely to make a nation more receptive to international knowledge flows. Consequently, the absorptive capacity of a company in a developing nation determines its likelihood of playing a role in the transfer and adaptation of more advanced technology i.e. technology from developed nations. This is further supported in a study that posits absorptive capacity as one of the most crucial factors, above structural conditions such as technological opportunity and knowledge spillovers, that

determines the ability of a firm to leverage external knowledge for innovation (Nieto & Quevedo, 2005). Finally, while a firm's absorptive capacity is not simply the sum of the absorptive capacities of its individual members, these individual absorptive capacities are major determinant to the overall absorptive capacity (Cohen & Levinthal, 1990).

### **2.2.5 Technology transfer**

Another important factor to note is that on the national and international stages, technology is a major differentiator. Technological inequalities exist among countries (Gumbau-Albert & Maudos, 2013). Varying degrees of technological development between countries, sectors and organizations precipitate the need for technology transfer. Derakshani (1984; p. 27) defines technology transfer in the international context as “the acquisition, development and utilization of technological knowledge by a country other than that in which this knowledge originated”. For less developed countries with lower technological capabilities, one of the potential benefits of technology transfer is the increased economic opportunity (Madu, 1989). When technology from more advanced countries is transferred appropriately – according to the needs and capacity of the receiving country, it becomes a crucial resource in alleviating economic difficulties and solving complex problems (Madu, 1989).

Technology transfer could be from the public sector to private; this type of technology transfer is a critical economic driver in countries (Bauer & Flagg, 2010). It could also be from universities to public and private business organizations, within corporations or across industries. IDEO, a product design firm has leveraged the idea of technology transfer by taking existing technological solutions from different industries and applying them in domains where they are not known; it

calls this strategy – technology brokering, and IDEO has used it to deliver innovative solutions to different verticals and industries (Hargadon & Sutton, 1997).

### **2.2.6 How technology spreads and is accepted**

Scholars and researchers are constantly seeking to understand why and how technology spreads and secures a foothold in the market, that is, the theory behind technology diffusion; as at the year 2003, over five thousand articles on the topic had been counted (Ghezzi, Rangone & Balocco, 2013). While numerous models seek to explain technology diffusion, the theory was first considered when Gabriel Tarde produced an S-shaped curve and put forward the concept of innovation being more readily accepted by populations with a more cosmopolitan and open mindset; Ryan & Gross subsequently validated Tarde’s model and added the five steps for successful adoption – awareness, interest, evaluation, trial and adoption; Rogers went further by classifying groups and individuals based on their receptiveness to innovation, these classifications include; innovators, early adopters, early majority, late majority and laggards (Gopalkrishnan, 2013).

Finally, in a bid to understand how users accept and use technology, Davis (1985) put forward the Technology Acceptance Model (TAM) This model explains that a user’s “attitude towards using” explains whether or not he/she actually uses the technology; this “attitude towards using” is majorly a function of two beliefs – perceived usefulness, which is the extent to which an individual believes a particular technology would enhance his/her performance, and perceived ease of use, which is the extent to which an individual believes using a particular technology would be free of effort – both physical and mental (Davis, 1985). While this model has been extended, criticized

and revised, a fairly recent study in Turkey has validated the efficiency of TAM in explaining the intention of pre-service university teachers to use technology; in validating the model's efficiency, the study also provided some evidence for the model's cross-cultural validity (Teo, Ömer & Bahçekapili, 2011).

### **2.3 The relationship between social entrepreneurship and technology**

Before exploring the different elements of the relationship between social entrepreneurship and technology, it is important to identify a related concept – 'Inclusive Innovation'. The usual innovative activities focus on the production of new goods and services for higher-income customers, with the major actors being formal supply-side organizations and agents involved in research and development (Foster & Heeks, 2013). Development in the context of normal innovation is seen as economic growth. Conversely, inclusive innovation is a new trend arising in the Global South, it's been called pro-poor innovation (Horton, 2008) and bottom of the pyramid innovation (Kaplinsky, 2011). This type of innovation focuses on the development of new appropriate goods and services for low-income consumers, the major actors are non-traditional, less formal innovators – which includes social innovators and entrepreneurs (Foster & Heeks, 2013). Development in the context of inclusive innovation is seen as socio-economic inclusion.

Inclusive innovation warrants a mention because it is a description of many of the activities of social entrepreneurs and enterprises. An ideal illustration is Benetech, a technological company that focuses on the development of appropriate technology products for disadvantaged and low-income customers that the usual technology companies don't target (Girling, 2009).

### **2.3.1 The need to adapt technology**

A good number of the issues that social entrepreneurship strives to solve are best described as wicked problems – persistent social problems that are particularly difficult to resolve (Dorado & Ventresca, 2013). Taking a design approach, which includes – understanding the context of the problem and the actors involved, is a highly useful approach to resolving these wicked problems (Rittel & Webber, 1973).

Consequently, the application of technology in social entrepreneurship should take a human centered design approach if it is to be useful in providing viable solutions. This idea was adequately summed up by Daniel Hillel, at workshop organized by the World Bank in the late 1980s:

“Perhaps the most glaring problem demanding attention arises ironically from our very success in developing the technology of drip irrigation to such a high level of mechanization. Have we let our fascination with high technology take control of our research, and have we, in consequence, turned away from the majority of the people in this hungry world who really need irrigation? I am referring, of course, to the special needs and circumstances of developing countries” (Venot, 2015; p.69).

As revealed in the above statement, there is a pressing need to adapt technology to the scale and specific needs of communities in developing economies. Existing solutions could be too complex for the population, or not suitably adapted to the environmental conditions of a target community (Venot, 2015) (Justus, 2004). The needs and interests of those developing technology, and those

using this technology differ (Abram, Maloney-Krichmar & Preece, 2004), and an insufficient consideration of the user can take social entrepreneurs away from the very mission they aim to fulfill; that is the social problem they seek to solve (Cornforth, 2014).

An answer to this issue is to be found in how social entrepreneurs consider the needs and specific context they are in. Social enterprises – such as Dripteck and International Development Enterprises (iDE) have been able provide value and empower communities by designing and promoting drip irrigation to meet the specific circumstances of smallholders (Venot, 2015).

Additionally, while there is a need for high technology in developing countries, the markets in these communities are rarely commercially viable enough to attract high-tech companies (Girling, 2009). This creates an abundance of problems that only persist due to the low-profit potential of a population. Furthermore, social enterprises and NGOs attempting to provide these technologies are often limited by funding; and are therefore unable to create sustainable solutions (Desa & Basu, 2013).

A potential resolution to this issue is to create affordable alternatives to the required high-tech solutions. Benetech, a low-profit technology company with a goal to target customers “who most high-tech companies won’t go after”, has leveraged this method to provide low-cost reading machines for the blind (Girling, 2009). With this combination of low-cost product and low-profit model, Benetech has been able to not only make substantial impact but also generate millions of dollars in annual revenue (Girling, 2009). It is also important to note that a major factor that has

ensured the success of Benetech's model is the presence of socially motivated technical experts (Girling, 2009). As technical expertise often demands a high level of remuneration, the mission-based motivation of social entrepreneurs is a key factor in the success of this solution, as it ensures the availability of skilled labor.

One other solution to the issue of cost is to provide a free and open-source version. This method has been used effectively in the provision of Humanitarian free and open-source software (HFOSS) – software used in the humanitarian and disaster-response domain (de Silva, 2010). Limitations to this solution, as revealed through HFOSS projects, include ensuring the quality and sustainability of solutions, this because the drivers of this projects are actors tagged “software engineers without borders”. These software engineers are mostly volunteers with limited time and funds. A possible approach to overcoming this limitation is the creation of an ecosystem of social enterprises, NGOs, corporate social responsibility programs and volunteers all collaborating to ensure the sustainability of the free and open-source solutions (de Silva, 2010).

Adapting technologies to the needs of a community often requires long periods of product, process and business-model development, the complexity of market and cultural forces may lead to years and years of development (Crean, 2010). Understanding how customers perceive solutions, or the best way to deliver an offering could take a decade of trial and error.

There is a potential for social entrepreneurs to cut these long development periods by leveraging the benefits of a social enterprise business model. These advantages include its malleability, an



increased ability to acquire funding and the ability to take a design thinking approach by communicating with the customers and understanding their general context; to sum it up, social entrepreneurs are able to rapidly refine and develop prototypes – “fail early, fail cheaply, fail fast” due to their connection and with the community (Crean, 2010).

**Table 2.5.** Issues that precipitate the need to adapt technology

| Issues             | Definition   | Possible Solutions  |
|--------------------|--|---|
| Scale & Complexity | <p>There is a pressing need to adapt technology to the scale and specific needs of communities in developing economies. Existing solutions could be too complex for the population, or not suitably adapted to the environmental conditions of a target community (Venot, 2015) (Justus, 2004). The needs and interests of those developing technology, and those using this technology differ (Abram, Maloney-Krichmar &amp; Preece, 2004), and an insufficient consideration of the user can take the social entrepreneur away from the very mission it aims to fulfill; that is the social problem it seeks to solve (Cornforth, 2014).</p> | <p>An answer to this issue is to be found in how social entrepreneurs do consider the needs and specific context they are in. Social enterprises – such as Driptech and International Development Enterprises (iDE) have been able provide value and empower communities by designing and promoting drip irrigation to meet the specific circumstances of smallholders (Venot, 2015).</p>   |
| Cost/Profit        | <p>Certain communities – mostly developing economies, are not commercially viable enough to justify the cost of providing high-tech solutions, leading to an abundance of problems that only persist due to the low profit potential of the population (Girling, 2009).</p> <p>Furthermore, social enterprises and NGOs attempting to provide these technologies are often limited by funding; and are therefore unable to create sustainable solutions (Desa &amp; Basu, 2013).</p>   | <p>A potential resolution to this issue is to create affordable alternatives to the required high-tech solutions. Benetech, a low-profit technology company, has leveraged this method to provide low-cost reading machines for the blind (Girling, 2009).</p> <p>One other solution to the issue of cost is to provide a free and open-source version.</p> <p>It is also important to note that a major factor that has ensured the success of Benetech’s model is the presence of socially motivated technical experts (Girling, 2009). As technical expertise often demands a high level of remuneration, the mission-based motivation of social entrepreneurs is a key factor in the success of this solution, as it ensures the availability of skilled labor.</p> |

|      |   |   |
|------|---|---|
|      |   |   |
| Time | Adapting technologies to the needs of a community often requires long periods of product, process and business-model development, the complexity of market and cultural forces may lead to years and years of development (Crean, 2010). Understanding how customers perceive solutions, or the best way to deliver an offering could take a decade of trial and error. | There is a potential for social entrepreneurs to cut these long development periods by leveraging the benefits of a social enterprise business model. These advantages include its malleability, an increased ability to acquire funding and the ability to take a design thinking approach by communicating with the customers and understanding their general context; to sum it up, social entrepreneurs are able to rapidly refine and develop prototypes – “fail early, fail cheaply, fail fast” due to their connection and with the community (Crean, 2010). |

Sources: (Venot, 2015; Justus, 2004; Abras, Maloney-Krichmar & Preece, 2004; Cornforth, 2014; Girling, 2009; Desa & Basu, 2013; Crean, 2010)

In summary, the literature reveals the common issues that precipitate the need to adapt technology – cost, scale/complexity and time. These issues require the adaptation of more affordable, appropriate, user-friendly technology. Development times also have to be managed, and this might in turn necessitate process or product innovation. Case in point is a social enterprise – the International Outreach Program (IOP), which used information technology to innovate a more efficient outreach model with increased agility, greater depth and breadth of impact (Richardson, Kettinger, Banks & Quintana, 2014). Additionally, social entrepreneurship serves as unique and effective vehicle for adapting technology to community needs due to its nimble business model and mission-based motivation (Crean, 2010).

**2.3.2 The need to create new technology for social enterprise use**

New technology provides many benefits to social entrepreneurs and enterprises; it supports and scales activities that could only be previously carried out to a limited degree, and it allows for the

innovation of new social solutions and therefore, social enterprises (Gopalkrishnan, 2013). The potential benefits identified establish a need to create technology specifically for social entrepreneurship's core mission to solve wicked problems.

A good illustration of this concept is revealed in Benetech's Miradi – a software that was developed to aid environmental conservation teams and organizations (Gopalkrishnan, 2013). Numerous non-profits and social organizations such as the Centre de la Nature Mount Saint-Hilaire and The Amazon Conservation Team (ACT) now use Miradi to optimize their processes and activities and therefore, deliver more effective solutions (Miradi, 2019).

Social enterprises often face limitations and obstacles due to limited resources (Peredo & McLean, 2006). The ability of new technology to address resource limitations by reducing product and process costs (Mirvis, Sales & Hackett, 1991) creates new possibilities. Taking a design approach to find out internal problems faced by social enterprises is an effective way to find out possible limitations that technology can be created to resolve.

It is important to note that a distinction exists between a social enterprise using existing technology; either high or low technology, and using technology specifically created for its activities. While most of the benefits intersect, technology created specifically for social enterprise activities have the potential to be more effective at improving efficiencies due to its customized ad hoc nature.

In other cases, social entrepreneurship's unique business model can be an effective vehicle for deploying new technology to society. This has been leveraged by certain universities, and research institutions that have chosen to target newly developed technology to social entrepreneurs – who then serve as a vehicle for technology transfer into society and the mainstream market (Lipinski, Lester & Nicholls, 2013).

Studies show that about 75% of university inventions are never brought to market (Lipinski, Lester & Nicholls, 2013). Lipinski, Lester and Nicholls (2013) through their proposed model, recognize a huge potential for social entrepreneurship – with its design approach, mission drive, flexible business model and ability to garner institutional support, to benefit immensely from the use of this new technology and serve as a means to get the technology to the broader market.

### **2.3.3 The need to develop tech for community**

Technology serves as a resource to both improve existing solutions and innovate new ones (Gopalkrishnan, 2013). It could be a vital tool for inclusive development i.e. development focused on marginalized and low-income peoples and communities (Cozzens & Sutz, 2014). There are many gaps in communities and societies that social entrepreneurs can leverage technology to solve. Specifically, there are numerous issues in developing countries that exist due to low technological development; consequently, the solution to these problems require the development of technology (Miah & Omar, 2012). Also, the often-low-income nature of disadvantaged communities precipitates a need for the development of affordable, inexpensive technologies (Venot, 2016).

There are many more social problems that require or can be solved with the development of technology. The table below looks at a wide range of them:

**Table 2.6.** Social and economic issues paired with technological solutions

| <b>Issues</b>   | <b>Technological Solutions</b>   |
|---|--|
| Unconnected populations   | Developing/improving telecommunications capacity (Gopalkrishnan, 2013)   |
| Unsafe and risky tools and technology                                 | Developing safer alternatives (Cross, 2013)  |
| Costly tools and technology   | Developing cheaper alternatives (Cross, 2013)  |
| Lack of access to knowledge and information                           | Developing technology to increase access to knowledge and information (Richardson, Kettinger, Banks & Quintana, 2014). |
| Poor infrastructure (electricity, water, sanitation)                  | Developing relevant technology for improve infrastructure (Warnecke & Houndonougbo, 2016).                             |
| Subpar, low-quality products, tools and technology                    | Developing high quality offerings (Urpelainen & Yoon, 2016).   |
| Low technological capability of entrepreneurs in developing economies | Developing technology to empower and facilitate entrepreneurship (Galvin & Iannotti, 2015).                            |
| Unsustainable consumption and production                              | Developing technology using sustainable, eco-friendly and responsible principles (Patrignani & Whitehouse, 2015)       |
| Environmental issues  | Develop environmentally-friendly technology or clean tech (Horwitch & Mulloth, 2010).                                  |

Sources: (Gopalkrishnan, 2013; Cross, 2013; Richardson, Kettinger, Banks & Quintana, 2014; Warnecke & Houndonougbo, 2016; Urpelainen & Yoon, 2016; Galvin & Iannotti, 2015; Patrignani & Whitehouse, 2015; Horwitch & Mulloth, 2010)

As revealed above, numerous social entrepreneurs are developing technologies to combat issues in communities all over the world. A key concept to consider when developing technology for communities with low technological capabilities is called ‘Appropriate Technology’. Murphy, McBean and Farahbakhsh (2009) define appropriate technology as technology that meets the local needs of the users, utilizes local materials and resources, is affordable, sustainable and culturally appropriate. This reveals a new dimension to developing technology for communities – technology developed for a community must be at the scale of the community. An article by Akubue (2000) reveals how the massive infusion of advanced technologies from developed economies has failed in addressing persistent socioeconomic problems in Third World countries. In other words, for social entrepreneurs seeking to solve wicked problems, developing appropriate technology might

be a basic requirement. The social enterprise KickStart has leveraged this concept to effective results; the organization, formally known as Appropriate Technologies For Enterprise Creation (ApproTEC), provides appropriate technologies to developing communities, empowering the individuals and creating sustainable incomes (Galvin & Iannotti, 2015).

Co-creation or co-development is another very effective practice when developing technology for communities. It is an approach that actively involves the users of a product or technology in the various stages of its development (Voorberg, Bekkers & Tummers, 2015). Using this practice, social enterprises have been able to create technology that is more relevant, effective and appropriate to users and communities. A good illustration of this practice is revealed in the activities of the Social Work and Research Centre, widely known as the Barefoot College. The organization works with and empowers the rural communities to identify, analyze and solve their own problems; it not only involves them but places them at the helm of socioeconomic development (Girling, 2009). Co-creation with the community leads to job creation (Gopalkrishnan, 2013) and technical education of community (Gopalkrishnan, 2013).

Developing technology in a community often leads to cascade effects. Rao (2012) reveals that SELCO's solar technology helped light up homes which in turn enabled children to study more, leading to an improvement in education. Also, the social enterprise Kickstart develops technology for entrepreneurs to run profitable small-scale enterprises and their goal is aiding local entrepreneurs to increase their income (Galvin & Iannotti, 2015). The social enterprise envisions improvements in education and health as a resulting effect from the increase in income amongst entrepreneurs and individuals in the community (Galvin & Iannotti, 2015).

The need to develop technology for communities and users spans multiple domains, from addressing general social issues to meeting specific community needs to sparking community development. The above section and examples reveal a tangible need for technology to be developed and the resulting positive gains. Co-creation with users and members of the community is an efficient way to surmount the numerous obstacles that complicate the development and deployment of technology. In a nutshell, there is a lot of social value to be created by developing technology to meet community needs and this highlights one more relationship between social entrepreneurship and technology.

#### **2.3.4 The need to provide technology to community**

The need to provide technology to communities intersects with the need to adapt and develop technology. To contrast the three, adapting technology involves taking advanced technological solutions from developed communities and adjusting them to the scale, cost and complexity of communities in need; developing technology involves developing technological solutions, often in conjunction with the stakeholders, to solve specific community issues, it leverages scientific knowledge and current technology to deliver relevant and often appropriate solutions to social problems; finally, providing technology involves delivering technology and technology solutions to people and locations that stand to benefit a lot from them, it rarely involves developing and may occasionally involve adapting but it usually involves the need to provide education and training on how to properly use the newly introduced technology.

A good illustration of the difference between providing and adapting technology is revealed in the One Laptop per Child initiative: The non-profit's mission is about getting computing technology in the hands of children in developing countries (Talbot, 2008). In the process of operating and fulfilling this mission, the One Laptop per Child initiative realised it had to adapt the technology to meet the complexities in these developing communities, adapting the technology required revising the design, the distribution model and the computing device's operating system; in this manner, the provision of technology to the community eventually required a form of adjustment, that is, adaptation (VanSandt, Sud & Marme, 2009).

In many cases, technology does not need to be adapted or developed but delivered as is, that is, existing technology is provided to communities that lack it. The social enterprise Boond Solar, apart from developing customized solar technology offerings, provides inexpensive solar products manufactured in China to communities, these products are highly popular and leverage China's cheap manufacturing costs to provide affordable solar appliances (Urpelainen & Yoon, 2016).

The issues and needs that precipitate the need for the provision of technology intersect the previous categories – adapting and developing. The key reason is the lack of availability of technology products, this could be due to poverty and low income in developing communities (Hilbert, 2010), absence of motivated suppliers; in the case of Boond Solar, the mission-driven nature of the enterprise spurred the desire to import and provide affordable solar products from China (Urpelainen & Yoon, 2016), ignored and underserved segment; CGNet Swara provides news and information to underserved tribal communities in India through a voice-based online portal developed at MIT (Gopalkrishnan, 2013; CGNet Swara, 2019) and special needs of consumers;



Village Networks provides mobile smartphone hardware and training along with a software solution developed for people living with disability (Darcy, Yerbury & Maxwell, 2019).

Warschauer and Ames (2010) criticized the One Laptop per Child initiative and labelled it flawed largely due to its poor effort at training teachers on how to use and teach the technology to children. A certain level of technological expertise is required to be able to use technology products, hence, the need to provide technology goes hand in hand with the need to provide technology education and training. The social enterprise - Village Networks offers training services and provides access to a 24/7 call centre to train and assist its users on how to use its software and how to use mobile smartphone hardware (Darcy, Yerbury & Maxwell, 2019). It represents a suitable model for how the provision of technology must be bundled with adequate training if it is to provide value to the communities that require them.

### **2.3.5 The benefits to gain from the use of technology by social entrepreneurs**

The strategic use of technology provides numerous benefits to organizations, these benefits include improved performance and organizational culture (Mirvis, Sales & Hackett, 1991), increased access to useful information and improved customer reach (Gopalkrishnan, 2013), reduced process and product costs, and higher differentiation of products (Porter, 1985). In some cases, the use of technology is indispensable to an organization's ability to offer its products and services (Gopalkrishnan, 2013).

These organizational benefits also extend to social enterprises and technology is a proven growth and productivity driver (Gopalkrishnan, 2013). The table below shows a short list of social

enterprises and how they have been able to leverage different types of technology to improve both internal and external activities.

**Table 2.7.** Social enterprises, the types of technology they use, and the benefits obtained

| <b>Social Enterprise</b>  | <b>Technology</b>                      | <b>Benefit</b>  |
|---|--|---|
| Boond Solar   | Information Technology                 | Instituted an online database to log sales and other relevant data. It facilitated service and maintenance, and helped Boon staff to monitor their performance continuously (Urpelainen & Yoon, 2016)         |
| DataDyne (in partnership with the Senegalese Ministry and Health and the World Health Organization (WHO)) | Mobile Technology                      | Used a mobile device-based data collection tool called EpiSurveyor to collect maternal health data across ten districts and identify a shortage in the use of partograms (Ranck, 2011)                        |
| Khan Academy  | Electronics and Information Technology | Uses a very cost effective and simple model that involved a camera, headphone and computer device to record and disseminate educational videos to millions of students around the world (Gopalkrishnan, 2013) |
| Orbis International   | Aeronautics                            | Retrofits a commercial airline plane to serve as a flying eye hospital and deliver eye treatments around the world (Williams, 2013)   |
| Provenance  | Blockchain Technology                  | Uses blockchain technology to provide consumers with knowledge on where and how products are formed (Sahota, 2017)  |
| International Outreach Program (IOP)  | Information Technology                 | Used information technology to develop partnerships and facilitate exchange of information (Richardson, Kettinger, Banks & Quintana, 2014)  |
| Bromford  | Information Technology                 | Uses an online learning platform to facilitate learning and other community-based activities among customers and employees (Moore, 2014)  |
| Kiva  | Information Technology                 | Leverages the internet to connect small lenders to entrepreneurs (VanSandt, Sud, Marme, 2009)   |

The social enterprises above and numerous others have used technology to innovate their process and business models, increase customer reach and access to information, improve their offering

and optimize internal efficiencies. The major need to use technology stems from the potential benefits to be gained when it is used in line with an organization's strategy.

In many cases, such as those of Khan Academy and DotNetFunda.com, the organization's offering and ability to deliver its value proposition is dependent on technology. Without utilizing information technology – internet and computing devices, it would be almost impossible for the aforementioned companies to disseminate its tutorials and videos at such a rate to such an audience. As Tim O'Reilly put it, technology creates new opportunities to do a job that customers want done (Gopalkrishnan, 2013).

### **2.3.6 Social entrepreneurship and the provision of technology education and training**

Technology is now an integral part of society; people's needs, and technology are intimately connected, this is evident in domains ranging from power and manufacturing to safety and communication. The major need for technology education stems from the need to respond to current and emerging economic and social needs (Rasinen, 2003).

In providing technology training and education to either students or disadvantaged people, there are goals should be taken into consideration to ensure value is provided. These goals include the following (Ritz, 2009):

- The education of people on the social, environmental and ethical impacts of technology use
- Knowledge on how to become educated technology users whether for personal, societal or professional purposes

- Knowledge on how to use technology to solve problems
- An understanding on how to troubleshoot and repair technological devices and systems
- Adequate knowledge to make informed career choices

Technology education is crucial in providing people with the necessary skills to create opportunities for themselves. As social entrepreneurs are concerned with empowering and delivering social value to people and communities, providing technology education is an important way to achieve this objective. A case in point is the social entrepreneur Vibha Gupta who trains rural women in India on how to use technology to create solutions; by providing adequate technology education and training, Vibha has created a team of engineers, doctors, mechanics and volunteers who have invented over a hundred technologies to empower and improve rural conditions (Gopalkrishnan, 2013).

Numerous social enterprises are centered around offering technology education to disadvantaged peoples as a skill to empower them; In Prezi, a Hungarian mission-driven software company, the Escape Code project offers programming courses to underprivileged children while the Coding Girls project offers the same programming courses to young girls (Mulloth, Kickul & Gundry, 2015).

Social enterprises such as Khan Academy and DotNetFunda.com offer technology education online to millions of learners. DotNetFunda.com in particular receives over two hundred thousand visitors from one hundred and eighty-eight countries every month, the website also offers

resources such as interview questions, career advice and anecdotes for individuals looking to launch a career in software development (Gopalkrishnan, 2013).

The need for developing communities to close the technological gap is more than an imperative for the necessity of technology education. By meeting this need, that is, providing technology training and education, social entrepreneurs are in a position to create and deliver substantial social and economic value.

Finally, appendix B shows the common points identified in the technology and social entrepreneurship literature during the literature review.

# **CHAPTER 3**

## **RESEARCH METHODOLOGY**

The first portion is a systematic review of the academic literature. The results derived from the systematic review are then used in the second portion to inform a qualitative analysis of the technology social entrepreneur cases. The aim is to critically evaluate, interpret and use the results to provide more insight and suggest recommendations for future research in the area of study (Lund et al., 2016).

### **3.1 Thematic Analysis: Deductive and Inductive Coding**

This present research is a qualitative research into the place of technology in social entrepreneurship. Data analysis in qualitative research is a means of applying a rigorous and systematic method to make sense of an inquiry (Smit, 2002). The approach the research takes is a thematic analysis of the evidence available. Thematic analysis is a method of qualitative data analysis that involves “systematically identifying, organizing and offering insight into patterns of meaning (themes) across a data set” (Braun & Clarke, 2012; p. 57). Thematic analysis involves data coding; the process of organizing and sorting data into categories, or codes (Stuckey, 2015). The two common approaches to coding are deductive and inductive. The inductive approach involves creating codes and themes based on the content of the data while the deductive approach involves bringing a set of concepts, ideas or codes (in the form of a codebook or guide) to inform data coding (Braun & Clarke, 2012).

In the analysis of academic literature, an inductive approach is used to develop codes to reveal important themes and concepts in the data itself. The analysis of the technology social entrepreneur cases uses a combination of both the deductive approach; through the concepts and codebook developed from the inductive coding of academic literature and the inductive approach; identifying concepts not previously revealed during the first inductive analysis (Fereday & Muir-Cochrane, 2006).

### **3.1.1 ATLAS.ti**

The systematic review and case analysis both use the ATLAS.ti 8 software for coding and data analysis. ATLAS.ti is a computer-aided data analysis software (CAQDAS). CAQDAS provide researchers with numerous benefits – a major benefit being effective data management (Smit, 2002).

The ATLAS.ti 8 software is used in this research to carry out thematic analysis – inductive and deductive coding, of both academic literature and social entrepreneur cases.

## **3.2 Systematic Review of Academic Literature**

As stated, a portion of this thesis consists of a systematic review of existing academic literature on social entrepreneurship and technology. A systematic review is the identification, evaluation and interpretation of available research addressing a topic area or research question (Kitchenham, 2004). Systematic reviews examine both published and unpublished evidence (Hemingway & Brereton, 2009). A systematic review differs from a literature review in the following ways (Robinson & Lowe, 2015):

- Focuses on a clear question
- Searches several databases using specific search terms
- Usually less than 50 papers reviewed and often less than 10
- Rigorous data analysis methods
- Includes tabular or pictographic form of data presentation

The usual rationale for undertaking a systematic review is to summarize existing evidence concerning a certain topic, identify gaps and suggest areas for further research while providing a context and framework to aid new research activities (Kitchenham, 2004).

### **3.2.1 Literature Selection Criteria**

In line with the established practices for conducting systematic review, a rigorous criterion was used to search and extract academic literature.

1. The search terms used where:
  - a. “social entrepreneurship” “technology”
  - b. “social enterprise” “technology”
2. Using the ProQuest platform, these search terms were entered into the following databases:
  - ABI/INFORM GLOBAL – Accessed June 11, 2019 and July 7, 2019
  - CANADIAN BUSINESS AND CURRENT AFFAIRS DATABASE – Accessed June 11, 2019 and July 5, 2019
  - INTERNATIONAL BIBLIOGRAPHY OF THE SOCIAL SCIENCES (IBSS) – Accessed July 5, 2019

The following twelve databases were searched in an aggregated form on July 5, 2019:



- SOCIOLOGICAL ABSTRACTS
  - DISSERTATIONS & THESES @ SAINT MARY'S UNIVERSITY (CANADA),
  - EBOOK CENTRAL
  - ERIC
  - FIAF INTERNATIONAL INDEX TO FILM PERIODICALS DATABASE
  - GEOREF
  - LITERATURE ONLINE
  - PERIODICALS ARCHIVE ONLINE
  - PHILOSOPHER'S INDEX
  - PROQUEST HISTORICAL NEWSPAPERS: THE GLOBE AND MAIL
  - PROQUEST HISTORICAL NEWSPAPERS: TORONTO STAR
  - PTSDPUBS
3. The only documents/journals/dissertations included in this table are those that fulfill one or more of the following requirements: (i) Contains relevant keywords related to social entrepreneurship, social enterprise and technology (ii) Contains terms such as social entrepreneurship, social enterprise and technology in the title, and (iii) Contains an abstract that details a social entrepreneur involved with technology in any capacity (iv) Are written or translated into English Language. Duplicates of previously included publications and publications that don't meet any of the four aforementioned criteria have been excluded from the table below.

The literature selected and reviewed are included in the appendix, and the data extraction forms are attached in a separate document.

### **3.2.2 Coding of Academic Literature**

Coding is a process used in the qualitative analysis of data; coding involves selecting a portion of data and assigning it a category (Dey, 1993). Coding data into categories or components is done both to reveal its structure and characteristic elements, and to identify substantive connections (Dey 1993). The research topic or question guides the process of coding and ensures that the researcher comes up with relevant codes (Stuckey, 2015). With the research topic in mind – “The place of technology in social entrepreneurship”, 86 codes were created in first level coding of the academic literature. These codes are presented in the appendix section of this document.

Second level coding was carried out within 6 key codes that adequately describe the place of technology in social enterprises. These six codes are: Adapting technology, creating technology for SE, developing technology for use by community, providing technology, technology education and using technology. A document was created on ATLAS.ti that grouped all the quotations and other codes under each of the six aforementioned codes. Each category was then coded again to unearth more insights. The second level coding created 67 codes which are also listed in the appendix section. Similar codes were formed into groups in order to discover themes within the literature. These themes – (i) Technology and Social Entrepreneurship in Developing Economies (ii) The Types of Technology (iii) Technology Creation by Social Entrepreneurs (iv) Applications of Technology (v) Technology Education and Advocacy, were used to explain the links between social entrepreneurship and technology as revealed in the literature. These codes derived through coding of the academic literature were then used to perform deductive coding on the social entrepreneur cases.

### 3.3 Analysis of Social Entrepreneur Cases

The activities of social entrepreneurs whose enterprises or solutions involve technology were examined in a considerable capacity. The social entrepreneurs on three credible social enterprise organizations were searched. These organizations are:

1. **Ashoka:** An organization that seeks to identify and support the world's leading social entrepreneurs, learn from the patterns in their innovations, and mobilize a global community that embraces these new frameworks to build an "everyone a changemaker world." (Ashoka, 2019)
2. **Skoll:** A foundation that "drives large-scale change by investing in, connecting, and celebrating social entrepreneurs and innovators who help them solve the world's most pressing problems." (Skoll, 2019)
3. **Schwab Foundation for Social Entrepreneurship:** "The Schwab Foundation for Social Entrepreneurship is a leading global platform that accelerates outstanding models of social innovation". The foundation helps scale solutions to support millions of vulnerable and low-income people in need. It supports the largest community of late stage social entrepreneurs in the world. (Schwab Foundation for Social Entrepreneurship, 2019).

#### 3.3.1. Social Entrepreneur Case Selection Criteria

A specific and rigorous selection criterion was created to search through the websites of each of these organizations:

1. **Ashoka:** Social entrepreneurs that have a business website (in English or with an English translation) and fit into one or more of the following categories:
  - i. Use technology to achieve their business objectives

- ii. Have a business model that revolves around technology e.g. a biotech firm
  - iii. Run a business that teaches technology to underprivileged or disadvantaged people
  - iv. Run a business that researches or advocates for the use of technology in a certain field or area
2. **Skoll Foundation:** Social entrepreneurs in the Skoll Awardees or Emerging Leaders Initiative category that have a business website (in English or with an English translation) and fit into one or more of the following categories:
- i. Use technology to achieve their business objectives
  - ii. Have a business model that revolves around technology e.g. a biotech firm
  - iii. Run a business that teaches technology to underprivileged or disadvantaged people
  - iv. Run a business that researches or advocates for the use of technology in a certain field or area
3. **Schwab Foundation for Social Entrepreneurship:** Social entrepreneurs in the Schwab Awardees category that have a business website (in English or with an English translation) and fit into one or more of the following categories:
- i. Use technology to achieve their business objectives
  - ii. Have a business model that revolves around technology e.g. a biotech firm
  - iii. Run a business that teaches technology to underprivileged or disadvantaged people
  - iv. Run a business that researches or advocates for the use of technology in a certain field or area

Following the selection criteria highlighted above, 50 social entrepreneurs were selected. Information on the activities of the social entrepreneurs and their social enterprises were extracted

from their websites for deductive coding using the codebook and results obtained from the systematic review of academic literature. The table shows the number of social entrepreneurs selected from each organization:

**Table 3.1.** Organizations and number of social entrepreneurs selected

| <b>Organization</b>                           | <b>No. of Social Entrepreneurs</b> |
|---|------------------------------------|
| Ashoka  | 18                                 |
| Schwab Foundation for Social Entrepreneurship | 20                                 |
| Skoll Foundation                              | 12                                 |
| <b>Total</b>                                  | <b>50</b>                          |

The social entrepreneur cases and all relevant information are presented in Chapter 5 of this present research – the results and findings from the case analysis.

### **3.3.2 Coding of Social Entrepreneur Cases**

A deductive coding of the social entrepreneur cases was employed using the list of codes and concepts derived from the initial systematic review. An important factor to note is that it is impossible to take a solely deductive or inductive approach to analyzing data, the main approach may be deductive or inductive, but a researcher always brings something to, or takes meaning away, from a piece of data (Braun & Clarke, 2012). Consequently, despite the method of coding being predominantly deductive, 36 new codes were developed from the content of the data in the social entrepreneur cases. These codes are also presented in the appendix section.

## CHAPTER 4

### RESULTS AND FINDINGS FROM SYSTEMATIC REVIEW

A systematic review of academic literature on social entrepreneurship and technology was carried out. The systematic review revealed numerous concepts and themes in line with the research question – the place of technology in social entrepreneurship.

#### 4.1 Results

Using the selection criteria, 55 journal articles were deemed suitable for the systematic review. A search using the keywords – “social entrepreneurship” “technology” and “social enterprise” “technology” was used on the ProQuest aggregated database. The following table shows the list of databases and results found:

**Table 4.1.** Databases searched, search terms and results

| Databases accessed via ProQuest                                 | Keyword and Results  | Date Searched | Journal Articles Sourced |
|---|--|---------------|--------------------------|
| <b>ABI/INFORM GLOBAL</b>  | “social entrepreneurship”<br>“technology” – 3532 results   | June 11, 2019 | 33                       |
|   | “social enterprise”<br>“technology” NOT “social entrepreneurship”<br>“technology” – 2665 results | July 7, 2019  |                          |
| <b>International Bibliography of the Social Sciences (IBSS)</b> | “social entrepreneurship”<br>“technology” – 755 results  | July 5, 2019  | 18                       |
|   | “social enterprise”<br>“technology” NOT “social entrepreneurship”<br>“technology” – 352 results  | July 5, 2019  |                          |
| <b>Canadian Business &amp; Current Affairs Database</b>         | “social entrepreneurship”<br>“technology” – 310 results  | June 11, 2019 | 3                        |
|   | “social enterprise”<br>“technology” NOT “social entrepreneurship”<br>“technology” – 416 results  | July 5, 2019  |                          |

|   |   |   |          |
|---|---|---|----------|
| <p><b>[12 Aggregated Databases searched together]</b><br/> <b>Dissertations &amp; Theses @ Saint Mary's University (Canada), Ebook Central, Eric, FIAF International Index to Film Periodicals Database, GEOREF, Literature Online, Periodicals Archive Online, Philosopher's Index, ProQuest Historical Newspapers: The Globe And Mail, ProQuest Historical Newspapers: Toronto Star, PTSDPUBS, Sociological Abstracts</b></p> | <p>“social entrepreneurship”<br/> “technology” – 757 results</p> <p>“social enterprise”<br/> “technology” NOT “social entrepreneurship”<br/> “technology” – 943 results</p> | <p>July 5, 2019</p> <p>July 5, 2019</p> | <p>1</p> |
|---|---|---|----------|

The results from the databases above included magazine articles, dissertations, newspaper articles, trade journals and other materials don't classify as academic journal articles. Eligibility of articles were based on the selection criteria before:

The only journal articles included are those that fulfill one or more of the following requirements: (i) Contains relevant keywords related to social entrepreneurship, social enterprise and technology (ii) Contains terms such as social entrepreneurship, social enterprise and technology in the title, and (iii) Contains an abstract that details a social entrepreneur or social enterprise involved with technology in any capacity (iv) Are written or translated into English Language. Duplicates of previously included publications and publications that don't meet any of the four aforementioned criteria have been excluded from the table below.

Out of the 55 journal articles that passed the rigorous selection criteria, 12 were not accessible within the time frame of the data extraction stage. Consequently, the systematic review was carried out on 43 journal articles from the following academic publications:

**Table 4.2.** Academic publications and number of articles sourced

| No . | Academic Publications  | No. of Journal Articles | 2016 ABDC Ranking |
|------|--|-------------------------|-------------------|
| 1    | Journal of Small Business and Enterprise Development                                       | 1                       | C                 |
| 2    | Journal of Applied Business Research   | 1                       |                   |
| 3    | Voluntas   | 1                       | B                 |
| 4    | American Journal of Management   | 1                       |                   |
| 5    | Health Affairs   | 1                       |                   |
| 6    | World Journal of Entrepreneurship, Management and Sustainable Development                  | 1                       |                   |
| 7    | World Development  | 1                       | A                 |
| 8    | Appropriate Technology   | 7                       |                   |
| 9    | Strategic Entrepreneurship Journal   | 1                       | A                 |
| 10   | Small Business Economics   | 1                       | A                 |
| 11   | Association for Computing Machinery. Communications of the ACM                             | 1                       | A                 |
| 12   | Journal of the Association for Information Systems   | 1                       | A*                |
| 13   | Technology Innovation Management Review  | 2                       |                   |
| 14   | Journal of High Technology Management Research   | 1                       | C                 |
| 15   | Management: Journal of Sustainable Business and Management Solutions in Emerging Economies | 1                       |                   |
| 16   | Sustainability: Science, Practice, & Policy  | 1                       |                   |
| 17   | The Journal of Applied Business and Economics  | 1                       | C                 |
| 18   | Environment  | 1                       |                   |
| 19   | The Open Source Business Resource  | 1                       |                   |
| 20   | Social Enterprise Journal  | 1                       | C                 |
| 21   | Clean Technologies and Environmental Policy  | 1                       |                   |
| 22   | Development and Learning in Organizations  | 1                       | C                 |
| 23   | Alternatives Journal   | 2                       |                   |
| 24   | M@n@gement   | 1                       | B                 |
| 25   | Child & Adolescent Social Work Journal: C & A  | 1                       |                   |
| 26   | Information, Communication & Society   | 1                       | A                 |
| 27   | Perspectives on Global Development and Technology  | 1                       |                   |
| 28   | Entrepreneurship Theory and Practice: ET&P   | 2                       | A*                |
| 29   | Journal of International Affairs   | 1                       |                   |
| 30   | Ageing and Society   | 1                       |                   |
| 31   | Journal of Business Ethics   | 1                       | A                 |
| 32   | Journal of Material Culture  | 1                       |                   |
| 33   | Journal of Economic Issues   | 1                       | B                 |
| 34   | Information Technology & People  | 1                       | A                 |
|      | <b>TOTAL</b>   | 43                      |                   |



## 4.2 Findings

The first and second level inductive coding of academic literature revealed numerous trends, connections and themes. The coding method employed on each journal article was used to reveal interrelated concepts across different literature (Thomas & Harden, 2008). Six categories detailing technology's place in social entrepreneurship were revealed: (i) Adapting technology (ii) Creating technology for social enterprise use (iii) Developing technology for use by community (which in this case involves users across different locations and domains) (iv) Providing technology (v) Using Technology (vi) Technology Education. These categories were used to elaborate on the relationship between social entrepreneurship and technology in the literature review section of this present research. In addition to these six categories, themes were revealed in the research that served to synthesize various concepts revealed in the inductive coding process, these themes include (i) Technology and Social Entrepreneurship in Developing Economies (ii) The Types of Technology (iii) Technology Creation by Social Entrepreneurs (iv) Applications of Technology (v) Technology Education and Advocacy

In line with the "Applications of Technology" theme, the United Nations' Sustainable Development Goals (SDGs) were used to identify which wicked problems the social entrepreneurs from both the academic literature and the selected cases leverage technology to address. A number of the SDGs were shaped to indicate the challenges in developing nations and aspirations towards solving them (Osborn, Cutter & Ulah, 2015). Hence, the SDGs also serve as an effective tool to map out the activity of social entrepreneurs, and the technologies they employ to tackle complex issues in developing economies.

#### **4.2.1 Technology and Social Entrepreneurship in Developing Economies**

Technology is a very important factor in the ability of social enterprises to solve problems and create value in developing communities. In the coding process, the ‘developing economies’ code appeared 77 times across 26 different journal articles. The literature revealed many interesting insights and concepts around technology and social entrepreneurship as regards developing nations.

As one part of the dual mission of social entrepreneurship is to create social value, it is inevitable that developing and rural areas would be a target for the activities of social entrepreneurs. There are numerous and characteristic issues in these countries and locations that precipitate the need for innovative solutions. The literature revealed numerous social entrepreneurs who are applying technology to create solutions to these idiosyncratic issues:

- Bright Simmons, a social entrepreneur in Ghana, developed an SMS-telecom database to combat fraud in pharmaceuticals, along with contaminated medicine (Gopalkrishnan, 2013)
- Zoona is a social enterprise that uses mobile technology to service unbanked or underbanked entrepreneurs in South Africa and Zambia (Martin, 2014)
- Boond is a for-profit social enterprise that provides, along with a suitable maintenance scheme, high quality solar products to poorly served locations in India (Urpelainen & Yoon, 2016)
- In a bid to address pollution and healthcare issues caused using firewood, a social entrepreneur in Kenya developed a unique and inexpensive cookstove using local craftsmen (Ness & Akerman, 2015)

- The Barefoot College in Tilonia, India is an innovative enterprise organizes, trains and equips the rural poor with the means to identify and solve their own problems (Girling, 2009)

Venot (2016) revealed the activity of social enterprises in adapting irrigation to the needs of the developing world. He identifies the complexity of solutions and how they do not scale down to the need of farmers. Furthermore, he reveals how a social enterprise – International Development Enterprises (iDE) has worked on adapting a less complex and more appropriate form of drip irrigation. Crean (2010; p. 279) expands on the concept of adapting technology by revealing the difficulties and obstacles involved:

“Social entrepreneurs often face long periods of product and business-model development. Some take a decade or more to adapt technologies to complex cultural and market forces. Even today, not enough is known about how consumers perceive products and services or how one accurately predicts the length of time it will take to develop a business model.”

Crean (2010) goes further to reveal how it took social entrepreneurs six years to modify and adapt the design of the treadle pump. The resulting effect is the manufacture and sale of the treadle pump by dozens of companies and thousands of distributors.

The adaptation of technology normally not suited to the unique conditions of developing or rural economies is one activity social entrepreneurs undertake. Susan Murcott of Pure Home Water, a graduate of MIT, realized that technologies from developed countries usually did not transfer to

their less-developed counterparts due to gaps in technical expertise or high costs (Nelson et al., 2013). To rectify this, she worked to ensure that the water filtration technology she intended to bring to Ghana was both inexpensive and easy-to-use.

In adapting technology to the needs of these less-developed countries, social enterprises are aligned with the appropriate technology movement – a movement that started in the 1950s in reaction to the transfer of inappropriate high technology to developing nations (Williams, 2013). Williams (2013; p. 450) identifies a new shift in the appropriate technology movement – “contextually appropriate local production of high technology”. This shift is anchored in social enterprises and non-profits, and it is evident in the following aspects: (i) scientific innovation (ii) organizational innovation (iii) technological innovation, (iv) local ideology (iv) social mission. An example to illustrate this story is revealed in two south Asian social enterprises – the Tilganga Institute of Ophthalmology in Nepal and Aravind Eye Care Systems in India. These non-profits combine a social mission (reaching unreached people) with a compassionate ideology, the technological innovation aspect is evident in their intraocular lens manufacturing facility while novel surgical techniques and a unique cost recovery model align with scientific innovation and organizational innovation respectively (Williams, 2013).

Beyond adapting technology to the conditions of developing economies, Galvin and Iannotti (2015) revealed the model of KickStart International, a social enterprise that believes a better way to address poverty is by merging the power of technology with the sustainability of the private sector and marketplace. In practical terms, KickStart, through an established private sector supply chain (including manufacturing, distribution and sales), has created and distributed tens of

thousands of low-cost, high-quality technologies to farmers and small-scale industries in Africa. By leveraging the ability of social enterprises to develop innovative business models, social entrepreneurs such as Nick and Martin of KickStart have been able to ensure the transfer of much-needed solutions and technologies to developing locations.

#### **4.2.2 The Types of Technology**

The literature on social enterprises revealed the presence of different types of technology. Technologies from clean and information to financial and healthcare have a place in social enterprises and their activities. Certain social enterprises are called green-tech ventures due to their focus on protecting the environment and preserving natural resources by developing and commercializing relevant technology (Meyskens & Carsrud, 2013). These green-tech ventures develop clean technologies in the domain of solar power, wind energy, recycling and ozone-friendly chemicals. Horwitch and Mulloth (2010) through a series of three social enterprise mini case studies; vision42, GREEN.US and Green Drinks, identified the potential of social entrepreneurship to represent new sources of innovation for clean technology.

In the domain of healthcare, Aravind Eye Care has provided value by redesigning and reducing the cost of a vital ophthalmic technology - intraocular lenses (Crean, 2010). Howard Weinstein, a social entrepreneur in Brazil manufactures and provides inexpensive hearing aids by designing them to use solar power instead of expensive zinc batteries (Gopalkrishnan, 2013).

The technologies that see the most use across the literature include computing, mobile and information and communication technologies. VanSandt, Sud and Marme (2009), in a study on

catalysts for social entrepreneurship, make the claim that information technology has made social entrepreneurship more viable. Information technology and its sub or related technologies are featured prominently in 23 of the journal articles reviewed. The forms include cloud computing, blockchain, internet, data, telecommunications, software and mobile technology.

#### **4.2.3 Technology Creation by Social Entrepreneurs**

Social entrepreneurs often develop new technologies in a bid to create value and solve wicked problems. Gopalkrishnan (2013) identifies several social entrepreneurs and enterprises that create technology to provide social value. These include Benetech; an enterprise owned by technology practitioners that has created numerous technologies and technological solutions – including a machine that converts printed books to audiobooks for the blind, Babu; a social entrepreneur and engineer that created solar powered tukis to replace petroleum based kerosene as a source of lighting in Nepal, and Agus Gannarto; an Indonesian social entrepreneur that developed small and inexpensive sewage treatment plants.

Kickstart International is another social enterprise that is involved in the development of new or different technologies. The enterprise has created high quality and low-cost versions of many staple technologies such as oilseed presses and irrigation pumps. In particular, it developed two new irrigation pump models – the Super MoneyMaker; a foot-powered treadle pump, and MoneyMaker; a hand-powered hip pump (Galvin & Iannotti, 2015). O’Hanlon (2014), a member of Engineers Without Borders UK, worked with a social enterprise in Mexico to develop a new chlorine injector system to improve the social enterprise – Isla Urbana’s current rainwater harvesting system.

In the clean technology category is the social enterprise – DA-AI Technology Co. Ltd. The venture, the first social enterprise in Taiwan, developed a technology for fabricating usable textiles from reprocessed polyethylene terephthalate (PET) bottles (Lin & Chen, 2016). The social enterprise Evrnu also developed a technology to create new fibre from textile waste (Weber, 2018).

A very suitable illustration for the relationship between technology creation and social entrepreneurship is revealed in the case of Not Impossible Labs. Not Impossible Labs is a social enterprise that creates technologies and technological solutions for individuals who are not able to afford or buy a solution (Kirkpatrick, 2015). The company then generalizes the solutions to the broader population. Not Impossible Labs creates new technologies by brainstorming with brilliant minds and seeking partnerships and funds from large companies in exchange for benefits and exposure. One of the company's inventions is the Eyewriter, a low-cost, open-source tracking system originally created for a paralyzed artist to enable him draw with his eyes (Kirkpatrick, 2015).

#### **4.2.4 Applications of Technology**

A large portion of the literature reviewed provided substantial insight into the issues social entrepreneurs apply technology to.

Social enterprises leverage technology to innovate new, more effective business models. VanSandt, Sud and Marme (2009) reveal this through Kiva; social enterprise that aims to leverage the power of the internet to revolutionize microfinance. It aims to do this by democratizing access

to microfinance, that is, by allowing lenders to fund small entrepreneurs anywhere in the world. Another social venture that has leveraged technology to innovate a new business model is Orbis International, a “flying eye hospital” that uses a commercial airline plane to provide its services around the globe (Williams, 2013; p. 459).

Not For Sale is a non-profit in the United States that uses technology – an open-source mapping software, to track slavery around the world (Gopalkrishnan, 2013). The company even claims that it would not have been able to operate without technology. This supports the ability of technology to create new opportunities for businesses (Bailetti, 2012).

Muskat and Sylvester (2012) discuss how by leveraging the internet, Ashoka has been able to create Changemakers.com; an online community that connects social innovators, investors and other stakeholders. They reveal how this space created by Ashoka is vital to accelerating effective social change. On the other hand, the Ecolo Co-op, a co-operative organization in Quebec, leveraged the internet to sell its products online (Michaud, 2013). Additionally, Bromford and Benetech are two social enterprises that have leveraged technology to educate clients, customers and individuals (Moore, 2014; Girling, 2009).

Numerous social enterprises also apply technology to environmental challenges, two of them identified in the literature include – GREEN.US; a clean technology venture with the aim to develop a “comprehensive urban rooftop solution” (Horwitch & Mulloth, 2010) and DA-AI Technology Co. Ltd; a social enterprise that developed a new recycling technology, and manufactures and sells green products (Lin & Chen, 2016).



Crean (2010) talks e-health; which he defines as “the use of information and communications technologies to improve health systems performance” (p. 278), and m-health; which he defines as “the use of mobile technologies, such as cell phones, to do the same” (p. 278). In his paper on accelerating innovation in ICT for health, Crean reveals how the field of social entrepreneurship has proved to be an effective vehicle for m-health and e-health. He describes how Aravind Eye Hospital leveraged technology to develop the Aravind system; a major innovation which has been adopted by hospitals all over the world and has enabled a substantial reduction in ophthalmology costs. The International Outreach Program (IOP), a social enterprise focused on providing pediatric healthcare launched the Cure4Kids IT platform to facilitate collaboration with other health institutions and sharing of vital content and information (Richardson et al., 2014).

Technology is also employed in finding solutions to infrastructural problems such as lack of electricity, Warnecke and Houndonougbo (2016) identify three different approaches to electrification carried out by solar-based social enterprises – (i) independent micro-grid projects; large fields of photovoltaic collection and storage units along with a distribution network to users (ii)solar home system kits; off-grid systems that are installed independently for users (iii) pico-solar systems; smaller and cheaper solar devices including portable device chargers and stand-alone LED systems.

Social enterprises are also using technology to advocate for pressing causes, Nyitottakvagyunk.hu (translated as WeAreOpen.hu) is an initiative co-founded by Prezi, Google and Espell to support the LGBT community by holding stakeholders accountable (Mulloth et al., 2015).

Most of the examples above align with one or more of the United Nations' Sustainable Development Goals (SDGs). Nevertheless, codes were coded for each of the SDGs and all of them were identified in the academic literature. The table below shows a quick snapshot of some social enterprises, their applications of technology, the literature in the systematic review the social enterprise was identified in and the Sustainable Development Goal it works toward.

**Table 4.3.** Social enterprises and technology applications, author and year from source article and SDGs addressed

| <b>Social Enterprise and Application of Technology</b>  | <b>Author and Year</b>  | <b>Sustainable Development Goal (SDG)</b>                                  |
|---|---|--|
| International Development Enterprises (iDE); a not-for-profit organization working to eradicate poverty in the Global South by providing technology and creating opportunities for poor rural households to earn a living and improve their sources of income | Anonymous, 2012<br>Title – “Ceramic water filters save lives”<br>Journal – Appropriate Technology | SDG 1 – No poverty<br>SDG 10 – Reduced inequalities                        |
| Kickstart International provides and disseminates appropriate technologies  | Galvin & Iannotti, 2015   | SDG 1 – No poverty<br>SDG 2 – Zero hunger<br>SDG 5 – Gender equality       |
| GREEN.US; a clean technology venture with the aim to develop a “comprehensive urban rooftop solution”   | Horwitch & Mulloth, 2010  | SDG 11 – Sustainable cities and communities                                |
| DA-AI Technology Co. Ltd; a social enterprise that developed a new recycling technology, and manufactures and sells green products  | Lin & Chen, 2016  | SDG 12 – Responsible consumption and production<br>SDG 13 – Climate action |
| Benetech created a software program to aid environment conservation projects all over the world   | Gopalkrishnan, 2013   | SDG 14 – Life below water<br>SDG 15 – Life on Land                         |
| The Cure4Kids platform developed by the International Outreach Program facilitates global collaboration between healthcare organizations and providers  | Saurabh, Bhowmick, Amrita & Biswas, 2012  | SDG 3 – Good health and well being<br>SDG 17 – Partnerships for the goals  |
| Khan Academy makes use of technology to record and disseminate educational content to millions of learners around the world   | Gopalkrishnan, 2013   | SDG 4 – Quality Education  |
| Pure Home Water develops and sells inexpensive and easy to use filtration systems to Ghana  | Nelson, Ingols, Christian-Murtie & Myers, 2011  | SDG 6 – Clean water and sanitation<br>SDG 3 – Good health and well-being   |
| Boond Engineering and Development is a social enterprise that provides high quality solar products and services to rural areas in India   | Urpelainen & Yoon, 2016   | SDG 7 – Affordable and clean energy  |

|  |                             |   |
|--|-----------------------------|---|
| Babajob.com is a social network for good that aims to bridge the digital divide by providing a platform for uneducated but skilled workers to find jobs and opportunities  | VanSandt, Sud & Marme, 2010 | SDG 1 – No poverty<br>SDG 8 – Decent work and economic growth |
| Rural Telecom Foundation (RTF) is an organization that brings connectivity to rural locations in India to bring them in to mainstream economic, social and cultural activities.  | Gopalkrishnan, 2013         | SDG 9 – Industry, Innovation and Infrastructure               |
| Benetech created the Martus Human Rights Bulletin System, a database program that allows observers and individuals to record and document human rights violations across the world. Benetech also applies data processing and analysis to better understand human rights issues. | Girling, 2009               | SDG 16 – Peace and Justice                                    |

Finally, an interesting case is the social enterprise – DataDyne, which in partnership with WHO and the Senegalese Ministry of Health created a pilot project which used an open-source tool named EpiSurveyor to identify shortcomings in the healthcare system (Ranck, 2010). The tool was used to collect maternal health data across a number of districts, this data revealed a shortage in the use of partograms by midwives. This example reveals the use of technology to identify and determine issues in a system.

**4.2.5 Technology Education and Advocacy**

The literature revealed two important activities that social enterprises carry out – technology education and technology advocacy. Gopalkrishnan (2013) reveals social enterprises involved in this activity – Khan Academy, Benetech and DotNetFunda.com. Another social enterprise - Change Agent Productions (CAP) targets low-income, culturally diverse, urban teens and young adults and provides technology and workforce skills to them (O’Donnell, Tan & Kirkner, 2012).

In a bid to forge Budapest as a world class technology hub, the mission-driven software company Prezi, organizes international conferences for attendees from 250 to over 1000 (Mulloth. Kickul & Gundry, 2015). The conference, which is organized, in partnership with Ustream, is focused on supporting the growth of technology and increasing the image of Hungary as a technology-forward location.

### **4.3 Conclusion**

The insights derived from the systematic review of social entrepreneurship and technology painted a clearer picture of the how technology factors into the activities of social entrepreneurs and social enterprises. It also revealed other important trends; the usefulness of technology in delivering social value to the developing world, and the forms of technology employed by social entrepreneurs. The next section reveals the results and findings from the analysis of the selected social entrepreneur cases.

## CHAPTER 5

### RESULTS AND FINDINGS FROM ANALYSIS OF SOCIAL ENTREPRENEUR CASES

This section contains the results and findings from the search and analysis of select social entrepreneurs that reflect a substantial relationship with technology. The codes and ideas from the previous section have informed the analysis of these social entrepreneur cases.

#### 5.1 Results

As stated earlier, the social entrepreneurs were identified and selected from the databases of three key organizations in the social entrepreneurship field – Ashoka, the Skoll Foundation and the Schwab Foundation for Social Entrepreneurship. The tables below show the selected social entrepreneurs by organization.

**Table 5.1** Social entrepreneurs selected from Ashoka  
Date accessed: June 21, 2019

| CASE NO. | FOUNDER                        | COMPANY   | COUNTRY       | WEBSITE   |
|----------|--------------------------------|---|---------------|---|
| 1        | Gregg Treinish                 | Adventure Scientists                                  | United States | <a href="http://www.adventureandscience.org">http://www.adventureandscience.org</a>           |
| 2        | Hamse Warfa                    | BanQu   | United States | <a href="http://www.banquapp.com/">http://www.banquapp.com/</a>                               |
| 3        | Paul Duan                      | Bayes Impact  | France        | <a href="https://www.bayesimpact.org">https://www.bayesimpact.org</a>                         |
| 4        | Jérémy Lachal                  | Bibliothèques Sans Frontières                         | France        | <a href="https://www.librarieswithoutborders.org">https://www.librarieswithoutborders.org</a> |
| 5        | Helena Puig Larrauri           | Build Up  | Spain         | <a href="http://howtobuildup.org">http://howtobuildup.org</a>                                 |
| 6        | Vijay Pratap Singh Aditya      | Ekgaon Technologies                                   | India         | <a href="https://www.ekgaon.com">https://www.ekgaon.com</a>                                   |
| 7        | Andres Felipe Gallardo Johnson | HAUS  | Mexico        | <a href="https://www.haus-app.com">https://www.haus-app.com</a>                               |
| 8        | Ronaldo Lemos                  | Instituto de Tecnologia e Sociedade do Rio de Janeiro | Brazil        | <a href="https://itsrio.org/en/en-home/">https://itsrio.org/en/en-home/</a>                   |
| 9        | Michihiko Iwamoto              | JEPLAN Inc.   | Japan         | <a href="https://www.jeplan.co.jp">https://www.jeplan.co.jp</a>                               |
| 10       | Theodoros Anagnostopoulos      | SciCo   | Greece        | <a href="http://scico.gr/en">http://scico.gr/en</a>   |

|    |                             |   |              |   |
|----|-----------------------------|---|--------------|---|
| 11 | Dennis Lennartsson          | Seeqest                                 | Sweden       | <a href="http://www.seeqest.com">http://www.seeqest.com</a>                       |
| 12 | Monish Anand                | Shubh Loans                             | India        | <a href="https://www.shubhloans.com">https://www.shubhloans.com</a>               |
| 13 | Frédéric Bardeau            | Simplon.co                              | France       | <a href="https://www.simplon.co">https://www.simplon.co</a>                       |
| 14 | Ahmed Smiley Ismael         | Siyafunda Community Technology Centres  | South Africa | <a href="https://www.siyafundact.org.za">https://www.siyafundact.org.za</a>       |
| 15 | Stephanie Hankey            | Tactical Technology Collective          | Germany      | <a href="https://www.tacticaltech.org">https://www.tacticaltech.org</a>           |
| 16 | Santhanagopalan Rajagopalan | Technology Informatics Design Endeavour | India        | <a href="http://www.tide-india.org/">http://www.tide-india.org/</a>               |
| 17 | Tamer Taha                  | Yomken                                  | Egypt        | <a href="https://www.yomken.com">https://www.yomken.com</a>                       |
| 18 | Njideka Harry               | Youth for Technology Foundation         | Nigeria      | <a href="http://www.youthfortechology.org/">http://www.youthfortechology.org/</a> |

**Table 5.2** Social entrepreneurs from Schwab  
Date accessed: July 2<sup>nd</sup>, 2019

| CASE NO. | FOUNDER(S)        | COMPANY/PRODUCT                | COUNTRY        | WEBSITE   |
|----------|-------------------|--------------------------------|----------------|---|
| 19       | Juliana Rotich    | BRCK                           | Kenya          | <a href="http://www.brck.com">http://www.brck.com</a>                           |
| 20       | Elizabeth Hausler | Build Change                   | USA            | <a href="https://www.buildchange.org">https://www.buildchange.org</a>           |
| 21       | Nancy Lublin      | Crisis Text Line               | USA            | <a href="https://www.crisistextline.org">https://www.crisistextline.org</a>     |
| 22       | Ned Tozun         | d.light design                 | Cayman Islands | <a href="https://www.dlight.com">https://www.dlight.com</a>                     |
| 23       | Kristin Peterson  | EveryLayer                     | USA            | <a href="http://www.everylayer.com">http://www.everylayer.com</a>               |
| 24       | Bas van Abel      | Fairphone                      | Netherlands    | <a href="https://www.fairphone.com/en/">https://www.fairphone.com/en/</a>       |
| 25       | Patrick Struebi   | Fairtrasa                      | Switzerland    | <a href="https://fairtrasa.com">https://fairtrasa.com</a>                       |
| 26       | Sugianto Tandio   | Greenhope                      | Indonesia      | <a href="http://www.greenhope.co/">http://www.greenhope.co/</a>                 |
| 27       | Jaime I. Ayala    | Hybrid Social Solutions (HSSi) | Philippines    | <a href="https://www.hybridsolutions.asia">https://www.hybridsolutions.asia</a> |
| 28       | Marco Roveda      | LifeGate Group                 | Italy          | <a href="https://www.lifegate.com/people">https://www.lifegate.com/people</a>   |
| 29       | Sharanjeet Shan   | Maths Centre                   | South Africa   | <a href="http://www.mcis.org.za/">http://www.mcis.org.za/</a>                   |
| 30       | Sameer Hajee      | Nuru Energy Group              | Mauritius      | <a href="http://www.nuruenergy.org">http://www.nuruenergy.org</a>               |
| 31       | Harish Hande      | SELCO Solar Light              | Denmark        | <a href="http://www.selco-india.com">http://www.selco-india.com</a>             |
| 32       | Luvuyo Rani       | Silulo Ulutho Technologies     | South Africa   | <a href="http://silulo.com">http://silulo.com</a>                               |
| 33       | Toby Norman       | Simprints Technology           | United Kingdom | <a href="https://www.simprints.com">https://www.simprints.com</a>               |
| 34       | Ashifi Gogo       | Sproxil                        | USA            | <a href="http://www.sproxil.com/">http://www.sproxil.com/</a>                   |
| 35       | Simon Henschel    | Sunlabob Renewable Energy      | Lao PDR        | <a href="http://www.sunlabob.com/">http://www.sunlabob.com/</a>                 |
| 36       | Tulin Akin        | Tabit                          | Turkey         | <a href="http://www.en.tabit.com.tr">http://www.en.tabit.com.tr</a>             |
| 37       | Tom Szaky         | TerraCycle                     | USA            | <a href="http://www.terracycle.com/">http://www.terracycle.com/</a>             |
| 38       | Keller Rinaudo    | Zipline                        | USA            | <a href="http://www.flvzipline.com/">http://www.flvzipline.com/</a>             |

**Table 5.3** Social entrepreneurs selected from Skoll  
Date accessed: July 2<sup>nd</sup>, 2019

| NO. | FOUNDER(S)       | COMPANY/PRODUCT | COUNTRY        | WEBSITE   |
|-----|------------------|-----------------|----------------|---|
| 39  | Lesley Marincola | Angaza          | United States  | <a href="https://www.angaza.com">https://www.angaza.com</a>     |
| 40  | Bart Weetjens    | Apopo           | Belgium        | <a href="https://www.apopo.org/en">https://www.apopo.org/en</a> |
| 41  | Jim Fruchterman  | Benetech        | United States  | <a href="https://benetech.org">https://benetech.org</a>         |
| 42  | Alasdair Harris  | Blue Ventures   | United Kingdom | <a href="https://blueventures.org">https://blueventures.org</a> |
| 43  | Peris Bosire     | FarmDrive       | Kenya          | <a href="https://farmdrive.co.ke">https://farmdrive.co.ke</a>   |

|    |   |                   |               |   |
|----|---|-------------------|---------------|---|
| 44 | Melissa Bime                              | Infiuss           | Cameroon      | <a href="http://infiuss.socialventures.biz">http://infiuss.socialventures.biz</a> |
| 45 | Salman Khan                               | Khan Academy      | United States | <a href="http://www.khanacademy.org/">http://www.khanacademy.org/</a>             |
| 46 | Josh Nesbit                               | Medic Mobile      | United States | <a href="https://medicmobile.org">https://medicmobile.org</a>                     |
| 47 | Bright Simons                             | mPedigree         | Ghana         | <a href="https://mpedigree.com">https://mpedigree.com</a>                         |
| 48 | Jim Taylor &<br>Debbie Aung<br>Din Taylor | Proximity Designs | United States | <a href="https://proximitydesigns.org">https://proximitydesigns.org</a>           |
| 49 | Julie Cordua                              | Thorn             | United States | <a href="https://www.thorn.org">https://www.thorn.org</a>                         |
| 50 | Blessing Mene                             | Vetsark Limited   | Nigeria       | <a href="https://vetsark.com">https://vetsark.com</a>                             |

The social entrepreneurs selected represent 28 countries across 5 continents – Asia, Europe, Africa, North America and South America. The codebook and concepts developed from the systematic review were applied to the social entrepreneur cases to establish the insights developed from the academic literature.

The cases of each social entrepreneur’s enterprise were sourced from data available on their websites – data from sections including the homepage, about page, services and offerings. This data was extracted and entered into the ATLAS.ti software. The codes from the both the first and second level coding process were then imported into the ATLAS.ti software to guide the deductive coding process.

As stated in Chapter 3, 31 new codes were created during the thematic analysis of the social entrepreneur cases, these new codes expand on existing concepts and provide new insights into technology’s place in social entrepreneurship.

## **5.2 Grouping of social entrepreneur cases based on categories developed in systematic review**

First, the social enterprises were coded into the six categories of technology developed earlier during the research – (i) Adapting technology (ii) Creating technology for social enterprise use (iii) Developing technology for use by community (which in this case involves users across different locations and domains) (iv) Providing technology (v) Using Technology (vi) Technology Education. Additionally, A seventh category was developed after the case analysis – Technology Advocacy. This category – previously identified as a code during the systematic review – was found to encapsulate the core mission of a surprising number of social enterprises selected for the case analysis.

### **5.2.1 Adapting technology**

Proximity Designs is a Myanmar based social enterprise run by Jim Taylor and Debbie Aung Din Taylor. The mission of the enterprise is design and provide affordable income-boosting products to empower rural families and encourage entrepreneurship (Proximity Designs, 2019). In line with the idea of adapting technology – redesigning and providing existing technology to meet the needs and scale of a specific community, Proximity Designs provides a line of farm technology products called Yetgaon irrigation products (Proximity Designs, 2019). These products are essentially modern agricultural tech – sensors, water pumps, sprinkler and drip irrigation devices, redesigned for small-plot growers.

Another social enterprise that reveals the concept of adapting technology is Sunlabob Renewable Energy – a Laos-based company that provides clean water and renewable energy solutions to



developing nations. One of the company's major offerings is the Sunlabob Pico Lantern; a lightweight and durable solar-powered lantern specially designed for use by rural households (Sunlabob Renewable Energy, 2019).

The Technology Informatics Design Endeavour is a social enterprise centered around the idea of adapting technology (TIDE, 2019):

“TIDE (Technology Informatics Design Endeavour) was founded on the 11th of May 1993 with the purpose of identifying concepts, prototypes and technologies that have been developed in various laboratories, adapt them where required and disseminate them to communities.”

TIDE's offerings fall into four categories – energy efficiency, water and environment, women and livelihood and cook stoves. The company, in addition to developing and providing technology, also provides training to individuals in rural and developing communities.

In Nairobi, a team of technologists, engineers and software developers work on building appropriate tools for connectivity. This team is BRCK, a social enterprise that develops connectivity devices that fit the unique infrastructure landscape in Kenya – inadequate electricity and poor internet connections (BRCK, 2019). These devices included solar-powered, rugged and aluminium cased hardware to provide sustainable internet to classrooms and businesses.

### 5.2.2 Creating technology for SE use

Benetech’s Miradi, an open source conservation project management tool, which was revealed in the review of academic literature, was also gleaned from the analysis of the social entrepreneur cases (Benetech, 2019). Miradi allows nature conservation practitioners to create, manage and learn from their projects to improve the effectiveness of their activities. According to the Benetech website, Miradi has “become the platform of choice for large conservation organizations, local and regional groups, researchers, nonprofit, for-profit, and governmental organizations and is used in more than 170 countries.” (Benetech, 2019). The table below shows a list of other social entrepreneurs whose social enterprises’ offerings align with the concept of creating technology for SE use.

**Table 5.4.** Social enterprises that create technology for social entrepreneurship use

| <b>Social Enterprise</b> | <b>Offering</b>   |
|--------------------------|---|
| Blue Ventures            | Offers technical advice, produces technical resources and collates data for other marine conservation organizations (Blue Ventures, 2019).  |
| Build Up                 | “With the support of Interpeace, three local research organizations – the Academy for Peace and Development, the Heritage Institute for Policy Studies and the Puntland Development Research Center – are introducing technology-enabled solutions to increase participation in their peacebuilding work. Build Up supported the selection of adequate technology, provides tailored training, and works with the organizations to design methodologies for using these new technologies.” (Build Up, 2019) |
| Yomken                   | Yomken offers an open innovation platform where low-tech MSEs (micro and small enterprises) and NGOs can crowdsource solutions and technologies. The enterprise sees its open-innovation model as a ‘technology-push’ mechanism (Yomken, 2019).   |

Source: (Blue Ventures, 2019; Build Up, 2019; Yomken, 2019).

### 5.2.3 Developing technology for use by community

A good number of the social enterprises analyzed are involved in the development of technology for use by communities – peoples and groups. The core mission of the social enterprise Angaza is

the creation of technology that “allows businesses to offer life-changing products to anyone, anywhere.” (Angaza, 2019). In line with this mission, Angaza developed a platform to help businesses in Kenya manage their sales networks and grow their client base. APOPO is a social enterprise based in Tanzania that researched and developed a detection rat technology for diagnosing tuberculosis and clearing out mine fields (APOPO, 2019). Yet another social enterprise is Bayes Impact, a company that works with citizens to build vital public services – one of which is Bob; a free online platform that leverages artificial intelligence to aid jobseekers with data-driven advice (Bayes Impact, 2019).

Benetech naturally falls within this category with its focus on creating software solutions that address deep-rooted social issues (Benetech, 2019). Bibliothèques Sans Frontières i.e. Libraries Without Borders developed the Ideas Box and Ideas Cube for both rural and disadvantaged areas. The Ideas Box is a multimedia center that can be deployed in different areas to provide access to knowledge and information, the Ideas Cube on the other hand is a book-sized, autonomous server that provides internet access to rural locations (Bibliothèques Sans Frontières, 2019).

Build Change works with local communities to build safer structures, to this end the enterprise assists homeowners in developing safe designs. The venture also develops and distributes image-based tools to assist schools with safe construction (Build Change, 2019). d.Light is a global pioneer in solar-powered solutions for developing communities. The company was founded in 2006 when Ned and Sam developed a prototype solar lantern, since then the company has expanded its product line with new innovative solar products (d. Light, 2019).

Ekgaon Technologies is a for-profit social enterprise that developed an online platform for farmers, under-served rural women, rural businesses and the large urban migrant labour population of aspiring consumers (ekgaon, 2019). The platform provides access to market, expert advice and microfinance. EveryLayer is another social enterprise with a platform as a major offering. The company's proprietary, cloud-based platform provides internet users in developing economies with access to high-speed broadband internet (EveryLayer, 2019).

Some social enterprises are involved in the development of mobile applications. Haus developed and provides a free monitoring and security mobile application to households, public services and private companies (Haus, 2019). Seeqest developed an app for users to visualize the contents of their pension fund; the idea of the Seeqest app is to provide users who are concerned with sustainability the ability to move their investments from unethical holdings (Seeqest, 2019). Shubh Loans main product is a mobile application developed by a team of bankers, technologists and data science experts. The app allows lenders access underserved and unserved segments by using real-time analytics and reports based on alternative data to provide them with credit scores (Shubh Loans, 2019). Sproxil developed mobile technology products and solutions to equip consumers and regulatory bodies with the ability to flag counterfeit medicine (Sproxil, 2019). Vetsark's core offering is a mobile application that provides veterinarians with a more effective way of managing clinical and business operations. (Vetsark, 2019).

Apart from developing closed-loop recycling solutions to ensure waste is recycled and used in line with the concept of the circular economy, TerraCycle developed Loop, an e-commerce platform that offers zero-waste packaging options for popular products (TerraCycle, 2019).

Other selected and reviewed social enterprises that fall into this category are listed in the table below:

**Table 5.5** Social enterprises that develop and create technology

| <b>Social Enterprise</b>                       | <b>Offering</b>   |
|--|---|
| BanQu  | BanQu developed the “first ever blockchain Economic Identity technology solution that enables a secure and immutable platform for creating economic opportunities for people around the world who are refugees and/or living in extreme poverty (BanQu, 2019).  |
| Fairphone                                      | Fairphone is a social enterprise that develops and sells responsibly produced ethical, modular smartphones.   |
| Fairtrasa                                      | Fairtrasa is an international social enterprise that empowers smallholder farmers by connecting them to the global food supply chain. The company collaborated with another social enterprise – eKutir to develop Bloom; a technology platform that facilitates and improves the activities of smallholder farmers (Fairtrasa, 2019). |
| Greenhope                                      | Greenhope is a clean technology social enterprise offers two newly developed technologies – Oxium; an oxo-biodegradable additive that speeds up the degradation of plastic, and Ecoplas; a different type of plastic that’s photodegradable, biodegradable and oxodegradable (Greenhope, 2019).                                       |
| JEPLAN Inc.                                    | JEPLAN is a social enterprise that uses a unique recycling technology to manufacture products from PET bottles and polyester clothes (JEPLAN, INC., 2019).  |
| Medic Mobile                                   | Medic Mobile developed an open-source software to aid health workers in delivering equitable care to the hardest-to-reach communities (Medic Mobile, 2019)  |
| mPedigree                                      | mPedigree builds innovative technology tools to provide global solutions to consumers, brand owners and governments (mPedigree, 2019).  |
| Nuru Energy                                    | Nuru Energy is a renewable energy enterprise that develops and provides solar products  |
| SELCO  | SELCO designs, develops and deploys customised solar solutions to meet the specific needs of rural communities in India (SELCO, 2019)   |
| Simplon.Co                                     | Simplon.Co is a social business that, among other things, creates websites and applications for businesses.   |
| Simprints                                      | Simprints is a non-profit technology startup that builds biometrics for beneficiary identification in developing nations.   |
| Tabit  | -Tabit is a social enterprise that provides solutions to agricultural professionals, one of them is a research center for the collaborative development of new and effective agricultural technologies (Tabit, 2019).   |
| Thorn  | Thorn developed a free technology product to aid law enforcement in combatting child sex trafficking (Thorn, 2019).   |
| TIDE - Technology Informatics Design Endeavour | TIDE develops and provide appropriate technology products such as safe smokeless cook stoves to rural communities.  |

|         |   |
|---------|---|
| Zipline | Zipline built “the world’s fastest and most reliable delivery drone” to provide medicine to those who need it the most (Zipline, 2019). |
|---------|---|

Source: (BanQu, 2019; Fairtrasa, 2019; Greenhope, 2019; JEPLAN, INC., 2019; Medic Mobile, 2019; mPedigree, 2019; SELCO, 2019; Tabit, 2019; Thorn, 2019; Zipline, 2019).

### 5.2.4 Providing technology

The first point to note is that most of the social enterprises covered in the previous sections that adapt or develop technologies also provide the resulting technologies to specific communities and areas. Nevertheless, there were certain social enterprises reviewed that fit solely into the category of providing technology, that is, by delivering existing technology products or solutions to communities or regions that don’t have them.

The first is Adventure Scientists, a social enterprise that collects and provides high-quality data to a network of partners, including medical research teams, to accelerate their missions (Adventure Scientists, 2019). The enterprise also provides a technology audit service – a full review of the latest and most effective field-collection technologies available e.g. drones and sensors.

Unlike the other solar and renewable energy social enterprises covered in this research that develop solar products and solutions, Hybrid Social Solutions Inc, through a network of strong partnerships, imports and provides affordable, high-quality solar products to both off-grid and on-grid communities in the Philippines (Hybrid Social Solutions, 2019). Additionally, LifeGate is a social enterprise that, amongst other things, supplies sustainable lighting and LED systems (LifeGate, 2019).

Silulo Ulutho Technologies, an enterprise based in South Africa, provides internet access to disadvantaged people through internet cafés. These internet cafés also provide access to services such as printing, faxing, scanning and laminating. Furthermore, the social enterprise provides security and communication technologies to businesses (Silulo Ulutho Technologies, 2019).

The social enterprise – Siyafunda Community Technology Centres, aims to support economic, educational, social and community development through the use of digital technologies. To achieve this, the social enterprise sets up technology centres where people can have access to the internet, computers and other digital technologies (Siyafunda CTC, 2019). The Youth for Technology Education, like Siyafunda CTC, is a social enterprise that pushes for the use of technology to create opportunities for developing communities. To this effect, the non-profit runs many programs including Agric-P.O.W.E.R – which is focused on providing rural female farmers with technology based agricultural improvements (Youth for Technology Foundation, 2019).

### **5.2.5 Technology Advocacy**

A crucial activity embarked on by social enterprises is technology advocacy, that is, the push for technology adoption in a community. The case analysis established this previously discovered concept as a category due to the number of social enterprises that embark on this activity as a core mission. The Tactical Technology Collective, Instituto de Tecnologia e Sociedade do Rio de Janeiro, SciCo and Simplon.Co are social enterprises that advocate for either the adoption of technology or a better understanding of the impacts of technology in the society. While the other organizations will be covered in the technology education category below, the Tactical Technology

Collective solely focuses on technology advocacy and is therefore a good example to illustrate the relationship between social entrepreneurship and this concept.

The Tactical Technology Collective explores possible uses of technology in the civic context, the story below elaborates on the organizations mission (Tactical Tech, 2019):

“The idea of Tactical Tech was born around 2001, as a question posed by co-founders Stephanie Hankey and Marek Tuszynski: What can be done to help activists, advocates and campaigners to think about and use technology differently?

At the time, there was a general optimism about technology, but not much specific focus on what it could do for civil society. There was also a lot of talk about how technology could be an equalising, emancipating force - but not much being done to make this actually happen. Trainings tended to take a top-down, parachute-in approach, with questionable results.

Tactical Tech was officially founded in 2003 to respond to these gaps.”

Projects initiated by Tactical Tech include XYZ; “an online platform for practical tools to navigate digital security and privacy from a gender perspective, learn from each other's activism, inspire one another and co-create.” (Tactical Tech, 2019), and the Data Detox kit; a toolkit to help users increase their online privacy and digital security. Essentially, in advocating for the use of technology in different areas of society, the non-profit catalyses and collaborates with stakeholders to bring beneficial projects into fruition.



### **5.2.6 Technology Education**

This category covers another way technology factors into social entrepreneurship. Social enterprises and social entrepreneurs provide STEM education to rural and undereducated populations in a bid to foster development and empower them to create opportunities for themselves. Twelve of the social enterprises covered in the research fit into this category.

The first is the organization – Bibliothèques Sans Frontières (BSF), also known as Libraries Without Borders. Amongst the numerous services and programs offered by the BSF is Les Voyageurs du Numérique; a program in France centered on teaching people with minimal digital skills how to use new information and communication technologies in a beneficial and responsible manner (Bibliothèques Sans Frontières, 2019). On the other hand, Build Up, with its focus on peace building, provides courses on technology and innovation to local and international peacebuilding professionals (Build Up, 2019).

The Instituto de Tecnologia e Sociedade do Rio de Janeiro, which translates to the Institute for Technology & Society, is a non-profit conducts research, advocates for technology in Brazil, Latin America and the Global South, and offers vital education on modern technologies such as digital identity, cybersecurity and artificial intelligence (ITS Rio, 2019). The Khan Academy’s mission is to “provide free, world-class education for anyone, anywhere” (Khan Academy, 2019). While the online academy’s offerings include all forms of education, it is included in this category because of its courses and modules involving science, technology, engineering and mathematics. The Maths Centre is an organization in South Africa that “equips teachers, learners and parents

with learning materials and programs in order to develop a higher competency and performance in Mathematics, Science, Technology and Entrepreneurship education.” (Maths Centre, 2019).

Still on the topic of technology education, SciCo is a social enterprise with a unique mission – to communicate scientific issues to the public (SciCo, 2019). The organization is comprised of scientists, academics, educators and artists who aim to strengthen the picture of the scientist in society and create interest in young people for scientific disciplines. Silulo Ulutho Technologies, which was covered in the previous category, runs a training academy that provides public computer courses to the public (Silulo Ulutho Technologies, 2019). Simplon.Co provides vital IT skills in fields such as UI/UX design, programming and web development to women, kids and refugees in many countries e.g. Senegal, Romania (Simplon.Co, 2019). Siyafunda CTC, which was covered in the providing technology category, also provides access to computer and digital literacy courses which include end user computing, python programming, IoT and cybersecurity (Siyafunda CTC, 2019).

The social enterprise – TIDE, which was covered in the adapting technology category, provides training modules on appropriate technologies such vermi-composting, stove construction, energy assessments and water audits (TIDE, 2019).

Finally, the Youth for Technology Foundation is an international non-profit that calls itself a “training organization”. The organization has numerous programs targeted at different populations from developing populations to kids and women. One of these programs is the YTF Academy

which provides technology skills to youth in Nigeria, Kenya and Uganda (Youth for Technology Foundation, 2019).

### **5.2.7 Using Technology**

Most, if not all, technology social enterprises use technology in some capacity – whether in the process of providing education like Khan Academy or developing a new recycling technology like in the case of TerraCycle. The social enterprises featured in this category are those that depend on the use of technology to provide their offerings, solutions or products.

The social enterprise – Adventure Scientists, which was previously featured in the providing technology category, provides high quality data and technology services to partner organization. To collect this high-quality data, Adventure Scientists uses various technologies with one example being a camera trap (Adventure Scientists, 2019).

Crisis Text Line uses mobile phone services to provide a free 24/7 confidential line to support people in crisis. The social enterprise trains Crisis Counselors to “bring texters from a hot moment through active listening and problem-solving” (Crisis Text Line, 2019). Additionally, Crisis Text Line leverages data science to provide faster and more accurate support.

According to FarmDrive’s website, the social enterprise “uses mobile phones, alternative data, and machine learning to close the critical data gap that prevents financial institutions from lending to creditworthy smallholder farmers.” (FarmDrive, 2019). The enterprise has an alternative risk

assessment model it uses to provide financial institutions with the data to assess the risk and provide loans to smallholder farmers.

Infiuss leverages computing and information technologies to create a vast database of blood banks. In addition to this, the social enterprise has a service center that hospitals and health facilities can contact via call or SMS to make requests for blood. On receiving the request, Infiuss then transports the blood from the source facility or hospital to the need hospital (Infiuss, 2019).

Khan Academy's model requires camera and video technology to create educational videos, and information and communication technologies to provide these videos to its millions of users across the world (Khan Academy, 2019).

The About page on Tabit's website describes the social enterprise as a team that "has the strength of reaching tens of thousands of agricultural professionals by using internet and mobile solutions". In line with the company's mission to increase the efficiency and profitability of rural agriculturalists, the company leverages technology to create projects ranging from research facilities to the SMS 2434 – Farmers' News Pack; a mobile information and news service for farmers (Tabit, 2019).

### **5.3 Types and forms of technologies revealed in cases**

Different types of technology were reflected in the reviewed social entrepreneur cases, the table below shows the types of technology and the social enterprises using, developing or providing them.

**Table 5.6** Types of technology used by selected social enterprises

| Type of technology                                     | Specific science researched/tech used/solution provided   | Social enterprise(s)  |
|--|---|---|
| Electronics & Information and communication technology | <ul style="list-style-type: none"> <li><b>i.</b> Data technologies</li> <li><b>ii.</b> Financial technology platform</li> <li><b>iii.</b> Blockchain-based platform</li> <li><b>iv.</b> Internet/online platforms</li> <li><b>v.</b> Software/mobile applications</li> <li><b>vi.</b> Networking technologies</li> <li><b>vii.</b> Mobile technology</li> <li><b>viii.</b> Field-collection technologies</li> <li><b>ix.</b> Agricultural technology (Agtech) platform</li> <li><b>x.</b> Sustainable lighting/LED systems</li> <li><b>xi.</b> Cloud computing platform</li> <li><b>xii.</b> Automatic identification and data capture technology (AIDC)</li> <li><b>xiii.</b> Internet of Things (IoT)</li> <li><b>xiv.</b> E-commerce</li> <li><b>xv.</b> Healthcare platforms</li> <li><b>xvi.</b> Drone technologies</li> </ul> | <ul style="list-style-type: none"> <li><b>i.</b> Adventure Scientists, Infiuss, Thorn</li> <li><b>ii.</b> Angaza, Bayes Impact, Ekgaon, FarmDrive, Shubh Loans</li> <li><b>iii.</b> BanQu</li> <li><b>iv.</b> Bayes Impact, Benetech, Khan Academy, Yomken, Tactical Technology Collective</li> <li><b>v.</b> Benetech, Haus-App, Seequest, Simprints, Zipline</li> <li><b>vi.</b> Bibliothèques Sans Frontières, BRCK, EveryLayer</li> <li><b>vii.</b> Crisis Text Line, Fairphone, Infiuss, Medic Mobile, mPedigree, Sproxil</li> <li><b>viii.</b> Adventure Scientists</li> <li><b>ix.</b> Fairtrasa, FarmDrive, Proximity Designs</li> <li><b>x.</b> LifeGate</li> <li><b>xi.</b> Simprints</li> <li><b>xii.</b> Simprints</li> <li><b>xiii.</b> Tabit, BRCK, Angaza</li> <li><b>xiv.</b> Fairtrasa, Fairtrasa</li> <li><b>xv.</b> VetsArk, Medic Mobile, Sproxil</li> <li><b>xvi.</b> Zipline</li> </ul> |
| Detection Technology                                   | <b>i.</b> Rat detection technology  | <b>i.</b> Apopo   |
| Marine science   | <b>i.</b> Carbon sequestration and Aquaculture  | <b>i.</b> Blue Ventures   |
| Building technology                                    | <b>i.</b> Disaster-resistant structures   | <b>i.</b> Build Change  |
| Renewable Energy technology                            | <ul style="list-style-type: none"> <li><b>i.</b> Solar products and solutions</li> <li><b>ii.</b> Low-tech energy efficient products</li> </ul>   | <ul style="list-style-type: none"> <li><b>i.</b> d.Light, Hybrid Social Solutions, Nuru Energy, SELCO, Sunlabob Renewable Energy</li> <li><b>ii.</b> TIDE</li> </ul>  |
| Green/clean technology                                 | <ul style="list-style-type: none"> <li><b>i.</b> Bio-degradable plastics</li> <li><b>ii.</b> Polyester recycling tech</li> <li><b>iii.</b> Plastic recycling additive</li> <li><b>iv.</b> Closed-loop recycling solutions</li> </ul>  | <ul style="list-style-type: none"> <li><b>i.</b> Greenhope</li> <li><b>ii.</b> JEPLAN Inc</li> <li><b>iii.</b> Greenhope</li> <li><b>iv.</b> TerraCycle</li> </ul>  |
| Agriculture & Biotechnology                            | <b>i.</b> Biologicals and seed treatments   | <b>i.</b> Tabit   |
| Hydrology  | <b>i.</b> Rainwater harvesting systems  | <b>i.</b> TIDE  |

#### 5.4 Intersection of literature concepts and activity of social enterprise cases

This section uses the United Nations Sustainable Development Goals to map out the activity of the social enterprise and which social problem it solves. It also goes further by connecting the

activity of the social enterprises with concepts discovered and developed from both the literature review and the systematic review. The appendix section contains a tabular representation of the connection between the cases, the SDGs and concepts from the literature and systematic review. Additionally, in order to reduce complexity, the term high technology will be used to itemize both medium-high and high technology classifications while the term low technology will be used to itemize both medium-low and low technology classifications, as revealed by Hatzichronoglou (1997) in the OECD's Science, Technology and Industry Working Papers.

#### **5.4.1 Sustainable Development Goals**

##### *Goal 1 – No poverty*

The five social enterprises within this category were revealed to have high technology solutions (Hatzichronoglou, 1997). BanQu's offering is a blockchain economic identity platform, the first ever developed, that creates opportunities for refugees and people living in extreme poverty by enabling them to participate in the global economy. Similar to BanQu, Simprints developed a biometric solution to provide identification and data solutions to the world's poorest citizens, a perfect example of the use of technology to empower marginalized communities (Nora et al., 2011). Fairtrasa's online platform – Bloom, connects smallholder farmers directly to global markets – the social enterprise leverages technology to increase the ability to reach customers and serve broader areas (West, 2012). FarmDrive uses machine learning, mobile phones and alternative data to provide services for smallholder farmers while SELCO designs and provides affordable solar powered products to rural and poor populations. On the issue of technological capabilities, in one of BanQu's projects, the social enterprise assisted small-scale developing nation farmers in setting up a sustainable supply chain to better leverage the benefits of BanQu's offering and

increase their productivity. Absorptive capacity – both at the individual and firm level (Cohen & Levinthal, 1990) – is revealed in the story of FarmDrive, a social enterprise started by two Kenyan women who developed their skills through competitions and internships before creating a solution to the gap between smallholder farmers and lending facilities. The company aggregates data sets from all around the world in order to create an effective credit-scoring system for Kenyan farmers.

### *Goal 2 – Zero Hunger*

Five social enterprises were also coded in this category, including Fairtrasa and FarmDrive which were covered in the previous goal. In addition to these two are: Ekgaon Technologies; which provides a platform for farmers to access information and advisory services along with a online market for them to target urban customers, Tabit; which researches and develops agricultural technology solutions for farmers in Turkey and Proximity Designs; which developed a holistic agricultural services platform for farmers in Myanmar to access farm technology, advising and finance. These three social enterprises all offer high-tech solutions – mobile, internet and software to be precise. Proximity Designs, a United States based company, brings new technology to Myanmar and aims to spread and give millions of farmers access to it, this touches literature on both technology transfer (Derakshani, 1984) and diffusion of technology (Ghezzi, Rangone & Balocco, 2013) respectively. The solutions of these social enterprises on farmers from Turkey to Myanmar, target the zero-hunger goal of promoting sustainable agriculture and doubling the income and productivity of small-scale farmers (Osborn, Cutter & Ullah, 2015).

### *Goal 3 – Good health and well-being*

Nine of the analyzed cases fit into this category. Noteworthy amongst the social enterprises is Apopo, a social enterprise that uses rats to diagnose tuberculosis in remote, developing economies. Apopo's solution is low-tech (Hatzichronoglou, 1997) but appropriate (Murphy, McBean & Farahbakhsh, 2009). The other social enterprises in this category all provide high-tech offerings from Infiuss, which provides a database of blood banks to health facilities in Cameroon, to Medic Mobile, which developed a software to aid medical practitioners in providing healthcare to the hardest to reach communities. The non-profit – Adventure Scientists targets SDG 3 in an indirect way – by providing high-quality data to organization addressing health challenges e.g. gathering field data to identify the genes responsible for antibiotic resistance. Finally, mPedigree – a social enterprise based in Ghana that uses and builds innovative web and mobile technologies, has built a partnership with regulatory agencies and foreign companies to build a technology movement in Ghana. By building its technological capabilities, mPedigree, a developing nation technology social enterprise, has become a global leader in the use of IT to secure items (mPedigree, 2019).

### *Goal 4 – Quality Education*

SDG 4 is focused on ensuring inclusive quality education and promoting life-long learning opportunities for all people (Osborn, Cutter & Ullah, 2015). Ten social enterprises lead the charge in this category. Four of these ventures located in developing countries – Maths Centre, Silulo Ulutho Technologies, HSSi and ITS Rio – exhibit absorptive capacity by aiming to gather and provide technology training and education to regions where it is lacking. Benetech exhibits the core idea of technology transfer (Derakshani, 1984), by “uniting two worlds: the social sector and Silicon Valley”, the company serves as a bridge by identify needs and issues that talent and



solutions from Silicon Valley have the potential to address (Benetech, 2019). Khan Academy makes use of high technology solutions – cutting edge camera and information technology (Khan Academy, 2019) – in order to reach millions of students and learners across the globe, the Bibliothèques Sans Frontières leverages the same solutions to reach people in marginalized communities (Bibliothèques Sans Frontières, 2019). The analysis revealed an absence of social enterprises with low technology offerings in this category, this could imply that the fulfillment of this Goal, quality education, depends on modern and advanced technologies, this is a concept that should be explored further.

#### *Goal 5 – Gender equality*

The aim of this goal is to achieve gender equality and the empowerment of all women and girls (Osborn, Cutter & Ullah, 2015). Six social enterprises are featured in this category. These social enterprises target the objectives of this goal either directly through programs and solutions, or indirectly, through company principles and internal policies. A number of the featured companies that pursue the actualization of this goal engage in the adaptation, development and provision of technology – TIDE empowers women in rural communities by intentionally involving them in its core goal of providing appropriate low-technology solutions and Ekgaon Technologies developed the OneVillageOneWorld Network that to facilitate women self help groups across India. Enterprises such as Simplon.co and Tactical Technology Collective provide digital training to women while also advocating for the use of technology in society. Connections were made between all the social enterprises in this category and the identified concepts from the reviewed literature. The social enterprise Thorn embodies most of these concepts. Thorn has an engineering and data science team that not only develops innovative technologies but searches for (Cohen &

Levinthal, 1990), and assesses whether new technologies could be repurposed (Bell & Pavitt, 1995) to achieve its mission – the protection of children, particularly young girls, from sexual exploitation. The enterprise, based in the United States, spreads its tools and technology to different institutions and companies, and different countries e.g. Canada (Derakshani, 1984; Ghezzi, Rangone & Balocco, 2013).

#### *Goal 6 – Clean water and sanitation*

The two social enterprises featured in this category are TIDE and Sunlabob Renewable Energy. Sunlabob Renewable Energy develops and provides solar powered water systems ranging from purifiers to wastewater treatment systems while TIDE develops, designs and implements rainwater harvesting systems in Indian communities. Sunlabob provides mostly high-tech offerings while TIDE provides most low-tech. TIDE identifies concepts, prototypes and technologies developed in various laboratories i.e. absorptive capacity, brings them in and adapts them where required i.e. it possesses and has built the technological capabilities required to properly exploit technical change (Bell & Pavitt, 1995), and it disseminates these adapted solutions to various communities – this is technology diffusion in action (Ghezzi, Rangone & Balocco, 2013).

#### *Goal 7 – Affordable and clean energy*

The activities of two of the social enterprises covered in Goal 6 – TIDE and Sunlabob Renewable Energy fall under this category, along with five other organizations – Angaza, SELCO, Nuru Energy, d.Light and Hybrid Social Solutions Inc. Four of these social enterprises – Sunlabob, TIDE, SELCO and Nuru adapt solar powered solutions to the level and cost of rural and developing communities. Hybrid Social Solutions is the only firm featured here that doesn't develop or adapt

energy solutions, rather the enterprise imports and provides solar products from other nations e.g. China. TIDE additionally provides skills and training on the energy assessment to individuals in rural communities. None of the enterprises here fall into the category of creating technology specifically for mission organizations, they develop for individuals, communities and businesses. Four of these renewable energy social enterprises are situated in developing countries, and the other three provide their solutions to developing economies, in other words, they are all focused on rural electrification and addressing energy poverty (Urpelainen & Yoon, 2016). Consequently, they are required to build their technological capabilities to be able to properly exploit the imported technological know-how and/or equipment (Bell, 1984), additionally in their aim to provide access to affordable and clean energy, they have to work on strategies to ensure the widespread acceptance and use of technology to the communities they aim to serve (Davis, 1985).

#### *Goal 8 – Decent work and economic growth*

The focus of this goal is the promotion of full, productive and decent employment for all along with sustainable, inclusive and sustainable economic growth (Osborn, Cutter & Ullah, 2015). Solutions that target this goal support job creation, innovation, entrepreneurship and creativity while aiming to eliminate forced labour, slavery and child labour. Five social enterprises from the analyzed cases fit into this category – BanQu, FarmDrive, Apopo, Shubh Loans and Siyafunda CTC. Apopo creates jobs, develops skills, frees up land and improves general socio-economic conditions, BanQu creates opportunities for refugees and people living in extreme poverty, FarmDrive uses technology to give smallholder farmers access to loans, allowing them to improve their livelihoods and contribute to economic development, Siyafunda's technology centres bring ICT to communities and skills them on how to use it to increase their employability and Shubh

Loans aims to provide ubiquitous access to credit in India. Siyafunda CTC and FarmDrive's absorptive capacities enable them to find and learn the external knowledge and skills required to create impact. Siyafunda CTC also aims to build technological capabilities not just within the organization, but also within the general South African community, this is to fulfill its goal of using digital technologies to support community, economic, educational, and social development (Siyafunda CTC, 2019; Bell, 1984).

### *Goal 9 - Industry, innovation and infrastructure*

This goal embodies the need to build resilient infrastructure and promote development and industrialization for all sectors and classes of people. It also espouses the need to foster innovation and upgrade the technological capabilities of sectors in all countries – particularly the Global South (Osborn, Cutter & Ullah, 2015). The seven enterprises featured in this category are BanQu, Shubh Loans and Siyafunda CTC; which have been covered in the previous sections, and EveryLayer, Angaza, Yomken and Silulo Ulutho Technologies. EveryLayer's affordable high-speed internet connects previous unconnected populations to the internet and provides them access to services and increased economic opportunity – the enterprise aims to bridge the digital divide that exists in the Global South (Hilbert, 2010), Angaza's technology solutions – which include payment management platforms and IoT devices – empower businesses and distributors to make life-changing products accessible and affordable to individuals in emerging markets, Yomken's open innovation platform allows low tech enterprises and NGOs to crowdsource creative and innovative technological solutions, Lastly is Silulo Ulutho which provides affordable access to internet and computing resources along with courses and training on how to employ them productively. All the concepts and ideas from the literature reviewed in this present research are featured in this section

– from Siyafunda CTC and Yomken which leverage upgraded technological capabilities to adapt technical change to their communities (Bell & Figueiredo, 2012), to Silulo Ulutho Technologies that leverages external knowledge on computing and provides it to individuals in South Africa in order to empower them (Cohen & Levinthal, 1990), and finally to Angaza, which aims to empower businesses and ensure affordability by providing numerous beneficial technological solutions (Ghezzi, Rangone & Balocco, 2013).

### *Goal 10 – Reduced inequalities*

This goal embodies the need to reduce inequalities within and among countries. This means improving income growth for the bottom percent of the population while empowering and promoting inclusion regardless of sex, age, ethnicity, race, disability, religion and economic status (Osborn, Cutter & Ullah, 2015). Five of the social enterprises in this category have previously been covered in Goal 5 – which covers gender equality, consequently this section will focus on the other four social enterprises that aim to mitigate other forms of inequalities. Lack of access to information is a major driver of inequality, BSF uses technology to provide access to information in 23 languages and 50 countries across the globe (Bibliothèques Sans Frontières, 2019). Benetech developed Bookshare, a library of e-books specifically for disabled people, the enterprise also runs several initiatives targeted at helping people with disability and learning differences, Benetech is an ideal example of a firm that uses technology to support and empower ‘disability citizenship’ (Darcy, Yerbury & Maxwell, 2019). Medic Mobile leverages information technology to increase the reach of healthcare workers, reduce mortality and strengthen community health systems, this is what Crean (2010) refers to as e-health; the use of information and communication technologies to improve health systems performance. HSSi specifically targets citizens in remote communities

with some of its offerings in order to reduce their inequities. Two major trends revealed in the social enterprises in this category are; (i) the transfer of technology from more developed locations in a bid to empower marginalized and underserved population segments and (ii) the search for, and use of external knowledge and know-how by social enterprises in order to provide appropriate solutions to these same marginalized segments.

### *Goal 11 – Sustainable cities and communities*

The focus of this goal is on making cities and human settlements safe, affordable, inclusive and resilient (Osborn, Cutter & Ullah, 2015). Only one social enterprise from the cases is featured in this category – Build Change. Build Change is a social enterprise that works with homeowners, engineers and other professionals and stakeholders to design and build disaster resistant structures. The social enterprise uses culturally appropriate, low-cost and locally available technologies and materials when training local professionals. Build Change, based in America, shares its designs and train builders and homeowners in emerging nations on how to build them. The organization “leaves in place permanent change in construction practice by building local skills and stimulating local demand” (Build Change, 2019), i.e. it boosts the technological capabilities of the nations it services. The ultimate aim of this enterprise is to spread its disaster resistant and sustainable structures to as many locations as possible. Finally, the activities of this organization bring to mind Clark’s (2010) concept of “Design for Sustainability” i.e. contextually appropriate and sustainable development of solutions in mostly emerging economies.

### *Goal 12 – Responsible consumption and production*

This goal embodies the need to ensure sustainable consumption and production patterns (Osborn, Cutter & Ullah, 2015). The three enterprises featured in this category are Seequest, Fairphone and Greenhope. Fairphone is a social enterprise that develops and sells responsibly produced ethical, modular smartphones, Seequest developed a digital tool to allow concerned individuals move their pension funds away from unsustainable investments and Greenhope developed a biodegradable plastic as a substitute for current plastics. The idea of Fairphone, an ethical smartphone, is representative of the concept called “Slow Tech”, that is, good and fair technology (Patrignani & Whitehouse, 2015). Greenhope on the other hand is a clean technology innovation that aims to promote responsible production and environmental sustainability (Horwitch & Mulloth, 2010). Seequest embodies Bailetti’s (2010) idea of the new application of technology to existing problems. Fairphone, in line with technology diffusion, hopes to spark a widespread fairer electronics movement that sees the trend in the electronics industry move towards the demand for more ethical, modular and responsible devices.

### *Goal 13 – Climate Action*

This category consists of five social enterprises that are taking urgent action to combat climate change and its impacts (Osborn, Cutter & Ullah, 2015). All the social enterprises in this category are high-technology firms (Hatzichronoglou, 1997). Adventure Scientists covered earlier, provides data and services to partners involved in environmental activities, Greenhope not only developed a substitute biodegradable plastic, it also developed a chemical to speed up degradation of plastics, the Hybrid Social Solution’s lanterns reduce 130kg of greenhouse gases per year, JEPLAN Inc’s vision is to circulate everything, it takes unwanted goods, recycles them then sells them as new

products and last but not the least is LifeGate, with its Zero Impact project that gives individuals the ability to calculate and minimize their CO2 emissions. Greenhope, JEPLAN Inc and LifeGate are in line with Horwitch and Mulloth's (2010) idea of clean technology innovations that have the potential to provide value. The goals of these companies require them to stay open and sensitive to new information and trends concerning clean technology, in other words, they are required to possess a higher than average absorptive capacity (Cohen & Levinthal, 1990). Additionally, the desire to combat climate action means these organizations must ensure the widespread use and acceptance of their technology solutions, that is, the need to ensure diffusion of their core technologies. It is also important to mention Hybrid Social Solutions which leverages more advanced technology to combat the issue in emerging Philippines (Gumbau-Albert & Maudos, 2013) – this is an example of the potential benefits of technology transfer.

#### *Goal 14 – Life below water*

All but one of the social enterprises featured in the category have been covered in the previous goals. Nevertheless, descriptions detailing how each of the social enterprises aim to achieve this goal – the conservation and sustainable use of the oceans, seas and marine resources (Osborn, Cutter & Ullah, 2015) – would be presented. Blue Ventures develops approaches for sustaining marine conservation and rebuilds tropical fisheries with coastal communities. Greenhope's additive is a solution for biodegrading the plastics dumped in the ocean. LifeGate's PlasticLess reduces plastic and microplastic pollution in the sea. The new addition to this category is TerraCycle - an innovative recycling company that seeks to minus synthetic pollution on land and in the sea. The enterprise's team of scientists have researched and developed a range of closed-loop solutions for many types of waste (TerraCycle, 2019), the company also developed Loop –



an e-commerce platform that offers zero-waste packaging options for popular products from our partners at P&G, Unilever, Nestle, PepsiCo, Coca Cola, and many others. It is a good example of a highly innovative company with impressive absorptive capacity. Also, as with the previous goal – climate action, all these companies are high-technology firms. Although this might imply that efforts to embark on conservation and climate action activities are dependent on high technology solutions, there is avenue here to explore this further.

### *Goal 15 – Life on Land*

Goal 15 reflects the need to “protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss” (Osborn, Cutter & Ullah, 2015; p. 19). As with the previous section, although all the social enterprises here have been covered, specifics on how they achieve this goal will be enumerated. Benetech developed an open-source, adaptive software called Miradi for conservation organizations – Miradi enables these conservationists to better design, manage and learn from their activities. It has become the platform of choice for large conservation organizations, local and regional groups, researchers, nonprofit, for-profit, and governmental organizations and is used in more than 170 countries (Benetech, 2019). The high-quality data collected by Adventure Scientists helps its partners protect wildlife habitats around the world. Apopo partnered with a conservation organization to examine the potential of the rat detection technology to detect illegally trafficked pangolins and African hardwoods. Greenhope’s additive degrades plastic pollution on land while its biodegradable plastic doesn’t allow for synthetic pollution on land. As the greenhouse effect is essential for life on Earth, LifeGate has numerous projects focused on countering global warming. Finally, one of TerraCycle’s core goals is to mitigate synthetic pollution of land. As with the social

enterprises in Goal 13 and Goal 14, these are all high-technology firms. They are also highly invested in seeing widespread use and acceptance of their clean technology solutions.

#### *Goal 16 – Peace, justice and strong institutions*

The agenda of this goal is to “promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels” (Osborn, Cutter & Ullah, 2015; p. 20). Nine social enterprises are featured in this category. Bayes Impact uses technology to build citizen-led public services, reflecting Gopalkrishnan’s (2013) supposition on the ability of technology to serve as an effective tool for government services and processes. Benetech developed Martus – an open source software application for human rights activists and defenders to document violations, this brings to mind Gelsomino’s (2010) paper on ICT activism and marginalized communities. Following peace talks in Colombia, the BSF built 20 idea boxes – mobile pop-up multimedia centers – to fast-track the rebuilding of communities. HAUS’s offering is a mobile application that provides security and monitoring capabilities to individuals, public services and private companies. Build Up and the British Council Syria set up the Digital Steps program to promote peace and help Syrian refugees – the program includes the provision of job matching platforms to connect refugees in their host communities find work. mPedigree consults and develops technology that facilitate government processes, particularly the execution of policies in domains such as supply chain regulation and consumer safety. The Tactical Technology Collective researches and investigates how digital technologies can contribute to a more equitable, sustainable and democratic society. And as revealed earlier – Thorn developed technology to aid law enforcements in fighting child sex trafficking. The last social enterprise in this section is Sproxil, which was covered in Goal 3. This

company builds trust across supply chains with a focus on addressing the issue of counterfeit medicine in the global health care industry. Most of the social enterprises featured in this category provide or leverage technical change in a bid to strengthen institutions e.g. Sproxil's provision of counterfeit-tracking technology to Nigeria. Hence, many of these social enterprises are involved or contribute to the development of the technological capabilities in the communities or organizations they service. Additionally, all the social enterprises in this category are involved in the use, development and/or research of high-tech solutions.

### *Goal 17 – Partnership for the goals*

The final goal symbolizes the need for cooperation and collaboration in the process of actualizing all the previous stated goals. This goal embodies the need to strengthen global partnerships; that includes the private sector, civil societies and other organizations (Kumar, Kumar & Vivekadhis, 2016). A large number of the social enterprises analyzed in the cases fall under this category – twenty-seven to be precise. All the social enterprises featured in this section have been covered above. The listed social enterprises all partner with various stakeholders to make their solutions and offerings possible, the stakeholders include – technology experts, government, communities and users, NGOs, and other social enterprises. Peerally, De Fuentes & Figueiredo (2018) identify the development of linkages with community as a form of technological capability – this is one reasoning for the need for many of these social enterprises to engage in partnerships. A noteworthy, singular mention is Yomken – with its crowdsourcing platform that allows different professionals and technologists brainstorm solutions to issues faced by micro enterprises and NGOs – the social enterprise singularly embodies the concept of SDG 17. Finally, there is need to explore the

implications of this to ascertain whether the nature of social entrepreneurship requires partnerships and collaborations for improve ability to deliver value.

## **CHAPTER 6**

### **DISCUSSION & CONCLUSION**

The objective of this research was to gain a better understanding of the place of technology in social entrepreneurship. This was done in order to explore, using available evidence, the role of technology in social entrepreneurship's mission to create social value and tackle wicked problems. It was also carried out to inform future research on not just social entrepreneurship and technology, but also entrepreneurship. The first portion – the systematic review of academic literature was conducted using distinct parameters and rigorous article selection criteria. Consequently, the material sourced is appropriate for this review. The selected peer reviewed articles were read and thematically analyzed to develop code and categories, and to discover themes centered on the technology's place in social entrepreneurship. The second portion – the analysis of social entrepreneur cases was also conducted using specific parameters and rigorous selection criteria. The search was limited to three credible organizations in the field of social entrepreneurship. The websites of the selected social entrepreneurs were accessed to extract relevant data concerning the offerings and activities of their social enterprises. This data was read and thematically analyzed using ATLAS.ti and a deductive approach with the codebook and concepts developed from the systematic review of literature. This was useful in exploring the real-world cases, confirming existing themes and developing more concepts.

## 6.1 Discussions

In our introduction, we stated that social entrepreneurship implies solutions to wicked problems, and that SDGs are the UNs bid to create a common vision to bring solutions to these wicked problems. Noting the importance of technology for innovation (Hoffman et al, 1998), entrepreneurship (Dahlstrand, 2007), and national economic growth (Malecki, 1997), we thus investigate the place of technology in social entrepreneurship, where there is limited understanding of how technology is leveraged by social entrepreneurs.

Six categories developed during the systematic review initially proved adequate in categorizing the role of technology in the sphere of social entrepreneurship. The case analysis then revealed a seventh category – technology advocacy – that completed the initial six in establishing the different roles technology plays in providing solutions to complex social issues. Additionally, while an overwhelmingly positive view of technology was not unexpected in the social entrepreneur cases, it was surprising to identify this sentiment across the reviewed social entrepreneurship literature. Most of the evidence analyzed in the literature posits positive benefits to be derived from the use of technology, often without juxtaposing it with limitations or potential disadvantages.

As stated earlier in the introduction section of this research, when managed effectively, technological advances allow for the development of new innovations and the formation of new enterprises (Ulijn & Brown, 2004), entrepreneurs play a crucial role in the ‘development of technological structure’ (Hussain et al., 2011; p.45). Information uncovered during the systematic review buttresses these points – it reveals how numerous social entrepreneurs are responsible for the development of new technological innovations, the adaptation of new technologies to the level

of developing communities and the use of technological advances to create better and more effective solutions to wicked problems. The information revealed on how social entrepreneurs leverage technology was then used for the deductive analysis of the fifty real-world cases, where larger connections and discoveries were made.

Our analysis of cases further reveals that social entrepreneurship targets all SDGs, yet the space of technology for each differs. For instance, while both SDG 1 and 2 focus on high level technologies, SDG 1 No poverty favours the development of technologies for use by communities; here indicating a user focused technology development perspective. As concerns SDG2 Zero Hunger, while there are initiatives that also develop technology for use by communities, this similar to SDG1, there is also a concern for the diffusion of existing technologies, and their transfer and the provision of technologies - three aspects not covered in the cases we studied as concerns SDG1. This said, high technology stands out as central in the social enterprise cases studied, cases that as we have discussed are largely in economies of the Global South. Thus, social entrepreneurship appears to be a path to bring high tech to these economies. Social entrepreneurship does so by the development of technological capabilities, as well as the transfer of existing technologies, their diffusion, and often the development of these technologies for specific use by these communities.

Going further, the analysis also revealed a lot of technology transfer in SDGs 3, 4 and 5. While the three all show a prevalence of high technology solutions, SDG 3 Good health and SDG 5 Gender equality also witness the application of low technology solutions by social enterprises. SDG4 – Quality Education sees a prevalence of technology education and training, and in conjunction with SDG5, advocacy for the use and better understanding of technology and its

potential benefits to different segments of society. To achieve the quality education goal, it is evident that a lot of social enterprises provide technology education. Social enterprises also provide technology education and skills to empower marginalized women in specific communities. Social entrepreneurship appears to be an effective tool when it comes to provision of skills and empowerment.

Based on the analysis of the cases, there wasn't much activity revealed in SDG 6 Clean water and sanitation. There was one high and one low technology solution. There was technology transfer of more appropriate low technology practices to the most rural of communities along with diffusion of the same technology practices. The transfer of even this low technology required the need to build technological capabilities, this further highlights the widening technological inequalities that exist between locations (Gumbau-Albert & Maudos, 2013). Both the high and low technology were adapted to the specific situation of the community by the social enterprises. While the implication here might mean that social enterprises aren't very active in leveraging technology to provide clean water solutions in the Global South, it could also mean that the social enterprises that provide these solutions were not covered in the analysis of this case. SDG 7 – Affordable and clean energy also shows a prevalence of high technology and a prevalence of the development of technology and the transfer and provision of technology products and know-how from more advanced locations. Two of the social enterprises under this SDG, those based in developing nations, show absorptive capacity. This could imply that the acquisition of knowledge from more advanced communities is essential for the development and provision of technological innovations.



SDG 8 Decent work and economic growth is characterized by social enterprises that develop, provide and make use of high technology solutions. There is the presence of technology education which in this case is vital to improving productivity and employability. There is an absence of enterprises in this category that adapt technology and advocate for its use. Activities involving the development of technological capabilities are evident in this category along with social enterprises that possess absorptive capacity.

The social enterprises providing solutions for SDG 9 Industry Innovation and Infrastructure are all working with high technologies. The analysis shows that these social enterprises are heavily involved in the development of technological capabilities and the diffusion of technology. An interesting point seen here is that there's no adaptation of technology going on, just the development of technology – both for the community and for other mission-driven organizations – and the provision of technology; facilitated by the transfer of technology from more advanced locations. Implications here are that social enterprises involved in the provision of solutions that drive industry, foster innovation and build infrastructure are developing and providing of high technology solutions without reducing the complexity or adapting it to the level of the community – this implication is further supported by the fact that some of these social enterprises also engage in technology education and training, which is required when introducing new technologies into a community.

SDG 10 – Reducing inequalities, while revealing an overwhelming presence of high technology social enterprises, also revealed the presence of one low-tech venture. Many of the social enterprises in this category exhibit absorptive capacity, engage in the transfer of technology, and

are involved in the development of technological capabilities. There is also a lot of community focused technology development and education. The analysis reveals very little activity in SDG 11 – Sustainable cities and communities. There was only one social enterprise involved in the sustainable building and construction of city and community spaces. In this case it was the co-development of safe and disaster resistant structures with emerging and disadvantaged communities. The solutions were safe and advanced designs that make use of low-cost, culturally appropriate materials. This might mean that there are challenges in ensuring the sustainable use and development of high technology building materials and structures in emerging nations, this might also be the reason why there is such little activity involved in this section. There is certainly a need for further research to uncover more information concerning this discovery. SDG 12 - Responsible Consumption and Production is predominantly characterized by the high-tech development of technology – by social enterprises that intend to provide ethical and responsibly produced alternatives.

SDGs 13, 14 and 15, which are all concerned with conservation and climate action, reveal social enterprises that leverage only high technology, and that are engaging mostly in the development and diffusion of technology. SDG 16 shows a high number of high technology social enterprises that are involved in the transfer of technology and are therefore engaged in the building of technological capabilities in order to exploit these technological innovations properly and effectively. These social enterprises develop technology to strengthen and improve the processes of institutions. This category has no low-technology social enterprise or solution.

The analysis of cases revealed that scarcity of low technology solutions. The ones discovered were only provided or developed in the poorest of communities. As earlier stated, social entrepreneurship has been discovered in this analysis to be a pathway for the introduction and development of high-technology solutions to the Global South, this could also mean that low technologies don't have much utility to the activities of social enterprises. This could be because low technology solutions don't provide the promise of rapid growth and development that high technology solutions do. There is room to further investigate the utility of low technology in social entrepreneurship. Another important note, there is a disproportionately high number of social enterprises that develop and provide technology to communities and engage in technology education and skills training. The least featured activities are the development of technology for social enterprises and mission-based companies, and technology advocacy.

## **6.2 Implications and recommendations for future research**

This present research revealed many opportunities for future research that could be helpful to increasing the understanding of not just technology's place in social entrepreneurship, but also how it facilitates social entrepreneurship's mission to solve wicked problems.

As stated in the previous section, a major theme revealed over the course of the research was the use of technology in solving issues in developing countries. There is need for a wider understanding of the efficacy of technology in solving wicked problems that exist in developing communities. Is leveraging modern technology a more rapid and effective way to create social value and solve these issues? What are the resulting effects of providing individuals in rural and developing areas with skills and education in technology and its related fields? Is technological

underdevelopment a major cause of the wicked problems inherent in less-developed nations? There is certainly room to further the research and understanding of the relationship between development, entrepreneurship and technological capabilities. On the other hand, the analysis of the social entrepreneur cases revealed the numerous types and forms of technology used, developed and provided by social entrepreneurs. It is common for people to limit their understanding of technology to information and communication technologies i.e. internet, mobile and computing. This research revealed the presence of different technologies important to the goals and activities of social entrepreneurs. It would be vital and beneficial to research into the presence of more technologies, not just within the sphere of social entrepreneurship, but also entrepreneurship generally.

As recommendations go, there is need for a deeper exploration into social entrepreneurs' introduction of high technology to the Global South. Is this activity effective in addressing the unique problems that exist within communities? Why not low technology solutions? Considering the potential benefits of low technology solution – their cost-effectiveness and ability to still provide significant impact (Miranda & Zaman, 2010; Afshari, 2013) – there is a need to explore the preference for high technology solutions, as revealed in this research. Is the preference a result of external influences? More research into this discovery has the potential to provide a more nuanced understanding of not just the efficacy of high technology in developing communities, but also the factors – whether external or internal – that influence the choices of social entrepreneurs. Another highly important direction for future research is the need for a critical inquiry into negative cases of technology being leveraged to address wicked problems, along with negative effects of this activity. A key finding revealed within this research was the predominantly positive outlook

on technology within social entrepreneurship literature. To further establish a balanced and holistic understanding of technology's place within social entrepreneurship, it is highly important to embark on a critical search into negative and unsuccessful attempts of technology being leveraged to address wicked problems.

Finally, there is also room for an increased understanding of the role and impact of technology advocacy organizations. These social enterprises explore and understand the role of technology societies. They formulate strategies and develop plans on how technology can be a solution to challenges. Understanding the impact of their activities would shed more light on technology advocacy.

### **6.3 Limitations of the study**

While the study used the best available evidence, there are still limitations. For the systematic review of academic literature, the scope could have been broader. Journal articles could have been sourced from more databases, particularly culturally diverse ones – the journal articles were limited to English or English-translated material. Finally, some of the eligible journal articles were not accessible.

For the analysis of the social entrepreneur cases, the shortlisted social entrepreneurs were only sourced from the databases of three accredited organizations in the field – Ashoka, Schwab and Skoll. The net could have been broader and more social entrepreneurs in different countries and regions could have been included in the study.

The research was to determine and elaborate on the place of technology in social entrepreneurship, to make a connection between social entrepreneurship's dual mission to address wicked problems and create economic value along with technology and its related concepts. In light of the finding which revealed the largely positive outlook on technology, a deep dive into the efficacy of technological solutions represents an important area for future research.

## **6.4 Conclusion**

A key lesson is the importance of absorptive capacities addressing issues, particularly within developing economies. Numerous examples during both the systematic review and case analysis reveal social entrepreneurs from emerging economies locating and successfully incorporating new technological information and innovations in a bid to create solutions to unique issues they grapple with. This concept is a viable means to developing sustainable and effective solutions to issues, and how it could even be a more optimal approach than 'reinventing the wheel', that is, creating solutions without leveraging newer, more advanced and often readily available information. Another one, which is linked to another technology concept – technological capabilities, is the fact that the introduction of a viable technology solutions is just the first step. There is a need to develop the capabilities of the receiving unit – either a community or firm – so that it is better able to use, manage, adapt and innovate the solution. On this note, it is also important to take the technological capabilities of a unit into consideration when deciding which technological solution to introduce or develop. By definition, providing sustainable solutions to social issues requires that the beneficiaries are able to access them on a long-term basis.

An important contribution of this research to the fields of both social entrepreneurship and technology is the connection of various technology concepts – including diffusion, technological capabilities, absorptive capacities and technology transfer – to the activities of social entrepreneurs aiming to address wicked problems. Beyond just identifying technology, its role and how it's being used within the sphere of social entrepreneurship, this research establishes the presence of diverse technology concepts in the field. This was done by analyzing both the selected literature and cases and identifying the different manifestations of these important technology concepts. Another important contribution is the identification of the mostly positive view of technology – identifying this is important in establishing (i) the current unbalanced narrative within the field and (ii) the need for more research to create a balanced narrative.

Social entrepreneurs aim to solve numerous social and environmental challenges and problems while generating economic value. Their activities range from developed nations to developing nations and from healthcare to education. Technology has numerous definitions, but for the purpose of this research – it means both tools and instruments created to aid human activity, and artefacts developed using the modern advanced knowledge – science, engineering and mathematics. This research explores the role technology plays in promoting the goals of social entrepreneurship by analyzing evidence in academic literature and in cases of real-world social enterprise activity.

The insights gleaned from this exploration not only increase the current understanding of the relationship between these two concepts, they also inform future research by revealing more topics and issues that require greater understanding.

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## APPENDIX

### i. Literature used in Systematic Review

| <b>Author</b>               | <b>Title</b>  | <b>Year</b> | <b>Journal</b>  | <b>Description</b>   |
|-----------------------------|---|-------------|---|--|
| Venot, J. P.                | A success of some sort: Social enterprises and drip irrigation in the developing world      | 2016        | World Development   | The paper explains processes behind framing drip irrigation as a promising technology to address challenges in the developing world and looks at a few social enterprises involved in the endeavour. |
| Gopalkrishnan, S. S.        | A new resource for social entrepreneurs: Technology   | 2013        | American Journal of Management                                      | The paper, through several cases, shows how social ventures use technology to broaden their enterprises  |
| Crean, K. W.                | Accelerating innovation in information and communication technology for health              | 2010        | Health Affairs  | The paper reveals how social entrepreneurship can offer an integrated approach to accelerating information and communication technology innovations in healthcare.                                   |
| Moore, H.                   | As learning systems go digital and social, can we keep up?                                  | 2014        | Development and Learning in Organizations: An International Journal | The paper explains how a UK enterprise adopted social media and digital technology, and resulting impact and insights generated.   |
| Muskat, E., & Sylvester, D. | Being Disruptive: How Open Growth is Delivering Effective Social Change at a Fast Pace      | 2012        | Technology Innovation Management Review                             | The paper “describes how the Ashoka Changemakers.com online community creates a space for: investors to find and support multiple innovations” (Muskat & Sylvester, 2012; p. 16).                    |
| Michaud, V.                 | Business as a pretext? Managing social-economic tensions on a social enterprise’s websites. | 2013        | M@n@gement  | “This paper explores how the social-economic tension experienced by a social enterprise is dealt with discursively through its mission statement and two   |

|   |  |      |  |   |
|---|--|------|--|---|
|   |  |      |  | websites.” (Michaud, 2013; p. 294).   |
| Blackman, T.                                | Care robots for the supermarket shelf: a product gap in assistive technologies.                  | 2013 | Ageing & Society                                     | The paper argues narrow focus of development in the field of assistive technologies while questioning current development trends.   |
| Anonymous                                   | Ceramic water filters save lives   | 2012 | Appropriate Technology                               | The paper reveals how a not-for-profit organization is developing and providing low-cost ceramic filters in rural Cambodia.   |
| Clark, G. E.                                | Design for the Global Household  | 2010 | Environment  | The paper sheds light on the Design for Sustainability concept.   |
| Saurabh, P., Bhowmick, B., & Biswas, D.     | Developmental Impact Analysis of an ICT-Enabled Scalable Healthcare Model in BRICS Economies.    | 2012 | Technology Innovation Management Review              | This paper “highlights the need for initiating a healthcare business model in a grassroots, emerging nation context” (Saurabh, Bhowmick & Biswas, 2012; p. 25).               |
| Mulloth, B., Kickul, J. R., & Gundry, L. K. | Driving technology innovation through social entrepreneurship at Prezi.                          | 2016 | Journal of Small Business and Enterprise Development | This paper provides new insights on the relationship between social entrepreneurship and technological innovation using the case of Prezi; a mission-driven software company. |
| VanSandt, C. V., Sud, M., & Marmé, C.       | Enabling the original intent: Catalysts for social entrepreneurship.                             | 2009 | Journal of Business Ethics                           | This paper explores and examines catalysts for social entrepreneurship, including information technology.   |
| Anonymous                                   | Gathering waste and making good of it  | 2012 | Appropriate Technology                               | This paper reveals how a social enterprise has created an innovative solution to sanitation problems in Kenya.  |
| Girling, R.                                 | Global innovators: How some companies are working to improve social conditions around the world. | 2009 | The Journal of Applied Business and Economics        | This paper, describes with examples, how social enterprises produce goods and services for social causes.   |
| De Silva, C.                                | Humanitarian free and open source software   | 2010 | Open Source Business Resource                        | This paper presents and elaborates on the concept of  |



|   |   |      |  |   |
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|   |   |      |  | Humanitarian free and open source software (HFOSS).   |
| Jones, K.   | ICT for the Next Five Billion People  | 2010 | Journal of International Affairs                   | This paper reviews the book – “ICT for the Next Five Billion People”  |
| Richardson, S. M., Kettinger, W. J., Banks, M. S., & Quintana, Y. | IT and agility in the social enterprise: A case study of st jude children’s research hospital’s “Cure4Kids” IT-platform for international outreach. | 2014 | Journal of the Association for Information Systems | The paper explores how social enterprises can leverage IT to improve agility and performance by looking at the case of a specific social enterprise.                  |
| Warnecke, T., & Houndonougbo, A. N.                               | Let There Be Light: Social Enterprise, Solar Power, and Sustainable Development.  | 2016 | Journal of Economic Issues                         | This paper explores social enterprise response to the issues of energy poverty and solar electrification.   |
| Rao, R.   | Lighting up the lives of the rural poor.  | 2012 | Appropriate Technology                             | This paper reports how a social enterprise – SELCO is bringing sustainable and affordable energy to rural communities in India.                                       |
| Justus, W. B.   | Manual irrigation pumps transform rural livelihoods.  | 2004 | Appropriate Technology                             | This paper reports how a range of cheap and simple human powered irrigation pumps developed by a social enterprise – ApproTEC, are having an impact in Kenya.         |
| Meyskens, M., & Carsrud, A. L.                                    | Nascent green-technology ventures: a study assessing the role of partnership diversity in firm success.   | 2013 | Small Business Economics                           | This paper examines the role partnership diversity in nascent green-technology ventures.  |
| Desa, G., & Basu, S.  | Optimization or bricolage? Overcoming resource constraints in global social entrepreneurship  | 2013 | Strategic Entrepreneurship Journal                 | This paper examines two processes social ventures use for resource mobilization and tests hypotheses on a sample of 202 technology social ventures from 42 countries. |
| Lipinski, J., Lester, D. L., & Nicholls, J.                       | Promoting social entrepreneurship: harnessing experiential learning with technology transfer to create knowledge based opportunities                | 2013 | Journal of Applied Business Research               | This paper suggests social entrepreneurs as a possible avenue for technology transfer.  |

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| Patrignani, N., & Whitehouse, D.               | Slow tech: bridging computer ethics and business ethics   | 2015 | Information Technology & People  | This paper uses Slow Tech to explain how to create a bridge between computer and business ethics.  |
| Galvin, M. D., & Iannotti, L.                  | Social enterprise and development: The KickStart model  | 2015 | VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations                   | This paper uses the model of a prominent social enterprise – KickStart International to examine the contributions of social enterprise to international development. |
| Ratten, V.                                     | Social entrepreneurship through digital communication in farming  | 2018 | World Journal of Entrepreneurship, Management and Sustainable Development                  | This paper discusses how to connect farms to society through digital technology and communication (Ratten, 2018; p. 99).   |
| Urpelainen, J. & Yoon, S,                      | Solar products for poor rural communities as a business: lessons from a successful project in Uttar Pradesh, India                      | 2016 | Clean Technologies and Environmental Policy  | This paper explores how the sale of solar technology products can be viable business in developing communities through lessons from a successful project in India.   |
| O’Hanlon, F.                                   | Solving Mexico City’s water crisis  | 2014 | Appropriate Technology   | This paper reports how rainwater-harvesting social enterprise is solving Mexico City’s water crisis.   |
| Sahota, J.                                     | Supply Chain Exposed  | 2017 | Alternatives Journal   | This paper talks about a social enterprise using blockchain technology to track the supply chain of produced goods.  |
| Ness, B., & Åkerman, A.                        | Sustainable diffusion of sustainable technologies? An entrepreneur-led initiative to promote improved cookstoves in rural western Kenya | 2015 | Sustainability: Science, Practice and Policy   | This paper “presents the accomplishments and challenges of a rural sustainable development initiative in Nyanza Province, Kenya.” (Ness & Akerman, 2015; p. 53).     |
| Jakšić, M. L., Marinković, S., & Rakićević, J. | Sustainable technology entrepreneurship and development—the case of Serbia  | 2014 | Management: Journal of Sustainable Business and Management Solutions in Emerging Economies | This paper defines the concept of sustainable technology entrepreneurship and focuses on specific indicators for   |

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|---|---|------|---|--|
|   |   |      |   | Serbia related to technology transfer.   |
| Horwitch, M., & Mulloth, B.                 | The interlinking of entrepreneurs, grassroots movements, public policy and hubs of innovation: The rise of Cleantech in New York City | 2010 | Journal of High Technology Management Research    | This paper creates insights on modern innovation in the context of Cleantech and with a focus on the roles of social entrepreneurship and grassroots activism.   |
| Williams, L. D.                             | Three models of development: community ophthalmology NGOs and the appropriate technology movement                                     | 2013 | Perspectives on Global Development and Technology | “This paper describes a new shift in the appropriate technology movement in less economically developed countries as seen in a multi-sited ethnography of non-governmental organizations (NGOs) in the scientific field of ophthalmology.” (Williams, 2013; p. 449). |
| Ranck, J.                                   | Time to get mHealth moving  | 2011 | Appropriate Technology                            | This paper establishes an argument on how mobile technology can be used to improve healthcare activities.  |
| Lin, C. J., & Chen, H. Y.                   | User expectancies for green products: A case study on the internal customers of a social enterprise                                   | 2016 | Social Enterprise Journal                         | This paper was commissioned by a social enterprise to identify what influences customers to purchase green products.   |
| Weber, S.                                   | Wear Now: The little conference that grew has put Canada in the top league of global sustainable fashion                              | 2018 | Alternatives Journal                              | This paper talks about the WEAR conference for sustainability and social entrepreneurs in the fashion sector,  |
| O'Donnell, J., Tan, P. P., & Kirkner, S. L. | Youth perceptions of a technology-focused social enterprise   | 2012 | Child and Adolescent Social Work Journal          | This paper uses a qualitative approach to explore youth's perceptions of their experience with a technology focused social enterprise.   |
| Martin, C.                                  | Zambian cotton farmers benefit from scratch cards   | 2014 | Appropriate Technology                            | This paper describes how a social enterprise provided an electronic payment solution to Zambian farmers.   |

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|---|---|------|--------------------------------------|---|
| Nelson, T., Ingols, C., Christian–Murtie, J., & Myers, P. | Susan Murcott and Pure Home Water: Building a Sustainable Mission–Driven Enterprise in Northern Ghana.                    | 2013 | Entrepreneurship Theory and Practice | This paper explores the work of an environmental engineer and social entrepreneur to deliver clean drinking water to communities in Ghana   |
| Desa, G.  | Resource mobilization in international social entrepreneurship: Bricolage as a mechanism of institutional transformation. | 2012 | Entrepreneurship Theory and Practice | “This paper examines how regulatory, political, and technological institutions affect resource-mobilization in 202 technology social ventures from 45 countries.” (Desa, 2012; p. 727).     |
| Darcy, S., Yerbury, H., & Maxwell, H.                     | Disability citizenship and digital capital: the case of engagement with a social enterprise telco                         | 2019 | Information, Communication & Society | This paper answers questions about the ways in which the mobile technology, seen here as assistive technologies, supports the development of disability citizenship and active citizenship. |
| Kirkpatrick, K.   | Using technology to help people.  | 2015 | Communications of the ACM            | This paper takes a look at companies and social enterprises creating technological solutions for individuals and people in need.  |
| Cross, J.   | The 100th object: Solar lighting technology and humanitarian goods  | 2013 | Journal of Material Culture          | The paper explores the significance of solar products as humanitarian goods.  |

## ii. First level codes – Systematic Review

| CODES DEVELOPED AFTER FIRST LEVEL INDUCTIVE CODING OF SYSTEMATIC REVIEW LITERATURE |   |   |
|--|---|---|
| 1. Academia  | 30. Healthcare technologies                   | 60. SDG 2 No Hunger   |
| 2. Adapting technology   | 31. Housing                                   | 61. SDG 3 Good health and well-being                            |
| 3. Addressing social problems  | 32. Inexpensive technologies                  | 62. SDG 4 Quality education                                     |
| 4. Agriculture   | 33. Information & communications technology   | 63. SDG 6 Clean water and sanitation                            |
| 5. Barriers to adopting technology   | 34. Innovation                                | 64. SDG 7 Affordable and clean energy                           |
| 6. Benetech  | 35. Internet activism                         | 65. SDG 8 Good jobs and economic growth                         |
| 7. Blockchain technology   | 36. IT Governance                             | 66. SELCO   |
| 8. Collaboration facilitated by technology   | 37. Khan Academy                              | 67. Slow Tech   |
| 9. Complexities in providing technology  | 38. Marketable technology                     | 68. SMEs  |
| 10. Conservation   | 39. Mobile technology                         | 69. Social change   |
| 11. Context  | 40. networks                                  | 70. Social Enterprise   |
| 12. Creating technology for SE use   | 41. NGOs                                      | 71. Social entrepreneurship                                     |
| 13. Data   | 42. Nonprofit                                 | 72. Social entrepreneurship as a bridge for technology transfer |
| 14. Data collection  | 43. Partnerships and alliances                | 73. Social entrepreneurship as a driver of innovation           |
| 15. Developing economies   | 44. positive relation to technology           | 74. Social networking   |
| 16. Developing technology for use by community                                     | 45. Providing technology                      | 75. Software  |
| 17. Diffusion of innovation  | 46. Recycling                                 | 76. Sub-Saharan Africa  |
| 18. Easier access to funding through technology                                    | 47. Relevance of technology                   | 77. Sustainability  |
| 19. E-commerce   | 48. Renewable energy                          | 78. Technology and Information Sharing                          |
| 20. Economic Development   | 49. Research and Development                  | 79. Technology as a growth driver for social enterprises        |
| 21. Education  | 50. resistance to technology                  | 80. Technology as a strategic differentiator                    |
| 22. Educational technologies   | 51. Scalable technologies                     | 81. Technology education  |
| 23. Environmental challenges   | 52. SDG 1 No poverty                          | 82. Technology to create work                                   |
| 24. Fairphone  | 53. SDG 10 Reduced inequalities               | 83. Telecommunications  |
| 25. Financial technologies   | 54. SDG 11 Sustainable cities and communities | 84. Using Technology  |
| 26. Gender inequality  | 55. SDG 13 Climate action                     | 85. Websites  |
| 27. Governance technologies  | 56. SDG 14 Life below water                   | 86. Youth population  |
| 28. Green revolution   | 57. SDG 15 Life on land                       |   |
| 29. Green/clean technology   | 58. SDG 16 Peace and justice                  |   |
|  | 59. SDG 17 Partnerships for the goals         |   |

### iii. Second level codes – Systematic Review

| CODES DEVELOPED AFTER SECOND LEVEL INDUCTIVE CODING USING SIX TECHNOLOGY CATEGORIES |  |   |
|---|--|---|
| 1. Appropriate technology   | 24. Human rights                               | 49. Servicing the unbanked/underbanked      |
| 2. Business model innovation  | 25. Improving systems                          | 50. Social change advocacy                  |
| 3. Cascade effect   | 26. Improvisation/bricolage                    | 51. Social enterprise-academia partnership  |
| 4. Challenges in appropriately adapting technology to community                     | 27. International                              | 52. Social entrepreneurship advantages      |
| 5. Challenges in developing a suitable business model                               | 28. Lack of electricity                        | 53. Social equality                         |
| 6. Cheaper or safer alternative   | 29. Leveraging tech to improve growth & income | 54. Solutions for the disabled              |
| 7. Cloudware applications   | 30. Leveraging tech to increase reach          | 55. Specific community needs                |
| 8. Co-development with users  | 31. Leveraging tech to innovate                | 56. Tailoring tech to need/problem          |
| 9. Combatting fraud   | 32. Leveraging tech to scale                   | 57. Tech advocacy                           |
| 10. Combatting slavery  | 33. Leveraging the environment                 | 58. Tech invented by academia               |
| 11. Conflict between research and practical needs                                   | 34. LGBT advocacy                              | 59. Technology to improve farming practices |
| 12. Conflict zones  | 35. Low technology                             | 60. Transfer of science and tech            |
| 13. Connecting people   | 36. Low-income market                          | 61. Unaffordable solutions                  |
| 14. Easy to use technology  | 37. Military technology transfer               | 62. Unconnected populations                 |
| 15. Empowering community  | 38. Necessity of tech                          | 63. Underserved/ignored populations         |
| 16. Empowering entrepreneurs/innovators   | 39. NGO-identified technology gaps             | 64. Undone science                          |
| 17. Ensuring quality  | 40. Obstacle: High investment costs            | 65. Using tech to identify issues           |
| 18. Expanding access to knowledge   | 41. Online repository                          | 66. Women empowerment                       |
| 19. Expanding access to tech  | 42. Positive results                           | 67. Youth population                        |
| 20. Free/open-source technology   | 43. PR/Marketing                               |   |
| 21. Gaps in technical expertise   | 44. Process innovation                         |   |
| 22. High social value   | 45. Providing training                         |   |
| 23. High social value vs low commercial value                                       | 46. Reducing costs with tech                   |   |
|   | 47. SE Collaboration for CSR                   |   |
|   | 48. Self-diagnosis technology                  |   |

**iv. Codes from analysis of social entrepreneur cases**

| <b>CODES DEVELOPED AFTER DEDUCTIVE CODING OF SOCIAL ENTREPRENEUR CASES</b> |   |  |
|--|---|--|
| 1. Absorptive capacity   | 14. Financial literacy                        | 27. Tech solutions to medical challenges     |
| 2. Agricultural technology (Agtech)  | 15. Food security                             | 28. Tech strategy                            |
| 3. Agronomy  | 16. High-tech                                 | 29. Tech to facilitate citizen participation |
| 4. Automatic id and data capture technology                                | 17. Human-centered design                     | 30. Tech to support businesses               |
| 5. Circular economy  | 18. Improvements on existing tech             | 31. Technological capabilities               |
| 6. Connecting people to markets  | 19. Marine Science                            | 32. Technology improves efficiencies         |
| 7. Diffusion   | 20. Mental health services                    | 33. Technology platform                      |
| 8. Digital divide  | 21. Providing technical advice and assistance | 34. Technology transfer                      |
| 9. Digital literacy  | 22. Recycling technology                      | 35. Trafficking                              |
| 10. Disaster and emergency management                                      | 23. Securing communities with Tech            | 36. Veterinary medicine                      |
| 11. Empowering refugees  | 24. Science communication                     |  |
| 12. Facilitating Tech Development  | 25. Sourcing technology products              |  |
| 13. Fairtrade  | 26. Sustainable Electronics                   |  |

## v. Intersection of social enterprise cases and concepts discovered during literature and systematic review

Gray – Categories developed from literature and systematic review, Light Green – Categories developing from analysis of cases

| Sustainable Development Goals             | High Technology                                     | Low Technology | Technology Capabilities  | Absorptive Capacity     | Technology Transfer      | Diffusion of Technology | Adapting Technology | Creating Technology for social enterprises | Developing Technology for use by community | Providing technology    | Using Technology | Technology Education                 | Technology Advocacy |
|---|---|----------------|--------------------------|-------------------------|--------------------------|-------------------------|---------------------|--|--|-------------------------|------------------|--------------------------------------|---------------------|
| <b>SDG 1 – No poverty</b>                 | C2<br>C25<br>C43<br>C31<br>C33                      |                | C2<br>C25<br>C31         | C43                     |                          |                         | C31                 |  | C2<br>C25<br>C31<br>C33                    |                         | C43              |                                      |                     |
| <b>SDG 2 – Zero hunger</b>                | C25<br>C43<br>C36<br>C48<br>C6                      |                | C25<br>C36<br>C48        | C36<br>C6               | C36<br>C48               | C36<br>C48              | C48                 |  | C25<br>C36<br>C6                           | C48                     | C43<br>C36       |                                      |                     |
| <b>SDG 3 – Good health and well-being</b> | C1<br>C46<br>C27<br>C44<br>C47<br>C21<br>C34<br>C38 | C40            | C47<br>C40               | C27<br>C21<br>C40       | C27<br>C34<br>C38<br>C40 | C1<br>C40               |                     |  | C40<br>C46<br>C47<br>C34<br>C38            | C1<br>C27<br>C34<br>C46 | C1<br>C44<br>C21 |                                      |                     |
| <b>SDG 4 – Quality education</b>          | C41<br>C4<br>C27<br>C44<br>C45<br>C19<br>C32        |                | C41<br>C4                | C27<br>C8<br>C32<br>C29 | C41<br>C4<br>C27         | C10<br>C32              | C19                 | C41  | C41<br>C4                                  | C27<br>C32              | C44<br>C45       | C8<br>C45<br>C10<br>C32<br>C4<br>C29 | C8<br>C10           |
| <b>SDG 5 – Gender equality</b>            | C15<br>C13<br>C18<br>C42<br>C6<br>C49               | C16            | C42<br>C16<br>C18<br>C49 | C16<br>C18<br>C6<br>C49 | C42<br>C16<br>C49        | C49                     | C16                 | C42  | C13<br>C15<br>C6<br>C49                    | C16<br>C18              |                  | C13<br>C15<br>C16<br>C18             | C13<br>C15          |



|  |  |     |                         |                         |                          |                          |                          |     |                                      |                                 |     |                                |            |
|--|--|-----|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-----|--------------------------------------|---------------------------------|-----|--------------------------------|------------|
| <b>SDG 6 – Clean water and sanitation</b>              | C35  | C16 | C16                     | C16                     | C16                      |                          | C35<br>C16               |     | C35                                  | C16                             |     | C16                            |            |
| <b>SDG 7 – Affordable and clean energy</b>             | C22<br>C27<br>C30<br>C35<br>C39<br>C31             | C16 | C30<br>C16<br>C31       | C27<br>C16              | C27<br>C30<br>C16<br>C39 | C30<br>C39               | C30<br>C35<br>C16<br>C31 |     | C22<br>C30<br>C35<br>C39<br>C31      | C22<br>C27<br>C30<br>C16<br>C39 |     | C16                            |            |
| <b>SDG 8 – Decent work and economic growth</b>         | C2<br>C43<br>C14<br>C12                            | C40 | C2<br>C14<br>C40        | C43<br>C14<br>C40       | C40                      | C12<br>C40               |                          |     | C40<br>C2<br>C12                     | C12<br>C14                      | C43 | C14                            |            |
| <b>SDG 9 – Industry, innovation and infrastructure</b> | C2<br>C23<br>C14<br>C17<br>C32<br>C12<br>C39       |     | C2<br>C23<br>C14<br>C17 | C14<br>C17<br>C32       | C23<br>C39               | C23<br>C32<br>C12<br>C39 |                          | C17 | C2<br>C23<br>C12<br>C39              | C32<br>C12<br>C14<br>C39        |     | C14<br>C32                     |            |
| <b>SDG 10 – Reduced inequalities</b>                   | C41<br>C4<br>C27<br>C46<br>C13<br>C15<br>C18<br>C6 | C16 | C41<br>C4<br>C16<br>C18 | C27<br>C16<br>C18<br>C6 | C41<br>C4<br>C27<br>C16  |                          | C16                      | C41 | C41<br>C46<br>C13<br>C15<br>C4<br>C6 | C27<br>C46<br>C16<br>C18        |     | C13<br>C15<br>C16<br>C18<br>C4 | C13<br>C15 |
| <b>SDG 11 – Sustainable cities and communities</b>     |  | C20 | C20                     |                         | C20                      | C20                      |                          |     | C20                                  |                                 |     |                                |            |
| <b>SDG 12 – Responsible consumption and</b>            | C24<br>C26<br>C11                                  |     |                         |                         |                          | C26                      |                          |     | C24<br>C26<br>C11                    | C11                             |     |                                |            |

|  |   |                   |   |  |   |   |                   |           |   |  |           |   |                        |
|--|---|-------------------|---|--|---|---|-------------------|-----------|---|--|-----------|---|------------------------|
| <b>production</b>                                      |   |                   |   |  |   |   |                   |           |   |  |           |   |                        |
| <b>SDG 13 – Climate action</b>                         | C1<br>C26<br>C27<br>C9<br>C28   |                   |   | C27<br>C9<br>C28   | C27   | C1<br>C26<br>C28                                    |                   |           | C26<br>C9   | C1<br>C27<br>C28   | C1        |   |                        |
| <b>SDG 14 – Life below water</b>                       | C42<br>C26<br>C28<br>C37  |                   | C42   | C28<br>C37   | C42   | C26<br>C28<br>C37                                   |                   | C42       | C26<br>C37  | C28  |           |   |                        |
| <b>SDG 15 – Life on land</b>                           | C1<br>C26<br>C28<br>C37<br>C50<br>C41   |                   | C50<br>C41  | C28<br>C37<br>C50  | C41   | C1<br>C26<br>C28<br>C37                             |                   | C41       | C26<br>C37<br>C50<br>C41  | C1<br>C28  | C1        |   |                        |
| <b>SDG 16 – Peace, justice and strong institutions</b> | C3<br>C41<br>C4<br>C47<br>C15<br>C49<br>C7<br>C34<br>C5   |                   | C41<br>C4<br>C5<br>C47<br>C49   | C5<br>C49  | C3<br>C41<br>C4<br>C5<br>C49<br>C34                       | C49   |                   | C41<br>C5 | C3<br>C41<br>C47<br>C15<br>C49<br>C34<br>C4   | C7<br>C34  |           | C5<br>C15<br>C4   | C5<br>C15              |
| <b>SDG 17 – Partnerships for the goals</b>             | C1<br>C2<br>C41<br>C4<br>C25<br>C26<br>C27<br>C9<br>C45<br>C28<br>C46<br>C47<br>C31<br>C13<br>C33 | C40<br>C20<br>C16 | C2<br>C41<br>C4<br>C20<br>C25<br>C47<br>C31<br>C14<br>C49<br>C16<br>C17<br>C18<br>C17<br>C18<br>C17<br>C18<br>C40<br>C5 | C27<br>C8<br>C9<br>C28<br>C14<br>C37<br>C49<br>C16<br>C40<br>C17<br>C18<br>C32<br>C39<br>C40<br>C5 | C41<br>C4<br>C20<br>C27<br>C49<br>C16<br>C39<br>C40<br>C5 | C1<br>C20<br>C26<br>C28<br>C37<br>C49<br>C32<br>C40 | C31<br>C16<br>C19 | C17<br>C5 | C40<br>C2<br>C41<br>C20<br>C25<br>C26<br>C9<br>C46<br>C47<br>C31<br>C13<br>C33<br>C15<br>C37<br>C49 | C1<br>C27<br>C28<br>C32<br>C46<br>C14<br>C16<br>C18<br>C39 | C1<br>C45 | C8<br>C45<br>C13<br>C14<br>C15<br>C16<br>C18<br>C32<br>C4<br>C5 | C8<br>C13<br>C15<br>C5 |

|  |   |  |  |  |  |  |  |  |           |  |  |  |  |
|--|---|--|--|--|--|--|--|--|-----------|--|--|--|--|
|  | C14<br>C15<br>C37<br>C49<br>C17<br>C18<br>C19<br>C32<br>C39<br>C5 |  |  |  |  |  |  |  | C4<br>C39 |  |  |  |  |
|--|---|--|--|--|--|--|--|--|-----------|--|--|--|--|

## vi. Data extraction forms for systematic review

12x` DATABASES: DISSERTATIONS & THESES @ SAINT MARY'S UNIVERSITY (CANADA), EBOOK CENTRAL, ERIC, FIAF INTERNATIONAL INDEX TO FILM PERIODICALS DATABASE, GEOREF, LITERATURE ONLINE, PERIODICALS ARCHIVE ONLINE, PHILOSOPHER'S INDEX, PROQUEST HISTORICAL NEWSPAPERS: THE GLOBE AND MAIL, PROQUEST HISTORICAL NEWSPAPERS: TORONTO STAR, PTSDPUBS, SOCIOLOGICAL ABSTRACTS

Searched: “social entrepreneurship” “technology”

757 results

Date Accessed: July 5, 2019

### INCLUSION CRITERIA

The only documents/journals/dissertations included in this table are those that fulfill one or more of the following requirements: (i) Contains relevant keywords related to social entrepreneurship, social enterprise and technology (ii) Contains terms such as social entrepreneurship, social enterprise and technology in the title, and (iii) Contains an abstract that details a social entrepreneur involved with technology in any capacity (iv) Are written or translated into English Language. Duplicates of previously included publications and publications that don't meet any of the four aforementioned criteria have been excluded from the table below.

| NO. | TITLE   | AUTHOR   | TYPE & PUBLICATION TITLE  | YEAR | RESULT    |
|-----|---|--|---|------|-----------|
| 1   | “Youth Perceptions of a Technology-Focused Social Enterprise” | O'donnell, Julie; Tan, P Philip; Kirkner, Sandra L | Scholarly Journals - <b>Child &amp; Adolescent Social Work Journal: C &amp; A; New York</b> | 2012 | 76 of 757 |

Searched: “social enterprise” “technology” NOT “social entrepreneurship” “technology”  
 943 results  
 Date Accessed: July 5, 2019

INCLUSION CRITERIA

The only documents/journals/dissertations included in this table are those that fulfill one or more of the following requirements: (i) Contains relevant keywords related to social enterprise and technology (ii) Contains terms such as social enterprise and technology in the title, and (iii) Contains an abstract that details a social enterprise involved with technology in any capacity (iv) Are written or translated into English Language. Duplicates of previously included publications and publications that don’t meet any of the four aforementioned criteria have been excluded from the table below.

| <b>NO.</b> | <b>TITLE</b>                             | <b>AUTHOR</b> | <b>TYPE &amp; PUBLICATION TITLE</b>                                  | <b>YEAR</b> | <b>RESULT</b> |
|------------|--|---------------|--|-------------|---------------|
| <b>1</b>   | Turning a protest into a product         | Pett, Shaun   | Newspapers - <b>The Globe and Mail (1936-Current); Toronto, Ont.</b> | 2014        | 37 of 943     |
| <b>2</b>   | Liz Murdoch's MacTaggart lecture in full | N/A           | Trade Journals - <b>Broadcast; London</b>                            | 2012        | 101 of 943    |
|            |  |               |  |             |               |
|            |  |               |  |             |               |
|            |  |               |  |             |               |

DATABASE: ABI/INFORM GLOBAL  
 Searched: “social entrepreneurship” “technology”  
 3532 results  
 Date Accessed: June 11 , 2019

INCLUSION CRITERIA

The only documents/journals/dissertations included in this table are those that fulfill one or more of the following requirements: (i) Contains relevant keywords related to social entrepreneurship, social enterprise and technology (ii) Contains terms such as social entrepreneurship, social enterprise and technology in the title, and (iii) Contains an abstract that details a social entrepreneur involved with technology in any capacity (iv) Are written or translated into English Language. Duplicates of previously included publications and publications that don’t meet any of the four aforementioned criteria have been excluded from the table below.

| NO. | TITLE  | AUTHOR   | SOURCE TYPE  | DOCUMENT TYPE       | PUBLICATION YEAR | RESULT     |
|-----|--|--|--|---------------------|------------------|------------|
| 1   | “Driving technology innovation through social entrepreneurship at Prezi”   | Mulloth, Bala; Kickul, Jill R; Gundry, Lisa K        | Scholarly Journals - <b>Journal of Small Business and Enterprise Development</b> | Journal Article     | 2016             | 1 of 3532  |
| 2   | “Promoting Social Entrepreneurship: Harnessing Experiential Learning With Technology Transfer To Create Knowledge Based Opportunities” | Lipinski, John; Lester, Donald L; Nicholls, Jeananne | Scholarly Journals - <b>Journal of Applied Business Research</b>                 | Feature             | 2013             | 3 of 3532  |
| 3   | “Mobilizing resources in constrained environments: A study of technology social ventures”  | Desa, Geoffrey                                       | Dissertations & Theses - <b>ProQuest Dissertations and Theses</b>                | Dissertation/Thesis | 2008             | 6 of 3532  |
| 4   | “A New Resource for Social Entrepreneurs: Technology”  | Gopalkrishnan, Shalini S                             | Scholarly Journals - <b>American Journal of Management</b>                       | Feature             | 2013             | 48 of 3532 |

|    |  |   |   |                 |      |             |
|----|--|---|---|-----------------|------|-------------|
| 5  | “Social entrepreneurship through digital communication in farming”                                       | Ratten, Vanessa   | Scholarly Journals - <b>World Journal of Entrepreneurship, Management and Sustainable Development</b> | Journal Article | 2018 | 79 of 3532  |
| 6  | “Accelerating Innovation In Information And Communication Technology For Health”                         | Crean, Kevin W  | Scholarly Journals - <b>Health Affairs; Chevy Chase</b>   | Journal Article | 2010 | 90 of 3532  |
| 7  | “A Success of Some Sort: Social Enterprises and Drip Irrigation in the Developing World”                 | Venot, Jean-Philippe  | Scholarly Journals - <b>World Development; Oxford</b>   | Journal Article | 2016 | 135 of 3532 |
| 8  | “Raise a glass to social entrepreneurship”   | Jacobs, Emma  | Trade Journals - <b>FT.com; London</b>  | News            | 2014 | 147 of 3532 |
| 9  | “The TIDE comes in: how one social enterprise in Bangalore uses technology to transform lives”           | Cho, Karen  | Other Sources - <b>INSEAD Articles; Fountainebleau</b>  | Feature         | 2009 | 201 of 3532 |
| 10 | “Optimization or Bricolage? Overcoming Resource Constraints in Global Social Entrepreneurship”           | Desa, Geoffrey; Basu, Sandip                                | Scholarly Journals - <b>Strategic Entrepreneurship Journal; Hoboken</b>                               | Feature         | 2013 | 208 of 3532 |
| 11 | “Indian School of Business launches DLabs, to incubate 50 startups this year [Startups]”                 | Bansal, Varsha  | Newspapers - <b>The Economic Times; New Delhi</b>   | News            | 2017 | 232 of 3532 |
| 12 | ***“From a FabLab towards a Social Entrepreneurship and Business Lab”                                    | Guerra, Alicia Guerra; deGómez, Lyda Sánchez                | Scholarly Journals - <b>Journal of Cases on Information Technology; Hershey</b>                       | Journal Article | 2016 | 243 of 3532 |
| 13 | “Nascent green-technology ventures: a study assessing the role of partnership diversity in firm success” | Meyskens, Moriah; Carsrud, Alan L                           | Scholarly Journals - <b>Small Business Economics; Dordrecht</b>                                       | Feature         | 2013 | 278 of 3532 |
| 14 | “Harvard joins hands with IIT-Delhi, Tatas to help startups [Startups]”                                  | Bhattacharya, Saumya; Khosla, Varuni                        | Newspapers - <b>The Economic Times; New Delhi</b>   | Newspaper       | 2016 | 279 of 3532 |
| 15 | “Indo-Israeli innovation accelerator launched in India [Startups]”                                       | The Economic Times; New Delhi                               | Newspapers - <b>The Economic Times; New Delhi</b>   | News            | 2017 | 417 of 3532 |
| 16 | “Doing it Responsibly – Bringing Innovations to Market in eHealth Problem”                               | Anonymous - <b>ISPIM Conference Proceedings; Manchester</b> | Conference Papers & Proceedings   | Commentary      | 2017 | 493 of 3532 |
| 17 | “Swedish entrepreneur focuses tech skills on solving real social ills”                                   | Milne, Richard  | Newspapers - <b>Financial Times; London (UK)</b>  | News            | 2017 | 494 of 3532 |

|    |  |   |  |                        |      |                |
|----|--|---|--|------------------------|------|----------------|
| 18 | ***“AI software founder wins world entrepreneur award”   | Bounds, Andy;<br>Wembridge, Mark  | Trade Journals - <b>FT.com; London</b>   | News                   | 2019 | 497 of<br>3532 |
| 19 | “Using Technology to Help People”  | Kirkpatrick, Keith  | Scholarly Journals - <b>Association for Computing Machinery. Communications of the ACM; New York</b> | Feature                | 2015 | 505 of<br>3532 |
| 20 | “Hot Gadgets and Hot Money are Not Cool for the Poor”  | Bellman, Eric   | Newspapers - <b>Wall Street Journal (Online); New York, N.Y.</b>                                     | News                   | 2010 | 509 of<br>3532 |
| 21 | “IT and Agility in the Social Enterprise: A Case Study of St Jude Children's Research Hospital's "Cure4Kids" IT-Platform for International Outreach”   | Richardson, Sandra;<br>Kettinger, William J;<br>Banks, Michael Shane;<br>Quintana, Yuri | Scholarly Journals - <b>Journal of the Association for Information Systems; Atlanta</b>              | Case Study,<br>Feature | 2014 | 520 of<br>3532 |
| 22 | “Developmental Impact Analysis of an ICT-Enabled Scalable Healthcare Model in BRICS Economies”   | Punit Saurabh;<br>Bhowmick, Bhaskar;<br>Amrita; Biswas,<br>Dhrubes                      | Scholarly Journals - <b>Technology Innovation Management Review; Ottawa</b>                          | Journal Article        | 2012 | 536 of<br>3532 |
| 23 | “The Virtual Delivery of Care”   | Radick, Lea E   | Trade Journals - <b>Healthcare Executive; Chicago</b>  | Feature                | 2016 | 544 of<br>3532 |
| 24 | “The interlinking of entrepreneurs, grassroots movements, public policy and hubs of innovation: The rise of Cleantech in New York City”                | Horwitch, Mel;<br>Mulloth, Bala   | Scholarly Journals - <b>Journal of High Technology Management Research; Greenwich</b>                | Feature                | 2010 | 562 of<br>3532 |
| 25 | “Morgan Stanley backs start-ups led by women and minorities”   | McLannahan, Ben   | Trade Journals - <b>FT.com; London</b>   | News                   | 2017 | 568 of<br>3532 |
| 26 | “Tech MNCs lend a helping hand, help solve social problems [Corporate Trends]”   | Peerzada Abrar;<br>Sreekala, G  | Newspapers - <b>The Economic Times; New Delhi</b>  | News                   | 2011 | 580 of<br>3532 |
| 27 | “How one Dubai firm is shaping the future of healthcare, education”  | N/A   | Newspapers - <b>Arabianbusiness.com; London</b>  | News                   | 2017 | 581 of<br>3532 |
| 28 | “SAP's incubation centre to join giants like Microsoft and Oracle in Bengaluru [Telecom]”  | Shaikh, Shadma  | Newspapers - <b>The Economic Times; New Delhi</b>  | Newspaper              | 2016 | 587 of<br>3532 |
| 29 | “The Water Fix: In a country where safe drinking water is scarce, JanaJal's water-dispensing ATMs offer a clean, convenient and inexpensive solution.” | Khetarpal, Sonal  | Magazines - <b>Business Today; New Delhi</b>   | News                   | 2017 | 589 of<br>3532 |



|    |   |   |  |                 |      |              |
|----|---|---|--|-----------------|------|--------------|
| 30 | “Building a business with backpack biogas”  | Jeffrey, James  | Magazines - <b>African Business; London</b>  | Feature         | 2015 | 594 of 3532  |
| 31 | “Hope at the bottom of the pyramid”   | Anonymous   | Other Sources - <b>INSEAD Articles; Fountainebleau</b>   | Feature         | 2012 | 605 of 3532  |
| 32 | “Sustainable Technology Entrepreneurship and Development – the Case of Serbia”  | Maja Levi Jakšić; Marinković, Sanja; Rakićević, Jovana          | Scholarly Journals - <b>Management: Journal of Sustainable Business and Management Solutions in Emerging Economies; Belgrade</b> | Journal Article | 2014 | 607 of 3532  |
| 33 | “Young Minds Walking Tall”  | Watson, Thomas  | Trade Journals - <b>Ivey Business Journal (Online); London</b>   | Feature         | 2018 | 620 of 3,532 |
| 34 | “Sustainable diffusion of sustainable technologies? An entrepreneur-led initiative to promote improved cookstoves in rural western Kenya” | Ness, Barry; Åkerman, Ann                                       | Scholarly Journals - <b>Sustainability: Science, Practice, &amp; Policy; Bethesda</b>  | Journal Article | 2015 | 635 of 3532  |
| 35 | “Global Innovators: How Some Companies Are Working To Improve Social Conditions Around The World”   | Girling, Robert   | Scholarly Journals - <b>The Journal of Applied Business and Economics; Thunder Bay</b>   | Feature         | 2009 | 644 of 3532  |
| 36 | “Design for the Global Household”   | Clark, George E   | Scholarly Journals - <b>Environment; Washington</b>  | Feature         | 2010 | 653 of 3532  |
| 37 | “A DIY tech evangelist scales up ahead of BBC giveaway”   | Newton, Richard   | Newspapers - <b>Financial Times; London (UK)</b>   | News            | 2015 | 666 of 3532  |
| 38 | ***“Spring Health’s Tryst: Selling Safe Drinking Water”   | Sindhi, Sumita; Choudhury, Pranab Ranjan                        | Scholarly Journals - <b>Asian Case Research Journal; Singapore</b>   | Journal Article | 2018 | 702 of 3532  |
| 39 | “Technology puts power in the hands of the many”  | Murray, Sarah   | Newspapers - <b>Financial Times; London (UK)</b>   | News            | 2013 | 708 of 3532  |
| 40 | “Better Vision for the Poor”  | Karnani, Aneel; Garrette, Bernard; Kassalow, Jordan; Lee, Moses | Magazines - <b>Stanford Social Innovation Review; Stanford</b>   | Feature         | 2011 | 710 of 3532  |
| 41 | “It takes a village”  | Anonymous   | Trade Journals - <b>Industrial Engineer; Norcross</b>  | News            | 2009 | 718 of 3532  |
| 42 | “Raspberry Pi creators win top UK engineering prize”  | Pooler, Michael   | Trade Journals - <b>FT.com; London</b>   | News            | 2017 | 729 of 3532  |
| 43 | “Being Disruptive: How Open Growth is Delivering Effective Social Change at a Fast Pace”  | Muskat, Elisha; Sylvester, Delyse                               | Scholarly Journals - <b>Technology Innovation Management Review; Ottawa</b>  | Journal Article | 2012 | 732 of 3532  |

|    |   |   |  |                        |      |              |
|----|---|---|--|------------------------|------|--------------|
| 44 | ***“Husk Power Systems: Scaling Up a Start-Up”  | Chao, Raul O; Sinha, Manoj; Goldberg, Rebecca | Reports - <b>Darden Business Publishing Case Collection; Charlottesville</b> | Business Case, Feature | 2012 | 735 of 3532  |
| 45 | “From cooling tech for Intel to chilling milk even without electricity, the journey of Inficold founders [SME Sector]”                    | Dewan, Neha                                   | Newspapers - <b>The Economic Times; New Delhi</b>                            | News                   | 2018 | 745 of 3532  |
| 46 | “Nasscom won't define 'digital', says rationalization impractical”  | N/A   | Newspapers - <b>Mint; New Delhi</b>  | News                   | 2018 | 759 of 3532  |
| 47 | “Manual irrigation pumps transform rural livelihoods”   | Wanzala Bahati Justus                         | Scholarly Journals - <b>Appropriate Technology; Burnham</b>                  | Feature                | 2004 | 801 of 3532  |
| 48 | ***“ideaForge: Mechanical Charger”  | Adhikari, Atanu; Deshmukh, Rama               | Reports - <b>Richard Ivey School of Business Case Collection; London</b>     | Business Case          | 2012 | 807 of 3532  |
| 49 | “This Braille device will help the blind to teach themselves”   | N/A   | Newspapers - <b>Mint; New Delhi</b>  | News                   | 2018 | 812 of 3532  |
| 50 | “GADZOOKS, It's MOOCs: THE FUSS OVER OPEN SOURCE LEARNING”  | Arnold, Stephen E                             | Trade Journals - <b>Online Searcher; Medford</b>                             | Cover Story            | 2013 | 814 of 3532  |
| 51 | “Future hinges on keeping doors open”   | Murray, Sarah                                 | Newspapers - <b>Financial Times; London (UK)</b>                             | News                   | 2010 | 927 of 3532  |
| 52 | “Tata Trusts launches energy innovation challenge”  | N/A   | Newspapers - <b>Mint; New Delhi</b>  | News                   | 2018 | 936 of 3532  |
| 53 | “Local production can help to tackle malaria: Case study: QCI”  | Moules, Jonathan                              | Newspapers - <b>Financial Times; London (UK)</b>                             | News                   | 2013 | 938 of 3532  |
| 54 | “MOOCs: meaningful learning tools for public administration education or academic simulacra?”   | Sementelli, Arthur J; Garrett, Terence M      | Scholarly Journals - <b>Education &amp; Training; London</b>                 | Journal Article        | 2015 | 953 of 3532  |
| 55 | “I am not a jholawala”  | N/A   | Newspapers - <b>Mint; New Delhi</b>  | News                   | 2015 | 955 of 3532  |
| 56 | “To Fix Capitalism, We May Need More Capitalism; The private sector is creating solutions for social needs such as housing and childcare” | Baker, Gerard                                 | Newspapers - <b>Wall Street Journal (Online); New York, N.Y.</b>             | News                   | 2019 | 970 of 3532  |
| 57 | “Social Everything Comes of Age”  | Greenberg, Paul                               | Magazines - <b>Customer Relationship Management: CRM; Medford</b>            | Commentary             | 2011 | 1000 of 3532 |
| 58 | “Gathering waste and making good of it”   | Anonymous                                     | Scholarly Journals - <b>Appropriate Technology; Burnham</b>                  | Cover Story            | 2012 | 1011 of 3532 |
| 59 | “Google launches Rs 12 crore hunt for India's most innovative   | Ghosh, Labonita                               | Newspapers - <b>The Economic Times; New Delhi</b>                            | News                   | 2013 | 1172 of 3532 |

|    |   |                                      |  |                 |      |              |
|----|---|--------------------------------------|--|-----------------|------|--------------|
|    | social entrepreneurs [Corporate Trends]”  |                                      |  |                 |      |              |
| 60 | “Single-minded about changing the market system: [USA 1ST EDITION]”                                 | Willman, John                        | Newspaper - <b>Financial Times; London (UK)</b>                        | News            | 2008 | 1173 of 3532 |
| 61 | “Water harvesting technique helps poor farmers”   | Anonymous                            | Scholarly Journals - <b>Appropriate Technology; Burnham</b>            | Journal Article | 2017 | 1465 of 3532 |
| 62 | “Solar lights a safer path for Tanzanians”  | Moules, Jonathan                     | Newspapers - <b>Financial Times; London (UK)</b>                       | News            | 2016 | 1585 of 3532 |
| 63 | “FIFTY YEARS OF SOCIAL CHANGE”  | Brilliant, Larry                     | Magazines - <b>Stanford Social Innovation Review; Stanford</b>         | Feature         | 2013 | 1693 of 3532 |
| 64 | “Humanitarian Free and Open Source Software”  | de Silva, Chamindra                  | Scholarly Journals - <b>The Open Source Business Resource; Ottawa</b>  | Feature         | 2010 | 1822 of 3532 |
| 65 | “iCitizen”  | Kamenetz, Anya                       | Magazines - <b>Fast Company; Boston</b>                                | Feature         | 2010 | 1911 of 3532 |
| 66 | “US-based MOOCs consortia in tie-ups with local universities for taking content online [Education]” | Bhattacharyya, Rica                  | Newspapers - <b>The Economic Times; New Delhi</b>                      | News            | 2013 | 1930 of 3532 |
| 67 | “35 Innovators Under 35 2015”   | Anonymous                            | Magazines - <b>MIT Technology Review; Cambridge</b>                    | Cover Story     | 2015 | 2104 of 3532 |
| 68 | “Intermediation in Open Development: A Knowledge Stewardship Approach*”                             | Katherine M A Reilly; Juan P Alperin | Scholarly Journals - <b>Global Media Journal, Canadian ed.; Ottawa</b> | Case Study      | 2016 | 2250 of 3532 |
| 69 | “The Power of Unreasonable Teams”   | Hartigan, Pamela; Love, Charmian     | Magazines - <b>Stanford Social Innovation Review; Stanford</b>         | Feature         | 2013 | 2306 of 3532 |
| 70 | “Two Countries, One Vision”   | Murray, Sarah                        | Magazines - <b>Stanford Social Innovation Review; Stanford</b>         | Feature         | 2017 | 2592 of 3532 |

Searched: “social enterprise” “technology” NOT “social entrepreneurship” “technology” (Only in ABI/INFORM Global Database)

2665 results

Date Accessed: July 7, 2019

### INCLUSION CRITERIA

The only documents/journals/dissertations included in this table are those that fulfill one or more of the following requirements: (i)

Contains relevant keywords related to social enterprise and technology (ii) Contains terms such as social enterprise and technology in

the title, and (iii) Contains an abstract that details a social enterprise involved with technology in any capacity (iv) Are written or translated into English Language. Duplicates of previously included publications and publications that don't meet any of the four aforementioned criteria have been excluded from the table below.

| <b>NO.</b> | <b>TITLE</b>   | <b>AUTHOR</b>                                  | <b>TYPE &amp; PUBLICATION NAME</b>   | <b>YEAR</b> | <b>RESULT</b> |
|------------|--|--|--|-------------|---------------|
| 1          | "10 Ways To Transform Into A Social Enterprise"  | Lundquist, Eric                                | Trade Journals - <b>Informationweek - Online; San Francisco</b>                        | 2012        | 5 of 2665     |
| 2          | "The Power of Lean Data"   | Dichter, Sasha; Adams, Tom; Ebrahim, Alnoor    | Magazines - <b>Stanford Social Innovation Review; Stanford</b>                         | 2016        | 9 of 2665     |
| 3          | "User expectancies for green products: A case study on the internal customers of a social enterprise"  | Lin, Chen-Ju; Chen, Hwang-Yeh                  | Scholarly Journals - <b>Social Enterprise Journal; Bingley</b>                         | 2016        | 11 of 2665    |
| 4          | "Q&A with computer scientist Sue Black"  | Lacey, Hester                                  | Trade Journals - <b>FT.com; London</b>   | 2019        | 69 of 2665    |
| 5          | "Boot camp rebels: tech developers quit corporate careers"   | Ram, Aliya                                     | Trade Journals - <b>FT.com; London</b>   | 2017        | 81 of 2665    |
| 6          | "Tackling the Lack of Women in Tech"   | Martinez, Janel                                | Magazines - <b>Black Enterprise; New York</b>  | 2013        | 91 of 2665    |
| 7          | "Emerging Forms of Entrepreneurship: For-Profit and Non-Profit Partnerships for the Dissemination of Solar Power into Rural Sub-Saharan Africa"                          | Willans, Simon; Christiansen, Amé; Munro, Paul | Conference Papers & Proceedings - <b>ICSB World Conference Proceedings; Washington</b> | 2011        | 92 of 2665    |
| 8          | "Disability tech goes mainstream"  | Jack, Andrew                                   | Trade Journals - <b>FT.com; London</b>   | 2017        | 149 of 2665   |
| 9          | "D.LIGHT LAUNCHES ULTRA-AFFORDABLE SOLAR LANTERN FOR EMERGING MKT"   | Anonymous                                      | Wire Feeds - <b>Asia Pulse; Rhodes</b>   | 2011        | 152 of 2665   |
| 10         | "Hands-on solutions to world poverty"  | Anonymous                                      | Trade Journals - <b>In Business; Emmaus</b>  | 2003        | 154 of 2665   |
| 11         | "A father who saw untapped forces in his son's autism"   | Jacobs, Emma                                   | Trade Journals - <b>FT.com; London</b>   | 2013        | 209 of 2665   |
| 12         | "Lighting up the lives of the rural poor"  | Rao, Radhakrishna                              | Scholarly Journals - <b>Appropriate Technology; Burnham</b>                            | 2012        | 224 of 2665   |
| 13         | "Migrant crisis triggers a wave of tech innovation"  | Wasik, Zosia                                   | Trade Journals - <b>FT.com; London</b>   | 2017        | 225 of 2665   |
| 14         | "Ceramic water filters save lives"   | Anonymous                                      | Scholarly Journals - <b>Appropriate Technology; Burnham</b>                            | 2012        | 235 of 2665   |
| 15         | "Drive to give cars a fresh start: A California group hopes the electric vehicles of the next generation will rely on its battery-charging technology, writes John Reed" | Reed, John                                     | Newspapers - <b>Financial Times; London (UK)</b>                                       | 2009        | 261 of 2665   |
| 16         | "Why India's clean tech sector is attracting US, Europe and Asia Pacific entrepreneurs [Jobs]"   | Peerzada Abrar                                 | Newspaper - <b>The Economic Times; New Delhi</b>                                       | 2012        | 282 of 2665   |

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|----|--|-----------------------------------|---|------|-------------|
| 17 | “Digital Divide Data: Content Conversion for Libraries”  | Griffin, Donovan                  | Magazines - <b>Information Today; Medford</b>                                   | 2015 | 311 of 2665 |
| 18 | “Sanergy's Fresh Life squat toilets tackle Kenyan poverty”   | Manson, Katrina                   | Trade Journals - <b>FT.com; London</b>  | 2013 | 318 of 2665 |
| 19 | “Solving Mexico City's water crisis”   | O'Hanlon, Francesca               | Scholarly Journals - <b>Appropriate Technology; Burnham</b>                     | 2014 | 343 of 2665 |
| 20 | “Marc Benioff Gets Back On Track”  | Murphy, Chris                     | Trade Journals - <b>Informationweek - Online; San Francisco</b>                 | 2013 | 377 of 2665 |
| 21 | “Solar products for poor rural communities as a business: lessons from a successful project in Uttar Pradesh, India”   | Urpelainen, Johannes; Yoon, Semeo | Scholarly Journals - <b>Clean Technologies and Environmental Policy; Berlin</b> | 2016 | 422 of 2665 |
| 22 | “Time to get mHealth moving”   | Ranck, Jody                       | Scholarly Journals - <b>Appropriate Technology; Burnham</b>                     | 2011 | 448 of 2665 |
| 23 | "A" Is for App   | Kamenetz, Anya                    | Magazines - <b>Fast Company; Boston</b>   | 2010 | 528 of 2665 |
| 24 | “Scrap paintball, add childcare”   | Calian, Sara                      | Trade Journals - <b>FT.com; London</b>  | 2016 | 550 of 2665 |
| 25 | “Trumping up a social venture”   | Boles, Jeff                       | Trade Journals - <b>CIO; Framingham</b>   | 2017 | 571 of 2665 |
| 26 | “A German entrepreneurial spirit to heal refugees' plight”   | Chazan, Guy                       | Trade Journals - <b>FT.com; London</b>  | 2016 | 594 of 2665 |
| 27 | “How the Lean Startup Approach Can Alleviate Poverty”  | N/A                               | News - <b>INSEAD Articles; Fontainebleau</b>                                    | 2015 | 640 of 2665 |
| 28 | “A bright idea for India”  | Kazmin, Amy                       | Trade Journals - <b>FT.com; London</b>  | 2009 | 702 of 2665 |
| 29 | “Zambian cotton farmers benefit from scratch cards”  | Martin, Chrissy                   | Scholarly Journals - <b>Appropriate Technology; Burnham</b>                     | 2014 | 703 of 2665 |
| 30 | “A Green Movement: A bunch of start-ups is offering innovative solutions for building a greener tomorrow. Their approach is finding new takers”                                    | Sharma, E Kumar                   | Magazines - <b>Business Today; New Delhi</b>                                    | 2017 | 707 of 2665 |
| 31 | “Clean, Green And Smart: Powered by cutting-edge technologies, a clutch of Indian start-ups has developed out-of-the-box solutions to reduce pollution and generate clean energy.” | KTP Radhika                       | Magazines - <b>Business Today; New Delhi</b>                                    | 2019 | 709 of 2665 |
| 32 | “Advancing The Social Good”  | McKinney, Jeffrey                 | Magazines - <b>Black Enterprise; New York</b>                                   | 2016 | 733 of 2665 |
| 33 | “Swipe To Drink: A handful of social enterprises are bridging the gap between people and potable water through water ATMs.”  | Pratap, Rashmi                    | Magazines - <b>Business Today; New Delhi</b>                                    | 2019 | 760 of 2665 |
| 34 | “Isle of Wight EcoIsland founder David Green”  | Harris, Stephen                   | Magazines - <b>The Engineer (Online); London</b>                                | 2012 | 847 of 2665 |
| 35 | “App spots life-threatening blood pressure spikes”   | N/A                               | Magazines - <b>The Engineer (Online); London</b>                                | 2014 | 924 of 2665 |

|    |   |                  |   |      |              |
|----|---|------------------|---|------|--------------|
| 36 | “MindFuel Launches Online STEM Store Featuring Popular Resources” | Revelli, Vanessa | Magazines - <b>Tech Directions; Ann Arbor</b>                                   | 2019 | 954 of 2665  |
| 37 | “The Gift of Time”  | Mergens, Celeste | Magazines - <b>Stanford Social Innovation Review; Stanford</b>                  | 2014 | 969 of 2665  |
| 38 | “Libraries as Laboratories”                                       | Boss, Suzie      | Magazines - <b>Stanford Social Innovation Review; Stanford</b>                  | 2014 | 1000 of 2665 |
| 39 | “Businesses I really admire”                                      | Fox, Martha Lane | Magazines - <b>Spectator Business; London</b>                                   | 2009 | 1137 of 2665 |
| 40 | “China air purifier sales slide as air quality improves”          | Patel, Sejal     | Trade Journals - <b>FT.com; London</b>  | 2015 | 1206 of 2665 |
| 41 | “Lantern business starts to work its magic”                       | Knight, Rebecca  | Newspapers - <b>Financial Times; London (UK)</b>                                | 2013 | 1346 of 2665 |
| 42 | “As learning systems go digital and social, can we keep up?”      | Moore, Helena    | Scholarly Journals - <b>Development and Learning in Organizations; Bradford</b> | 2014 | 1732 of 2665 |
| 43 | “Mining the sun”  | Miller, David    | Trade Journals - <b>Electrical Apparatus; Chicago</b>                           | 2019 | 1914 of 2665 |

CANADIAN BUSINESS & CURRENT AFFAIRS DATABASE

Searched: “social entrepreneurship” “technology”

310 results

Date Accessed: June 11, 2019

INCLUSION CRITERIA

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| <b>NO.</b> | <b>TITLE</b>   | <b>AUTHOR</b>    | <b>TYPE &amp; PUBLICATION TITLE</b>   | <b>PUBLICATION YEAR</b> | <b>RESULT</b> |
|------------|--|------------------|---|-------------------------|---------------|
| 1          | “The Wired Woman Society Presents Social Entrepreneurship: Ways to Give Back”  | N/A              | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                                   | 2004                    | 4 of 310      |
| 2          | “HOW SOCIAL ENTERPRISE DRIVES HEALTHCARE INNOVATION”   | Boehm, Leslie    | Trade Journals - <b>Canadian Healthcare Manager; Toronto</b>                  | 2010                    | 5 of 310      |
| 3          | “Canadian innovation to shine at 2010 "Davos of social entrepreneurship”   | Anonymous        | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                                   | 2010                    | 7 of 310      |
| 4          | “Cut from a different cloth; Social entrepreneurship in India”   | N/A              | Magazines - <b>The Economist; London</b>                                      | 2013                    | 10 of 310     |
| 5          | “WE Day Connect unites young people worldwide in an interactive online classroom for social good”  | N/A              | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                                   | 2018                    | 44 of 310     |
| 6          | “Social entrepreneurs get fresh focus; Accelerator program at UNB expands to nine months, up to 25 new ventures”                                     | Moreira, Carol   | Newspapers - <b>Chronicle - Herald; Halifax, N.S.</b>                         | 2014                    | 46 of 310     |
| 7          | “Modern connections revive rural community Business Hub”   | N/A              | Newspapers - <b>Chronicle - Herald; Halifax, N.S.</b>                         | 2016                    | 63 of 310     |
| 8          | “We can learn so much by being open and inclusive’: Toronto hosts conference on global citizenship and inclusion, featuring life-saving rescue work” | Keung, Nicholas  | Newspapers - <b>Toronto Star; Toronto, Ont.</b>                               | 2017                    | 64 of 310     |
| 9          | “Canadian entrepreneurs recognized for helping to solve critical health care, employment, and environmental issues”                                  | N/A              | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                                   | 2017                    | 65 of 310     |
| 10         | “Winner of \$25,000 Social Enterprise Pitch Competition announced at Discovery”  | N/A              | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                                   | 2017                    | 68 of 310     |
| 11         | “Canadian entrepreneurs recognized for innovations in health, food, and environment”   | N/A              | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                                   | 2018                    | 78 of 310     |
| 12         | “Horyou 'Blockchain With a Purpose': A Token for Inclusion and Sustainability”   | N/A              | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                                   | 2018                    | 80 of 310     |
| 13         | “Wear Now”   | Weber, Sabine    | Scholarly Journals - <b>Alternatives Journal; Waterloo</b>                    | 2018                    | 81 of 310     |
| 14         | “Free for All”   | Brown, Jesse     | Magazines - <b>Toronto Life; Toronto</b>                                      | 2013                    | 93 of 310     |
| 15         | “Social e-enterprise; value creation through ICT”  | N/A              | Trade Journal Book Review - <b>Reference and Research Book News; Portland</b> | 2013                    | 104 of 310    |
| 16         | “The absorbing tale of one man's quest for better feminine hygiene”  | Nolen, Stephanie | Newspapers - <b>The Globe and Mail (Index-only); Toronto, Ont.</b>            | 2012                    | 108 of 310    |

|    |   |                  |  |      |            |
|----|---|------------------|--|------|------------|
| 17 | “Students devise ropeless fishing gear”   | Ayers, Tom       | Newspapers - <b>Chronicle - Herald; Halifax, N.S.</b>    | 2018 | 110 of 310 |
| 18 | “AFRICA'S QUIET REVOLUTION”   | Wahl, Andrew     | Magazines - <b>Canadian Business; Toronto</b>            | 2008 | 118 of 310 |
| 19 | “Mainstream capital for alternative energyGreening the machine; Toronto multimillionaire Ron Dembo is among a growing cast of technology entrepreneurs, investors who have discovered that you can save the world and make money at the same time: [ONT Edition]” | Hamilton, Tyler  | Newspapers - <b>Toronto Star; Toronto, Ont.</b>          | 2006 | 180 of 310 |
| 20 | “Business as a pretext? Managing social-economic tensions on a social enterprise's websites”  | Michaud, Valérie | Scholarly Journals - <b>M@n@gement; Nantes</b>           | 2013 | 237 of 310 |
| 21 | “Power To The Bottom: Social enterprise has a soulmate in Web 2.0, a powerful new tool for bottom-up, collaborative innovation.”  | Huang, Lily      | Magazines - <b>Newsweek, International ed.; New York</b> | 2008 | 252 of 310 |

Searched: “social enterprise” “technology” NOT “social entrepreneurship” “technology”  
416 results

Date Accessed: July 5, 2019

#### INCLUSION CRITERIA

The only documents/journals/dissertations included in this table are those that fulfill one or more of the following requirements: (i) Contains relevant keywords related to social enterprise and technology (ii) Contains terms such as social enterprise and technology in the title, and (iii) Contains an abstract that details a social enterprise involved with technology in any capacity (iv) Are written or translated into English Language. Duplicates of previously included publications and publications that don't meet any of the four aforementioned criteria have been excluded from the table below.

| NO. | TITLE   | AUTHOR | TYPE & PUBLICATION TITLE                    | PUBLICATION YEAR | RESULT   |
|-----|---|--------|---|------------------|----------|
| 1   | “International Government Health and Human Services Experts Meet to Discuss Business and Technology Transformation” | N/A    | Wire Feeds - <b>Canada NewsWire; Ottawa</b> | 2007             | 3 of 416 |



|    |   |   |  |      |            |
|----|---|---|--|------|------------|
| 2  | “Deloitte report reveals three forces driving the growth of the social enterprise”  | N/A   | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                        | 2018 | 5 of 416   |
| 3  | “The power of social enterprise”  | Avery, Simon                                | Newspapers - <b>The Globe and Mail (Index-only); Toronto, Ont.</b> | 2010 | 8 of 416   |
| 4  | “Toronto-based social enterprise takes top spot at Parapan Am accessibility tech pitch contest”   | N/A   | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                        | 2015 | 12 of 416  |
| 5  | “Kinaxis Sponsors 'Random Hacks of Kindness' to Help Foster Social Good”  | N/A   | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                        | 2017 | 13 of 416  |
| 6  | “Calgary Social Enterprise to Create IT Employment for People with Autism: Specialisterne Founder Thorkil Sonne in Calgary January 30-31, To Launch First Canadian Project” | N/A   | Trade Journals - <b>Marketwire; Toronto</b>                        | 2012 | 19 of 416  |
| 7  | “Diversity Alone Is Not Enough”   | Price, Mandy                                | Trade Journals - <b>Leadership Excellence; Aurora</b>              | 2019 | 24 of 416  |
| 8  | “Technology as if people mattered”  | Godrej, Dinyar                              | Magazines - <b>New Internationalist; Oxford</b>                    | 2016 | 37 of 416  |
| 9  | “Power to the people;”  | Anonymous                                   | Magazines - <b>The Economist; London</b>                           | 2010 | 73 of 416  |
| 10 | “Supply Chain Exposed”  | Sahota, Jasman                              | Scholarly Journals - <b>Alternatives Journal</b>                   | 2017 | 78 of 416  |
| 11 | “HireUp receives Government of Canada funding to combat youth homelessness”   | N/A   | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                        | 2017 | 89 of 416  |
| 12 | “THE TOP 100”   | Anonymous                                   | Magazines - <b>Financial Post Magazine; Toronto</b>                | 2012 | 169 of 416 |
| 13 | “Government of Canada Supports Ontario Firm Through Build in Canada Innovation Program”   | N/A   | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                        | 2017 | 180 of 416 |
| 14 | “INSEAD successfully launches its first annual "Business as a Force for Good" award”  | N/A   | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                        | 2018 | 185 of 416 |
| 15 | “A nation short on electricity makes plans to grow its own; Using dirt to overcome the 'biggest obstacle to development in Africa”  | Robertson, Kate                             | Newspapers - <b>Toronto Star; Toronto, Ont.</b>                    | 2008 | 253 of 416 |
| 16 | “Company planning to take manure, food waste for digesters; The company also hopes to help food banks by donating part of the money it gets for electricity”                | Romahn, Jim; TOM VAN DUSEN; FARMER, ONTARIO | Magazines - <b>Ontario Farmer; London</b>                          | 2008 | 255 of 416 |
| 17 | “Circ MedTech Donates Three Mobile Clinics to Zimbabwe's National HIV Prevention Program”   | N/A   | Wire Feeds - <b>Canada NewsWire; Ottawa</b>                        | 2016 | 298 of 416 |

|    |  |     |   |      |            |
|----|--|-----|---|------|------------|
| 18 | “Britain: Checked out; Public libraries”   | N/A | Magazines - <b>The Economist; London</b>    | 2011 | 316 of 416 |
| 19 | “Two mobile applications to help you stick to your resolutions for 2012”   | N/A | Wire Feeds - <b>Canada NewsWire; Ottawa</b> | 2012 | 339 of 416 |
| 20 | “Smartphone App Reads Blood Oxygen Levels, Advances Towards Developing World Obstetrics Use with Major New Investment” | N/A | Wire Feeds - <b>Canada NewsWire; Ottawa</b> | 2014 | 349 of 416 |

### INTERNATIONAL BIBLIOGRAPHY OF THE SOCIAL SCIENCES (IBSS)

Searched: “social entrepreneurship” “technology” only in IBSS

755 results

Date Accessed: July 5, 2019

#### INCLUSION CRITERIA

The only documents/journals/dissertations included in this table are those that fulfill one or more of the following requirements: (i) Contains relevant keywords related to social entrepreneurship, social enterprise and technology (ii) Contains terms such as social entrepreneurship, social enterprise and technology in the title, and (iii) Contains an abstract that details a social entrepreneur involved with technology in any capacity (iv) Are written or translated into English Language. Duplicates of previously included publications and publications that don’t meet any of the four aforementioned criteria have been excluded from the table below.

| NO. | TITLE  | AUTHOR                                    | TYPE & PUBLICATION TITLE   | YEAR | RESULT    |
|-----|--|---|--|------|-----------|
| 1   | “Social Enterprise and Development: The KickStart Model”   | Galvin, Michael D; Iannotti, Lora         | Scholarly Journals - <b>Voluntas; Baltimore</b>                  | 2015 | 22 of 755 |
| 2   | “Predictors of social entrepreneurship success: a cross-national analysis of antecedent factors”                           | Roy, Abhijit; Brumagim, Alan; Goll, Irene | Scholarly Journals - <b>Journal of Social Entrepreneurship</b>   | 2014 | 24 of 755 |
| 3   | “Resource mobilization in international social entrepreneurship: bricolage as a mechanism of institutional transformation” | Desi, Geoffrey                            | Scholarly Journals – <b>Entrepreneurship Theory and Practice</b> | 2012 | 27 of 755 |

|    |  |  |  |      |            |
|----|--|--|--|------|------------|
| 4  | “Enabling the original intent: catalysts for social entrepreneurship”  | VanSandt, Craig V; Sud, Mukesh; Marmé, Christopher | Scholarly Journals - <b>Journal of Business Ethics</b>                             | 2009 | 42 of 755  |
| 5  | “The 100th object: solar lighting technology and humanitarian goods”   | Cross, Jamie                                       | Scholarly Journals - <b>Journal of Material Culture</b>                            | 2013 | 96 of 755  |
| 6  | “Disability citizenship and digital capital: the case of engagement with a social enterprise telco”                  | Darcy, Simon; Yerbury, Hilary; Maxwell, Hazel      | Scholarly Journals - <b>Information, Communication &amp; Society; Abingdon</b>     | 2019 | 104 of 755 |
| 7  | “How Social Enterprises Change: The Perspective of the Evolution of Technology”                                      | Gordon, Michael                                    | Scholarly Journals - <b>Journal of Social Entrepreneurship; Abingdon</b>           | 2016 | 116 of 755 |
| 8  | “Digital Social Entrepreneurs as Bridges in Public-Private Partnerships”   | Battisti, Sandro                                   | Scholarly Journals - <b>Journal of Social Entrepreneurship; Abingdon</b>           | 2019 | 118 of 755 |
| 9  | “Solving 'Social Market Failures' with Social Enterprises? Grameen Shakti (Village Energy) in Bangladesh”            | Hackett, Michelle T.                               | Scholarly Journals - <b>Journal of Social Entrepreneurship; Abingdon</b>           | 2016 | 171 of 755 |
| 10 | “The case for open source appropriate technology”  | Pearce, Joshua M                                   | Scholarly Journals - <b>Environment, Development and Sustainability; Dordrecht</b> | 2012 | 183 of 755 |
| 11 | “Let There Be Light: Social Enterprise, Solar Power, and Sustainable Development”                                    | Warnecke, Tonia; Houndonougbo, Ahiteme N           | Scholarly Journals - <b>Journal of Economic Issues; Abingdon</b>                   | 2016 | 194 of 755 |
| 12 | “Foreign Aid, NGOs and the Private Sector: New Forms of Hybridity in Renewable Energy Provision in Kenya and Uganda” | MacLean, Lauren M; Brass, Jennifer N               | Scholarly Journals - <b>Africa Today; Bloomington</b>                              | 2015 | 195 of 755 |
| 13 | “Wood-ribbed huts provided warmth at TED2016”  | Caulfield, Peter                                   | Trade Journals - <b>Journal of Commerce; Vancouver</b>                             | 2016 | 208 of 755 |
| 14 | “Slow tech: bridging computer ethics and business ethics”  | Patrignani, Norberto; Whitehouse, Diane            | Scholarly Journals - <b>Information Technology &amp; People; West Linn</b>         | 2015 | 354 of 755 |

Searched: “social enterprise” “technology” NOT “social entrepreneurship” “technology”  
352 results

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|------------|---|---|--|-------------|---------------|
| <b>1</b>   | “A 'Tripadvisor' for disability? Social enterprise and 'digital disruption' in Australia”               | McLoughlin, Ian; McNicoll, Yolande; Beecher Kelk, Aviva; Cornford, James; Hutchinson, Kelly | Scholarly Journals - <b>Information, Communication &amp; Society; Abingdon</b>   | 2019        | 4 of 352      |
| <b>2</b>   | “Three models of development: community ophthalmology NGOs and the appropriate technology movement”     | Williams, Logan D.A.  | Scholarly Journals - <b>Perspectives on Global Development and Technology</b>    | 2013        | 15 of 352     |
| <b>3</b>   | “Susan Murcott and Pure Home Water: Building a Sustainable Mission–Driven Enterprise in Northern Ghana” | Nelson, Teresa; Ingols, Cynthia; Christian-Murtie, Jennifer; Myers, Paul.                   | Scholarly Journals - <b>Entrepreneurship Theory and Practice: ET&amp;P; Waco</b> | 2013        | 39 of 352     |
| <b>4</b>   | “ICT for the Next Five Billion People - Book Review”  | Jones, Kermit   | Scholarly Journals - <b>Journal of International Affairs; New York</b>           | 2010        | 68 of 352     |
| <b>5</b>   | “Care robots for the supermarket shelf: a product gap in assistive technologies”                        | Blackman, Tim   | Scholarly Journals - <b>Ageing and Society; Cambridge</b>                        | 2013        | 79 of 352     |