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The Role of Quadruple Helix in Fostering Social Innovation through Women's Entrepreneurship

A Case Study of Sri Lanka

by

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Abstract

Aftermath of the Tsunami disaster in 2004 and current COVID-19 pandemic, developing nations have faced serious economic disparities. Sri Lanka, an island nation in south Asia, has faced the same economic hardships that many economies face globally. The hardest hit segment of this economic incongruences has been the marginal communities.

Post-Tsunami disaster development scenarios have revealed female entrepreneurs of marginal communities as social innovators. Through foreign and governmental aid, the said women entrepreneurs have managed to develop village economies and empower local society. However, as the international aid reduced over time, due to lack of empowerment, economic hardship and domestic abuse, female entrepreneurship has reduced throughout the nation (Goonetilleke, 2015). Currently, the prominent support that seems to empower women entrepreneurship have been mostly via non-governmental organizations, which have induced limited collaborations between the government agencies, industries and universities. Yet, there is lack of transparency and lack of partnership within these actors.

Throughout the study, I portray that by creating a knowledge economy via strengthening the quadruple helix, it is possible to increase female entrepreneurship thus leading social innovations in marginal communities. Moreover, the findings of this research I propose for practical policy implementations, by creation of regional incubators which are accessible to marginal communities. I propose regional incubators will act as a collaborative agent between the government agencies, various industries, regional universities and of course, the civil society. Furthermore, they will act as knowledge transfer offices. An innovative hub in this nature will act as a beacon of female entrepreneurship and as a forefront of social innovation.

Keywords: Social Innovation, Female Entrepreneurship, Quadruple Helix, Entrepreneurial Ecosystems, Regional Incubators, Knowledge-driven Entrepreneurship

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Finally, I dedicate this thesis to my mother, who is the most courageous female entrepreneur I have ever known.

Thathsara D Palliyaguru

Lund, May 2021

List of Acronyms

CBSL – Central Bank of Sri Lanka

EE – Entrepreneurial Ecosystem

IDB – Industrial Development Board

IIVCC – University of Sri Jayewardenepura Innovation Invention and Venture Creation Council

Kantha Sangamaya – Regional Women’s Empowerment and Finance Group

NEDA – National Enterprise Development Agency of Sri Lanka

QH – Quadruple Helix

Sarvodaya – A nonprofit organization with chapters established in every district of Sri Lanka

SDF – Sarvodaya Development Finance

SLIC – Sri Lanka Innovators Commission

SWM – Sarvodaya Women’s Movement

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Introduction

“If you want to lift humanity, empower women. It is the most comprehensive, pervasive, high – leverage investment you can make in human beings”

- Melinda Gates, *Moment of Lift* -

The consequences of natural disasters impact individuals at social, cultural, political and economic spheres (Banford & Froude, 2015). Vulnerabilities are heightened for marginal communities in post disaster economic environments, especially for the female gender (De Mel & Ruwanpura, 2006; Ruwanpura, 2008) This was the case for post – disaster Sri Lanka aftermath 2004 Tsunami devastation . Women from vulnerable populations suffered at large as they found themselves without support as the husbands or the fathers of the families had been deceased. The Tsunami disaster hit on Sunday morning, December 26th of 2004, during the time of weekend farmer’s market. Majority of farmers and small business owners weekly arrive to the farmers market that would be held at coastal urban market spaces. A total of 230,000 lives were lost on this day (The World Bank, 2014).

Inevitably, governments and institutions play a role in the extents as to how the communities will be impacted aftermath of a large-scale disaster such as the Tsunami of 2004 or Covid-19 pandemic (Ruwanpura, 2008; Castro & Zermeño, 2020). In the case of the Tsunami disaster, international help rushed to the island to help restart the marginal economies (World Bank 2014). Banford and Froude (2015) argues that, though there is not a theoretical frame to discusses all social economic impacts aftermath a disaster, a social vulnerability approach could be utilized as it assumes that the effects of natural disasters are socially constructed and reflective of regional and global distributions of power (Banford & Froude, 2015). In this framework, it is possible to analyze the effect of authoritative institutions such as government, industry and university has on a community. In the case of the Tsunami disaster, the upliftment of marginal communities were seen via entrepreneurship (Hyndman, 2008; Ruwanpura, 2008). This could be seen as a form of social innovation where government, non-governmental organizations (NGOs), universities and other private and public institutions as well as industries came together to increase innovation and entrepreneurship in marginal communities thus facilitating fueling economic rebound.

The solutions that social innovations bring are from entrepreneurs and innovators within the community and those who are familiar with the community (Carayannis et al., 2019). Especially at grassroots level social innovations can create impactful and sustainable economic development.

1.1 Motivation

Entrepreneurship is considered as a major vehicle for economic development and women contribution to the economic development as new entrepreneurs is increasingly becoming significant worldwide; In 2019, approximately 405 million women were involved in creating and operating businesses (PRNewswire, 2019). Furthermore, women entrepreneurs are considered as the rising stars of the economies in the developing countries. Women entrepreneurs are designated as a crucial “untapped source” of economic growth and development by various scholars (Minniti & Naude, 2010).

The attention of many scholars and practitioners have been drawn towards the women entrepreneurship in developing countries as there is a significant growth in the segment. As a result, many international public institutions, local governments, non-governmental organizations (NGOs), charities and knowledge institutions have initiated programs and policies to promote and empower women entrepreneurship. These programs include capacity-building agendas, networking, provision of finance and financial literature that enables aspired women to start their business with confidence and growth their firms (Vossenbarg, 2013). However, despite the growing number of initiatives to empower women entrepreneurship in developing countries, there are numerous barriers for women to emerge as entrepreneurs (Niethammer, 2013) and it is evident through the regional statistics (Vossenbarg, 2013). Even though the gender gap of entrepreneurship in a global context may seem insignificant, when studied regional and country level, it varies greatly in size (Vossenbarg, 2013). Moreover, it can be also noticed that despite the increasing initiatives by different stakeholders in the society for the empowerment of women entrepreneurship, women still own and manage a fewer business to men, with a much less earnings and slower growth rates. It is also considered that women led businesses are more likely to fail (Vossenbarg, 2013).

In the Sri Lankan context women entrepreneurship is a salient theme that needs to be researched and studied more in detail as female active participation in economy is relatively low even though they constitute to more than half of the population in Sri Lanka (Surangi, 2014; Ranasinghe, 2008). Moreover, Sri Lanka’s women ownership of their own businesses is significantly low. Sri Lanka’s female participation in the labor force is as low as 33.6% in 2018 whereas male participation is 73% in 2018 (Asian Development Bank, 2019). Furthermore, the world economic forum also presented that Sri Lanka is having lower female economic participation as it shows that Sri Lanka scored only 0.558 by being 126th country in their Economic Participation and Opportunity Index (World Economic Forum, 2020). Researchers show that the lack of women emerging as entrepreneurs and not being successful in pursuing self-employment in this category has resulted in lower levels of contribution to the Sri Lankan economy (Ranasinghe, 2008). This can be further supported through the findings of Sri Lanka Statistic Department (2018) which presents that only 35.3% of women are economically active in Sri Lanka whereas the male percentage is high as 64.7%.

1.2 Research Problem

Since women are a powerful source of economic development, I believe empowerment of women entrepreneurship will assist Sri Lanka's current state of economic development. The research gap that I identify via literature review is as follows. First, gender gap in innovation and entrepreneurship can be seen from global north to global south. Entrepreneurship has been socially normalized as a masculine activity across societies (Lindberg et al., 2014). Policy creating models such as the triple helix model does not account the gender differences thus sustain innovation and entrepreneurial activities to be masculine throughout practical and critical management and innovation research (García-Terán & Skoglund, 2019; Kimatu, 2016; Lindberg et al., 2014). Via past empirical research, Lindberg challenges the gendered norms of the triple helix as a prominent innovation model. Thus, my research utilizes the knowledge creation that has led to the innovation model quadruple helix to analyze innovative entrepreneurial activities done in context of Sri Lanka, which is a developing nation.

Secondly, through this study I inspect the differences of gendered entrepreneurship in marginal economies in a developing nation. Thus I research the holistic overview of knowledge economy, yet analyzes deep social and cultural spheres to understand the differences the genders face in creation of entrepreneurial and social innovations (Galvão et al., 2017). A similar study had been conducted by Josphert Ngui Kimatu on *Evolution of strategic interactions from the triple to quadruple helix innovation models for sustainable development*. However, this study goes beyond the sustainable development paradigm to analyze social innovations fostered via the quadruple helix model.

Furthermore, another instrumental study was *A quadruple helix model of entrepreneurship, innovation and stages of economic development* by Galvão Anderson et al., (2017) The researchers successfully compared the role of entrepreneurship in economic development based on the four dimensions of the quadruple helix model in relation to the three stages of economy defined by the GEM (Global Entrepreneurship Monitor) which is innovation, efficiency, and factor driven economies. In this context, Galvão Anderson et al investigated a set of variables that allowed them to measure and verify the stimulus that the four helixes represent in economic development. This study provided abundance of theoretical guidance to analyze the case study of Sri Lanka.

Tertiarily, lack of research on women entrepreneurs as social innovators inspired the researcher to conduct this research to understand the consequences of entrepreneurial knowledge economy, in context to marginal communities. Especially in terms of social innovations. As per the researcher's understanding, the existing literature only covers national innovation systems with respect to the triple helix model (Weerasinghe & Jayawardane, (2019). There are no studies done on quadruple helix model as a form of social innovation to empower women entrepreneurs in Sri Lanka. The researcher applied findings from the non-profit organization, Sarvodaya and its connectiveness to female entrepreneurs to understand the level of social innovation that is fostered via increased female entrepreneurship in marginal communities.

1.3 Aim and Scope

The aim and scope of this study contributes to the analysis and application of quadruple helix model in context of Sri Lanka's marginal female entrepreneurial ecosystems as a form of social innovations. Thus far, focus of quadruple helix have been mostly researched towards creating technological and research-based innovations. However, there is a widespread belief that each nation has experienced a unique pattern in the transition to knowledge based economy, on account of different capacities and traditions in economic and cultural patterns and science as well as technology systems (Goktepe, 2003).

As initially theorized by Henry Etzkowitz and Loet Leydesdorff in the 1990s, according to the publication *The Triple Helix, University-Industry-Government Relations: A laboratory for Knowledge-Based Economic Development* (1996), interactions between universities, industries and governments have given rise to new intermediary institutions, such as technology transfer offices. However, research have revealed that the evolution of the interactions of the innovation models has increasingly raised the necessity of a strong civil society in the triple helix thus unsimilar to the prior model, the quadruple helix could be applied to study emergence of new knowledge based economic development in developing nations (Kimatu, 2016).

This study aims to find evidence and claim the argument that quadruple helix model is more appropriate form of social innovation for a country with an emerging economy like Sri Lanka compared to triple helix model. With this study, the researcher aims to identify the degree to which quadruple helix model can assist to empower women entrepreneurship in marginal communities. Furthermore, with this study, the researcher aims to identify and put forward new ways and recommendations as to how quadruple helix model can empower women entrepreneurship in marginal communities in Sri Lanka.

Therefore, in order to address the above-mentioned research gap, I raise the following main research question.

Can marginal women entrepreneurship be fostered through the quadruple helix model as a form of Social Innovation?

In order to properly address the main research question by decomposing it, I formulated the following sub questions.

- Sub question 1: How effective is the triple helix model as a form of social innovation in Sri Lanka to foster marginal women entrepreneurship
- Sub question 2: What additional value is brought towards to the empowerment of marginal women entrepreneurship by the civil societies

In this research I hope to analyze the quadruple helix which is an innovation-economics and knowledge-society based model, and if the quadruple helix model can be utilized to create policy changes that will help the empowerment of female entrepreneurship in developing nations. Furthermore, I will analyze such developments in female entrepreneurial activities give rise to social innovation. Based on prior research, social innovation can create large differences in communities as it gives power to the entrepreneurs to address the pressing issues in the communities directly (Fagerberg et al., 2011; Megre et al., 2012; Westley & McGowan, 2017; Phills et al., 2008; Carayannis et al., 2019; Mair & Marti, 2006; Pol & Ville, 2009; Mulgan et al., 2007; Hämäläinen, 2007; Heiskala, 2007; Maguirre et al., 2016; Rosca et al., 2020).

1.4 Thesis Outline

The outline of the thesis is organized as follows. Chapter 2 discusses the literature review, that is followed for the study and chapter 3 will present theoretical approach. In chapter 4 methodology will be presented along with the presentation of the analyzed data in chapter 5 and comprehensive discussion on empirical findings is brought forth in the chapter 6. Finally, the discussion and conclusion are presented consecutively in the chapter 7 of the thesis.

2 Literature Review

2.1 Entrepreneurship

Entrepreneurship is often considered as an essential engine of economic growth and development through its process of creation of value (Volery, 2004). The importance of entrepreneurship as a crucial economic agent has been widely discussed in academic literature. Therefore, many definitions are presented by different scholars in defining entrepreneurship. Schumpeter (1934) portrays an entrepreneur as a “captain of industry” or simply put as a creator. “man who organizes the firm (business unit) and/or increases its productive capacity” (McClelland, 1961) the “hero who perceives gaps and connects markets” (Liebenstein, 1968), and the “key man” (Hebert & Link, 1982) are some of the early characterizations presented on entrepreneurship. It is evident from above definitions given on “entrepreneurship” that much emphasis was given on male entrepreneurs in early studies. This emphasis was mainly due to the evident contribution of men as the primary participants in entrepreneurship as male were the most active in business creation, ownership and self-employment for decades in history (Hebert & Link, 1982).

Past research show case that entrepreneurship and innovation is not equally available for all genders through different economies (Lindberg et al., 2014). These gender differences persist from early entrepreneurial activities to late stage developed activities (Lindberg et al., 2012) Significant differences between various stages of entrepreneurial activities indicate untapped potential and unexploited opportunities(Allen et al., 2007). Lindberg further explains that the statistical gender gap has evolved as a consequence of general perceptions of gender in society as it innovative activities and entrepreneurial activities are commonly seen as masculine activities. However beyond a statistical gender gap a cultural gender gap continue to exist as well (Lindberg et al., 2014). However, later studies produced more gender-neutral definitions, which suggests entrepreneurs to be agents who initiate the process of change while discovering and utilizing new opportunities. “Schumpeter (1965) gives a broader definition in his literature for the term by defining “entrepreneurs as individuals who exploit market opportunity through technical and/or organizational innovation”. According to Hisrich (1990) entrepreneur is “someone who demonstrates initiative and creative thinking, is able to organize social and economic mechanisms to turn resources and situations to practical account and accepts risk and failure”.

2.2 Entrepreneurial Ecosystem

The extent studies that are done on entrepreneurship have mostly been focused on behavioral aspects and characteristics of individuals or firms (Shane, 2003; Shane & Venkataraman, 2000). Nevertheless, several scholars have highlighted the importance of further studying and understanding of entrepreneurship in a broader setting (Autio et al. 2014; Spilling 1996; Zahra and Wright 2011; Colombelli et al. 2017). In order to further study on a holistic approach to entrepreneurship, scholars have recently embraced on studying entrepreneurship from a systematic and interdisciplinary perspective (Acs et al. 2014; Qian et al. 2012).

As a result, the new concept which offers a holistic and a systematic view of entrepreneurship emerged as “Entrepreneurial Ecosystem” (EE) (Cavallo, Ghezzi & Balocco, 2018). Inspired by the field of biology, the concept of ecosystem was introduced into management literature (Moore, 1993; Iansiti & Levien, 2004). Stam (2015) define entrepreneurial ecosystem as “a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship”. The concept is also referred as the interaction of systematic and framework conditions where both biotic and abiotic components are being considered (Stam & Spigel, 2016). Stam and Spigel (2016) further elaborates that the systematic conditions such as entrepreneurial networks, leadership finance, knowledge, talent and support services are considered to be at the heart of the entrepreneurial ecosystem. In order to develop and influence on the growth of entrepreneurial firms, the entrepreneurial ecosystem consists of variety of actors that are interconnected (Spilling, 1996). Hence, it is evident that the entrepreneurs can be considered to be central players information, development and maintenance of a system (Stam, 2015).

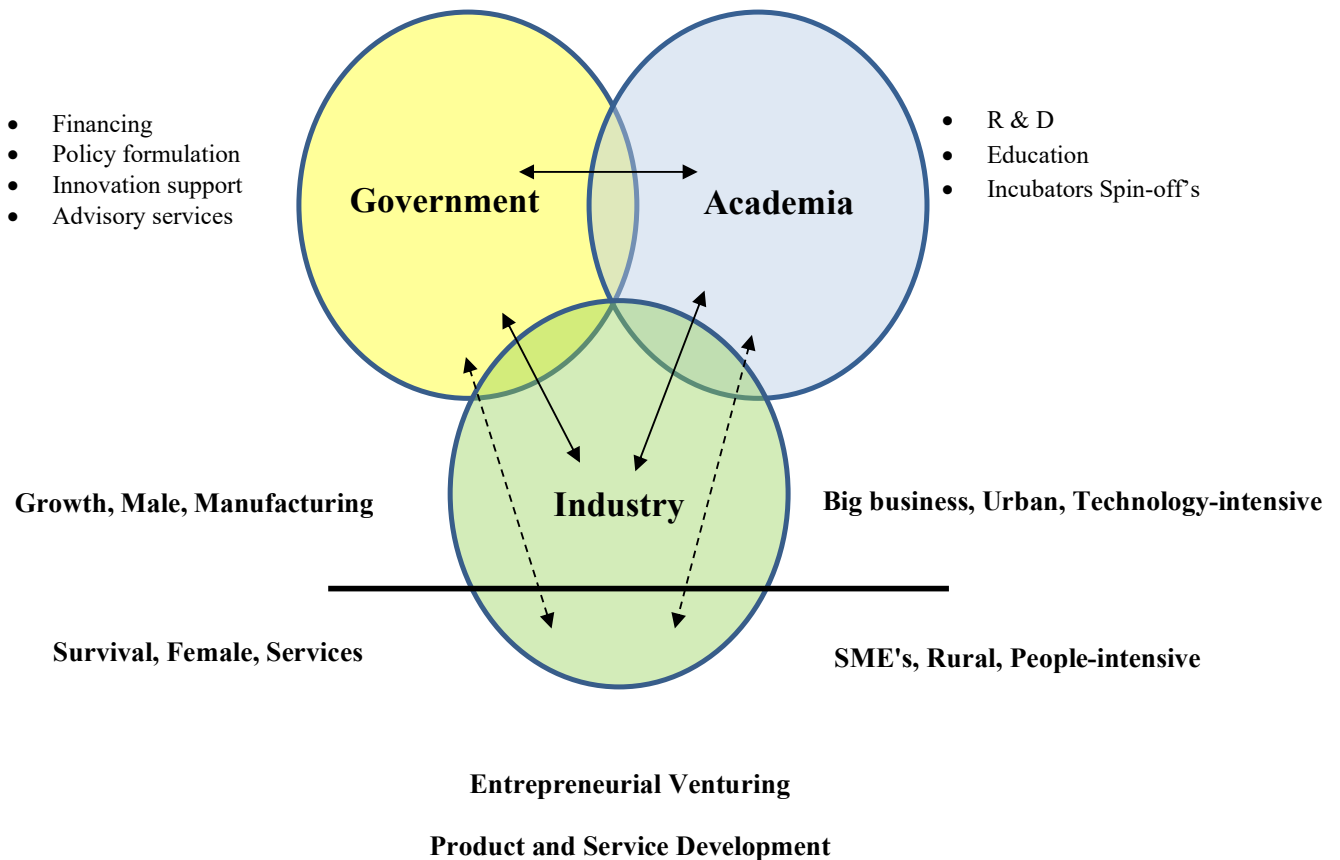
There are several definitions for entrepreneurial ecosystem that provides a regional aspect to it by introducing regional development perspective as its ultimate aim (Mason & Brown, 2014; Isenberg, 2011) whereas some scholars have showed that the ultimate aim of EE to be the creation of new ventures (Van de Ven, 1993; Spilling, 1996; Neck et al., 2004).

2.3 The Triple Helix vs. Quadruple Helix Model

Triple Helix and similar approaches such as national systems of innovation have been widely adopted as a utilization tool for knowledge creation and economic development (Göktepe-Hultén, 2010; Chaminade et al., 2018). Lindberg (2014) argues that majority of innovation models such as the triple helix model is embedded with discriminatory effects and gender biases. Statistically these prominent innovation models have given rise and sustenance to traditional male dominance in innovation and entrepreneurship while neglecting gender as a societal structure (Lindberg et al., 2014). Furthermore, as well as a statistical gender gap in innovation models, a cultural gender gap exists. Thus, the research by Lindberg analyses how the gender gap in entrepreneurship can be bridged by enhancement of societal innovation

system models via integrating the civil society in innovation models (Andersson et al., 2018; Lindberg et al., 2015; Lindberg et al., 2014). Therefore, social innovations are pedagogically adopted in the quadruple helix model rather than the dominant triple helix model (Boelman et al., 2014; Carayannis et al., 2019; Edwards-Schachter & Wallace, 2017; Hämäläinen, 2007; Lindberg et al., 2015; Weerawardena & Mort, 2006).

Figure 1: The Partially Blind Triple Helix Model



Source : Lindberg et al., (2015) & Author

According to Kimatu's study (2016) on innovation models based on developing countries the researcher has identified the lack of collaboration between the industry, government and university in majority of developing nations (Kimatu, 2016). Due to lack of coordination between actors, rather than the triple helix model, the quadruple helix model is better suited for developing countries as the model analyze and integrates collaborative institutions and platforms that aid the incorporation of the fourth helix, the Civil Society. (Saiz-Álvarez &

Palma-Ruiz, 2019; Carayannis et al., 2019; Galvão et al., 2017; Kimatu, 2016; Weerasinghe & Jayawardane, 2019). Thus, this study adopts the quadruple helix model that fosters innovation and economic development by encapsulating the civil society into innovation and entrepreneurship. Adopted from Lindberg et al.'s study of quadruple helix (2014) as the model analyses the actors who are capable of national innovation and delimitation of gender gap to foster entrepreneurship and economic development. While innovation and entrepreneurship are regarded as key factors of societal development and economic growth, research has shown that innovation and entrepreneurship is not equally available to everyone. Furthermore, some populations are underrepresented in entrepreneurial activities (Lindberg et al., 2014). As both early-stage entrepreneurial activities and ongoing sustainable businesses are counted as indicators of dynamic entrepreneurial propensity in economic development, significant differences in various categories of populations will therefore act as untapped potential for economic development (Skoglund, 2011; Andersson et al., 2018; Jamali, 2009; Lindberg et al., 2015; Lindberg et al., 2014; Vossenbergh, 2013).

The triple helix concept studies how governments interact with universities and industry to create innovations (Etzkowits, 2008). The quadruple helix theory is brought up by Carayannis and Campbell (2009, 2011) to analyze the role of civil society participate in innovation. Theoretically, the helix models refer to structures and processes where diversity agents are arranged into "fluid and heterogenous innovation networks" (Carayannis & Campbell, 2011). Due to fluid movement of knowledge, co-creation of processes among the actors help create innovative environments (Lindberg, Lindgren & Packendorff, 2014). However, there is evidence from research (Lindberg, Danilda & Torstensson, 2012; Pettersson, 2007) that triple helix innovation systems tend to emphasize and sustain traditional masculine notions of entrepreneurship and innovation. Furthermore, publicly supported triple helix initiatives also tend to be suited within male dominated settings of networks and industries. (Lindberg, Lindgren & Packendorff, 2012) A broader approach is thus manifested in quadruple helix where the focal interest in conceptualizing and developing the notion of a fourth helix is non-governmental organizations. As per Carayannis, Grigoroudis, Stamati and Valvi (2021) "Quadruple Helix Innovation development means facilitating citizen innovations, informing and promoting participation, developing decisions making interfaces and building individual capabilities (Lindberg, Lindgren & Packendorff, 2014). In this study quadruple helix helps to analyze collaborative platforms for women-led SMEs, analyze women-led SMEs to governmental and academic actors, developing competences and process innovations related to entrepreneurial venturing outside traditional triple helix constellations and carrying individual and societal aspects of entrepreneurship.

2.4 Social Innovation

The term social innovation is becoming more known throughout socio economic circles. Pol and Ville in their paper *Social Innovation: Buzz Word or Enduring Term* argues that it is yet a critical type of innovation that brings value to society and social innovations can break societal inequalities. In theoretical paradigms Pol and Ville establishes that some social scientists see social innovation as the prime mover of institutional change. (Pol & Ville, 2009) This identification is of paramount importance in creating paradigm shifts in institutionalized gender discriminations. Moreover, creators of social innovation ideas are commonly known as social innovators who can be identified via three sectors (Westley, McGowan & Tjörnbo, 2017). First, these social innovators identify a stable but inherently unjust equilibrium that causes the exclusion, marginalization or suffering of a segment of society that lacks the financial means or political clout to achieve any transformative benefit on its own. Then the social innovator identifies an opportunity in the said unjust equilibrium, developing a social value proposition, bringing to bear inspiration, creativity, direct action, courage and fortitude, thereby challenges the stable state's hegemony which finally results in a stable equilibrium that helps to release trapped potential and alleviates the suffering of the marginalized group (Martin & Osberg, 2007).

According to Phills, Deiglmeier and Miller (2008) social innovations means a novel solution to a social problem that is more effective, efficient, sustainable than existing solutions. The value created accrues primarily to society as a whole rather than private individuals (Phills, Deiglmeier & Miller, 2008). Furthermore, a social innovation can be a product, a process or a technology, an idea, a piece of legislation, a social movement, an intervention or a combination of above-mentioned (Phills, Deiglmeier & Miller, 2008). Overall, social innovation can be understood as a process that produces a tangible or intangible outcome that increases the wellbeing of the community (Maguirre, Ruelas & Torre, 2016). The aim of social innovation is to produce sustainable and impactful social change (Phills, Deiglmeier & Miller, 2008). Carayannis, et al., (2021) presents in their study that “collaborative advantages” are being focused on social innovation ecosystems and that through the culmination of right resources and relations at the ideal time periods, greater social innovation can be created. Furthermore, the scholars presents that the following can be delivered through social innovation ecosystems.

1. “Through innovation the creation of new or the alteration of existing ways that give societal value can occur. Social innovation may help the stimulation of innovation, which will lead to the societal and sustainable creation of new products, services, methods and strategies” (Carayannis, et al., 2021).
2. “Social innovation has the ability to develop new social relations and address societal, as well as sustainability challenges. In this way, “the cross-boundary competence can be strengthen, the traditional silos within and between academia, public and private

organizations can be broken down, and all these will democratize the production and application of knowledge for social development” (Carayannis, et al., 2021).

3. “The validity of social innovations can be found in the fact that these innovations can address societal needs, lead to sustainable development and can be global depending on the innovation scalability” (Carayannis, et al., 2021).

Moreover, Carayannis, et al., (2021) shows that as innovation is the outcome of interactive involvements of different spheres of actors, who contributing as per their institutional function in the society, “the quadruple helix model seems to be the most suitable approach for social innovation” (Carayannis et al., 2021, p.243). Furthermore, Mulgan et al. (2012) shows that as per the existing initiatives, the main focus is given upon commercial and technical innovations, hence, there is a long way ahead in order for social innovation to be completely developed, supported and funded.

3 Theory

3.1 Quadruple Helix Based Social Innovation Ecosystem

Social innovations help resolve critical issues that are common to communities by engagement of those who are affected most by it. It calls for the community entrepreneur and the community innovator to combine forces with other actors to solve issues that will help many by cultivating bottom-up practices (Boelman et al., 2014). However social innovative practices are hardly created due to lack of stimulation funding, lack of public value creation, lack of network, coordination between actors, lack of policy and legal frameworks (Boelman et al., 2014).

As discussed above, the meaning of social innovation can be diversified. The common elements that are poignant between business concepts of social economy and social ideas are the connectivity of social innovations (Carayannis et al., 2019; Boelman et al., 2014). Furthermore, according to *Social Business Model Innovation – A Quadruple Helix Based Social Innovations Ecosystem* study by Carayannis et al., (2021) necessities such as identification of new, unmet or inadequate social needs, development of new solutions to the identified social needs, evaluation of the effectiveness of the new solutions that were created and scaling up effective social innovations can be met via social innovations which describes the process through which answers are given to social needs that will lead to better results for the entire society.

I further elaborate that in general, the social innovation approaches have characteristics such as being open rather than closed as regards to knowledge-sharing and ownership of knowledge. Social innovations are multidisciplinary and more integrated to problem solving than the single department or single profession solutions of the past. They are known as participative and empowering of citizens and users via “bottom-up” model rather than “top down” and expert-led model. Furthermore, social innovations are demand-led rather than supply-driven, while also being tailored rather than mass-produced, as most solutions must be adapted to local circumstances and personalized to individuals (Carayannis et al.,2021).

3.2 Contemporary Debate on Social Innovation

According to Phills et al. (2008) the contemporary debate around social innovations can be discussed as a novel solution to a social problem that is more effective, efficient, sustainable than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals (Phillis et al. 2018). As much as a social innovation could be

product, a process or a technology but it can also be an idea, a piece of legislation, a social movement, an intervention or some combination of them (Phillis et al. 2018).

The term social innovation is becoming more known throughout socio economic circles. Pol and Ville in their paper *Social Innovation : Buzz Word or Enduring Term* argues that it is yet a critical type of innovation that brings value to society and that social innovations can break societal inequalities. In theoretical paradigms Pol and Ville establishes that some social scientists see social innovation as the prime mover of institutional change (Pol and Ville, 2009). This identification is of paramount importance in creating paradigm shifts in institutionalized gender discriminations.

3.3 Female Entrepreneurship: Sri Lankan Context

The United Nation's Development Program states that even though there are more women in the labor market today than ever before, women are still facing substantial discrimination in entrepreneurship (UNDP, 2020). In many areas of the globe women are systemically denied same rights as men. To add on, sexual violence and exploitation along with unequal wages and discrimination in public offices act as barriers for women to advance in economic platforms. Furthermore, environmental issues such as climate change and natural disasters effects women disproportionately in work environments and in their livelihoods (Ranasinghe, 2008).

The importance of human agency for the emergence of new economic and social activities is a central in social studies and often coincided with the notion of entrepreneurship (Fagerberg et al., 2011). Pioneer innovation theorist, Josef Schumpeter (1965) states that an entrepreneur has the willingness to try new ideas in practice regardless the often-stiff opposition from a resistant environment. Furthermore Kirzner (1973) states that an entrepreneur could be seen as an individual who will actively exploit opportunities as they emerge.

The Sri Lankan female labor force is quite imbalanced. Out of the economically inactive population of the country, 69% are women, and out of the total economically active population, women take 34% (Attygalle et al, 2014). From the economically active population, female entrepreneurial percentage is further diminished due to variety of social constraints (Ranasinghe, 2008). Therefore, it is not surprising that most of the studies done in relation to entrepreneurship in Sri Lanka deliberates on male entrepreneurship (Farook, 1992; Fernando, 2006; Gunatillake,1992; Karunanayake & Senadheera, 2006; Ranasinghe, 1996). Only a handful of research has been conducted on women entrepreneurs in Sri Lanka and further less to analyze the social constraints that affect female entrepreneurship (Kodithuwakku, 2003.) Lack of female entrepreneurship is interlinked with economic and social development challenges for the entire nation.

Though women take more than 50% of Sri Lankan population, their participation in the economy is comparatively low (Sri Lanka Department of Census and Statistics, 2014). The

number of females represented in entrepreneur’s category is 25% of the total employed population of Sri Lanka in 2013/2014 (Sri Lanka Department of Census and Statistics, 2015)

The following listing of the economic census further elaborate that in 2013 there were 1.03 million registered businesses and 90% of economic activity was created by sole ownership. The statistics of the 2013 Sri Lanka Department of census and statistics are demonstrated in the chart below.

Table 1: Percentage of female business ownership in business establishments in Sri Lanka 2013/2014

Business Establishments in Sri Lanka 2013/2014					
	Total	Percent Registered	Percent Run by Females	Percent with Sole Ownership	Persons Engaged
Total	1,019,681	57.6%	24.8%	90.4%	3,003,119
Micro	935,736	54.6%	26.3%	93.1%	1,338,675
Small	71,126	89.1%	8.3%	64.5%	529,751
Medium	10,405	100%	6.1%	35.9%	386,756
Large	2,414	100%	4.6%	20.3%	747,937

Source: Sri Lanka Department of Census and Statistics (2015).

3.4 Quadruple Helix in Sri Lankan Context

Boelman et al (2014) emphasizes that the triple helix model has been less efficient in satisfying society’s complex issues and discusses that more recently quadruple helix model has been used as a more dynamic communication model, that can facilitate communications between policy makers and has already led to promotion in innovation in many economies.

As the triple helix model seems to sustain gender gap in though it is paramount in fostering innovation the quadruple helix model is much related to the study as it analyzes female entrepreneurship (Lindberg et al., 2015). Furthermore, as the civil society is taken as the fourth helix, Lindberg et al, (2015) states that civil society to be represented by Non-Governmental Organizations (NGOs) as their involvement in developing entrepreneurship can be seen via four aspects.

1. They facilitate collaborative platforms for women-led ventures

2. They legitimate and link women-led SMEs to governmental and academic actors
3. They aid in developing competences and process innovations related to entrepreneurial venturing outside traditional Triple Helix constellations
4. They help carrying individual and societal aspects of entrepreneurship

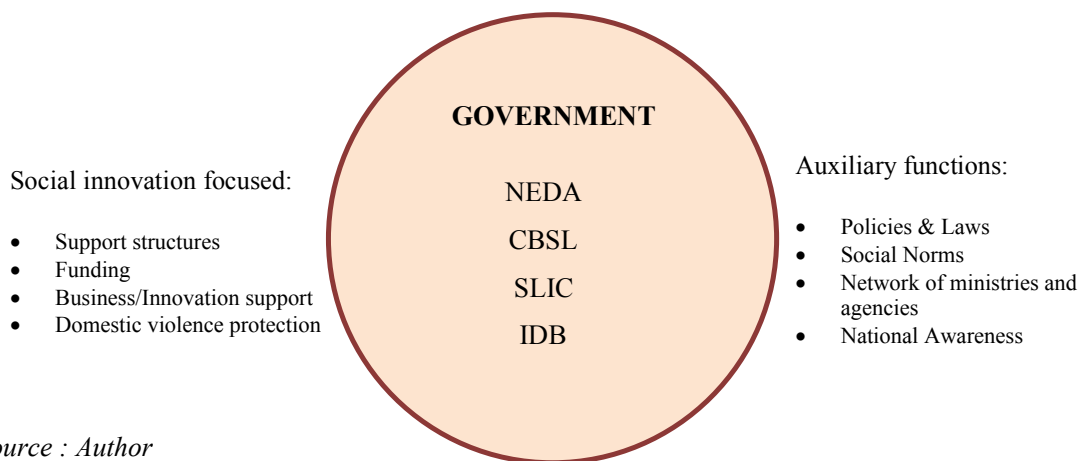
The non-governmental and nonprofit sector is adopted as the fourth helix to represent society due to two reasons. First, they maintain a clear role as a *Collaborative Platform*, especially for women entrepreneurs and marginal communities (Lindberg et al., 2014). As NGOs are seen as platforms with non-hierarchical platforms for networking and business collaborations between business individuals, projects, and firms, the entrepreneurs who reach to them envision NGOs as “cluster incubators”. Secondly, NGOs seem to take on a role as legitimators and linkages for small businesses as they play a role in linking businesses to other actors (Andersson et al., 2018; Lindberg et al., 2014)

In this case study the non-governmental organization that has been of focus is called Sarvodaya. The four helixes that were analyzed in context of Sri Lanka for this study is described as follows.

Helix 1: Government

The Sri Lankan government recognize the importance of innovation and enterprise development. Thus, the Sri Lankan government has created many commissions and national development agencies to provide business development services such as micro loans, innovation loans, non-governmental organization aid and other facilities that help with entrepreneurial eco-system development (CBSL, 2021; IDB, 2021).

Figure 2: Role of Sri Lankan Government as part of QH



Source : Author

The above diagram (Figure 2) portrays the various functionalities of the Sri Lankan government agencies as a main actor of the quadruple helix. Through the National Enterprise Development

Agency (NEDA, 2021) the Sri Lankan Innovators Commission (SLIC), Central Bank of Sri Lanka (CBSL) and Industrial Development Board (IDB) Sri Lankan government asserts a lot of effort to foster innovation entrepreneurship. However, due to lack of corporation and effectiveness the outcome has been quite minimal (Weerasinghe & Jayawardane, 2019). A further description of each of the analyzed government institution's role are described in table 2.

Table 2: Typology of Sri Lankan Government Agencies and Role Descriptions

Institution	Role in fostering innovation and entrepreneurship
The Central Bank of Sri Lanka (CBSL)	<p>Takes a central role in aiding entrepreneurship via enabling access to finance.</p> <p>Provides refinance schemes, interests subsidy schemes and credit guarantee schemes</p> <p>Inspire to increase regional growth, reduction of poverty, skill development and training and strengthening economic activities.</p> <p>Loan schemes include</p> <ul style="list-style-type: none"> • Saubhagya • PAMP RF • SEPI II • SAPP • NCRS <p>Source : CBSL (2021)</p>
Industrial Development Board - IDB	<p>Entrepreneurship development training programs</p> <ul style="list-style-type: none"> • Technology training – leather and rubber products • Workshops – computer and software management • Foundry technology • Food packaging technology course • Spice processing technology course • Appropriate technology and research development • Ornamental flower nursery course • Soap manufacturing course <p>Dissemination of industrial information</p> <p>Publications in industry development</p>

	<p>Exposure to Global Market</p> <p>Business Startup Services</p> <p>Source: IDB (2021)</p>
Sri Lankan Innovators Commission (SLIC)	<p>Statutory Body which came into operation on 1st August in 1987</p> <p>Formed by the Sri Lanka Inventors Incentives Act No 53 of 1979</p> <p>Functions under State Ministry of Skills Development, Vocational Education, Research & Innovations</p> <p>Vision: “Prosperity through invention and innovation”</p> <p>Patent Support</p> <p>Innovation Grants</p> <p>Source: SLIC (2021)</p>
National Enterprise Development Agency- (NEDA)	<p>Vision: “Creating a dynamic and sustainable competitive Enterprise Sector, this will contribute to the economic, political and social aspirations of the nation”</p> <p>Stimulate the growth, expansion and development of micro, small and medium enterprises</p> <p>Empowerment of people of human capital development</p> <p>Facilitate the access of entrepreneurs to finances</p> <ul style="list-style-type: none"> • Technology Development Fund <p>Facilitate regional economic development</p> <p>Source: NEDA (2021)</p>

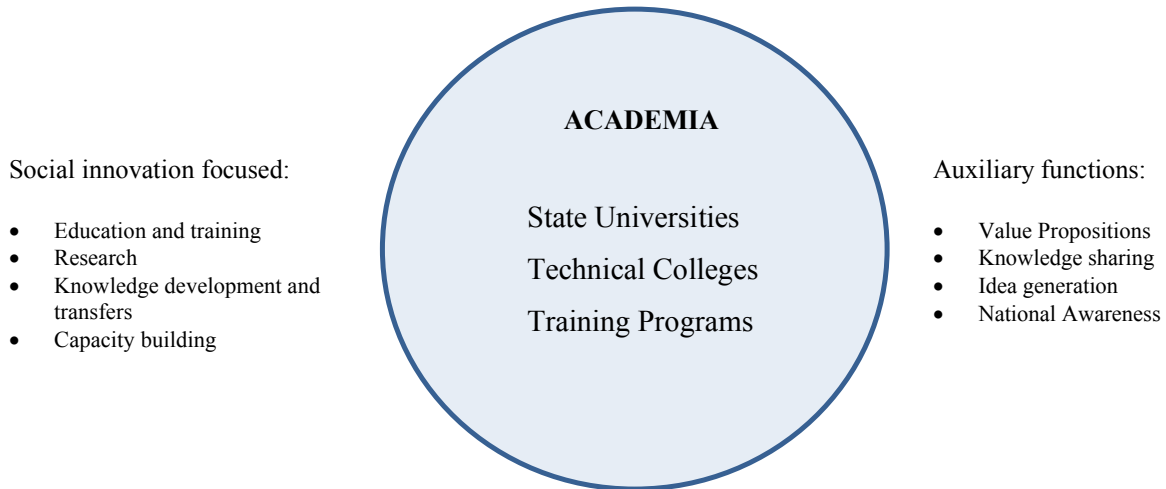
Source: Author

Helix 2: Academia

Following Social Demand Model of Education, Sri Lanka offers universal primary enrollment and equality of educational opportunity to all its citizens. Based on social welfare oriented free scheme of education, Sri Lanka have made a tremendous impact on the social, economic and political developments in the country. Sri Lanka has higher literacy rates compared to its

neighbors in South Asia. (Jayasundara, 2014). The diagram below portrays the role of Sri Lankan state universities, technical colleges and training programs contribute as the academia helix of the quadruple helix.

Figure 3: Role of Sri Lankan Academia as part of QH



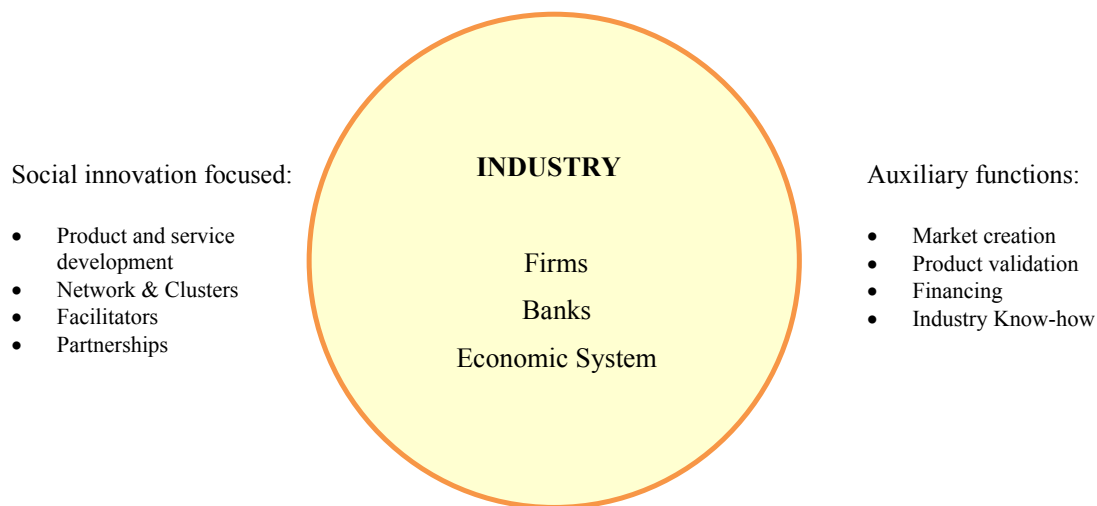
Source : Author

Though many firms and research centers engage in creating new technologies and discoveries that aid in industry development, universities still hold a key place in true scientific, technological and innovative discoveries (Göktepe-Hultén, 2010). Furthermore though Universities are considered as centers of knowledge creation, their affiliation with industries have intensified over the years (Göktepe-Hultén, 2010). A similar situation can be identified in context of Sri Lanka. Universities are increasingly becoming aware of their role as knowledge generators and create tangible contribution to industries (SLIC, 2021; IDB, 2021). Furthermore, regional universities collaborate with non-profit organization such as Sarvodaya in improving entrepreneurial ventures (Sarvodaya, 2021a). Sri Lanka has sixteen state universities throughout the island (Samantha Kumara, 2012) Majority of these universities have programs focused on increasing regional entrepreneurial activities along with branches of technical collages and training programs offered by the Sri Lanka Innovation Commission (IIVCC, 2021; SLIC, 2021). University of Jaffna, University of Sri Jayewardenepura and University of Kelaniya have created incubators with government aid to promote start up ecosystem among students. The incubators offer funding for successful business ideas along with training for business management (SLIC, 2021).

Helix 3: Industry

According to the World Bank (2021) the free-market economy of Sri Lanka was worth \$84 billion by nominal gross domestic product (GDP) in 2019 and \$297.76 billion by purchasing power parity (PPP) (Bank, 2021). The country has experienced an annual growth of 6.4 percent from 2003 to 2012, well above its regional peers driven by the growth of non-tradable sectors which the World Bank warned to be both unsustainable and unequitable and has slowed since then. Subsequently, Sri Lanka was re-classified as a lower middle income nation by the World Bank from a previous upper middle income status (Athukorala et al., 2017; Bank, 2021).

Figure 4: The role of Sri Lankan Industries as part of QH



Source: Author

Main industries that help Sri Lankan economy are agriculture, textiles and clothing, tourism, telecommunications, information technology services, banking, shipping, petroleum refining, construction and processing of tea, rubber, coconuts, tobacco and other agricultural commodities (Athukorala et al., 2017) The banks and private sector take a key place in stimulating local industries and regional growth. (Karunanayake & Abhayaratne, 2002).

Helix 4: Civil Society: NGO's

NGOs take an integral role in regional development especially when it comes to connecting the civil society with actors who can support entrepreneurial efforts (Stam, 2015; Spilling, 1991; Karunanayake & Abhayaratne, 2002; Qian et al., 2013). Furthermore, due to more civic

engagement and community values non-governmental and non-profit sector seem to gain trust of the civic society to lead regional development in a complementary manner (Pearce, 2003).

Figure 5: The role of Sri Lankan NGO's as part of QH



Source: Author

As mentioned, the key organization focused on this study is Sarvodaya. Sarvodaya has been found by Dr. A. T. Ariyaratne in 1958, when he established the concept of “Shramadana” which translate to sharing of one’s time, thoughts, labor and energy. Dr. Ariyaratne spent time organizing and gathering volunteers to come together and build a road in an impoverished rural village of Sri Lanka. As of today, the Sarvodaya Shramadana Movement which is also known as *Lanka Jathika Sarvodaya Shramadana Sangamaya* is Sri Lanka’s most broadly embedded community-based development organization network. Sarvodaya has expanded over 20 district centers, including 325 divisional centers and over 3,000 legally independent village societies in districts across the country (Sarvodaya, 2021a). Sarvodaya has many divisions within the organization as listed below:

- Sarvodaya Disaster Management Unit
- Early Childhood Development Unit
- International Collaborations Unit
- Rural Technical Services Unit
- Woodwork and Exports Unit
- Community Health Unit
- Sarvodaya Institute of Higher Learning
- Sarvodaya Shramadana Societies
- Sarvodaya Development Finance
- Sarvodaya Women’s Movement

- Suwasetha Sena Society
- Shanthi Sena
- Vishwa Nikethan

Sarvodaya’s key aim has been regional development in rural and marginal villages. Their mission is to establish a self-involvement society for the community, provide them with knowledge and know-how of conducting entrepreneurship, facilitate business development with micro loans and other financial assets such as grants, conduct workshops on financial literacy. Sarvodaya further helps with community building and establish movements that helps the community to build within itself. Furthermore, while working in a community Sarvodaya facilitates “Shramadana” which is volunteer projects for community enhancement projects. Sarvodaya utilizes their key development segments such as the Development Finance Project, Women’s Movement and Technical Services Unit among many others to facilitate the rural development according to the needs of the community (Sarvodaya, 2021b; Sarvodaya, 2021c). Table 3 provides a typology of different units of Sarvodaya and their functions.

Table 3: Typology of Sarvodaya Unit Functions

Sarvodaya Unit	Description
Suvasetha seva socitiety	In 1975 Suwasetha Seva Society was established as a government approved charity. The main objectives of this charity are to protect and empower children, adolescents, the disabled and elders through: <ul style="list-style-type: none"> • Nutrition and residential care for children suffering from malnutrition, orphaned and abandoned children • Residential facilities for teenage victims of sexual abuse • Vocational training for young females with disabilities Community-based rehabilitation programs for persons with disabilities programs for street children
Shanthi Sena	Sarvodaya Shanthi Sena, stands for Peace Brigades is the youth wing of the Sarvodaya Shramadana Movement. Founded in 1978, the main objective of Shanthi Sena is to develop youth leadership, and to help and encourage a disciplined society free of violence and suffering.
Vishva Nikethan	Vishva Niketan is a peace building center: a place for all to pursue the calming and healing mindset according to cultural buddhist values demonstrated in the national heritage of Sri Lanka. They promote creating an atmosphere of tranquility and serenity close to nature and promote Vishva Niketan as a center of holistic meditation.
Sarvodaya Development Finance (SDF)	The purpose of SDF is to support underserved rural economies and grass roots entrepreneurship in Sri Lanka, that represented communities deemed ‘non-bankable’ by formal financial institutions. As the financial arm of the Sarvodaya Movement, SDF is the only finance company in Sri Lanka owned by a charity and is the first dedicated development finance institution in Sri

	Lanka. SDF is also one of the oldest Micro credit institutions in Sri Lanka and is the first formal financial institution to channel private sector investments into low and mid-income groups in the country.
Sarvodaya Women's Movement (SWM)	SWM takes a key place in establishing entrepreneurship programs, empowerment and addressing gender issues in Sri Lanka. The movement works to empower women by generating awareness of women's rights and women's issues, and to build the capabilities of women through assisting female entrepreneurs to acquire knowledge and skills in a holistic manner that will enable greater self-reliance and financial freedom. This division acts as a grassroots organization to promote inclusion, innovation and empowerment.

Source: Sarvodaya (2021)

4 Methodology

This chapter elaborates the procedure to be used in this study in order investigate women entrepreneurship can be fostered through the quadruple helix model as a form of social innovation. At the outset, this chapter explains the research approach, the research design alongside with the process of data collection and how the data will be analyzed in order to come to a conclusion. Furthermore, the chapter will elaborate on the trustworthiness of this study.

4.1 Approach

In academia, there are two major approaches to research that can be used by scholars when embarking on a research study of the social and individual world. These are quantitative research approach and qualitative research approach. The quantitative research approach can be defined as a type of empirical research which tests theories which contains variables that are measured with numbers and analyzed with statistic measurements in order to come into conclusions of underlying phenomena of interest (Creswell, 1994; Gay and Airisian, 2000). On contrary to the quantitative approach, qualitative approach is more engaged in naturalistic inquiry which is more open and explores an area of interest. As per Fossey, Harvey, Mcdermott and Davidson (2002) “central to good qualitative research is whether the research participants’ subjective meanings, actions and social contexts, as understood by them, are illuminated”. On contrary to quantitative studies which are concerned with investigating into cause-effect relationships through deductive reasoning and coming up with generalization outcomes, qualitative studies are more suggestive and is concerned more with the process, context, interpretation or understanding through inductive reasoning (Yilmaz, 2013; Axelsson & Nilsson, 2017). Hence, qualitative studies are open for further research (Axelsson & Nilsson, 2013).

For this study, the qualitative research approach has been used as the study aims in understanding the effect of quadruple helix model for empowerment of women entrepreneurship as a mode of social innovation. The research question that has been researched upon is based on a social constructive epistemology hence, qualitative research approach is ideal.

As broadly accepted, there are three major research methodological approaches that are categorized upon the research aim or the purpose. They are explanatory approach, exploratory approach and descriptive approach. An exploratory research aims to explore and get a better understanding of the underlying subject of interest whereas an explanatory research aims to

identify cause and effect of underlying phenomena. The descriptive research aims to describe or throw more light into a phenomenon through a process of data collection.

In this study, the researcher used an exploratory research approach with the aim of getting a deep understanding of the contribution to the empowerment of women entrepreneurship by each agent in quadruple helix model, the impact and effectiveness of triple helix model vs quadruple helix model in Sri Lanka for the empowerment of women entrepreneurship as a form of social innovation.

4.2 Research Logic

There are three main approaches of logical reasoning for conducting research: inductive, deductive and abductive. Deductive reasoning is building a theory and inferencing through testing the hypothesis whereas inductive reasoning is the approach of building a theory through observation and investigation. Abduction reasoning involves in a selective process in understanding how the data support the existing hypothesis or theories and how the data may require for modification in existing understandings (Thornberg, 2012).

The researcher used the abductive approach in this study as it has gathered and analyzed data from the reality along with matching with existing theories along the research process. The use of abductive reasoning approach can be further supported through the argument put forward by Starrin and Svensson (1994) stating that an abductive study is more appropriate in a qualitative research where the interest area that is being investigated and analyzed falls in an emerging field of knowledge.

4.3 Research Design

As per Durrheim (2007), a research design is defined as “a strategic framework for action that serves as a bridge between research questions and the execution or implementation of the research”. The four research design methods that are being widely used by scholars within applied science are survey, case study, experiment and action research. Höst, Regnell and Runeson (2006) describes surveys to be studies that describe current situation of a phenomenon, case studies to be an action series which thoroughly investigates a process, an experiment research as a process of comparing different alternatives and an action research to be an observation and document study of a certain process.

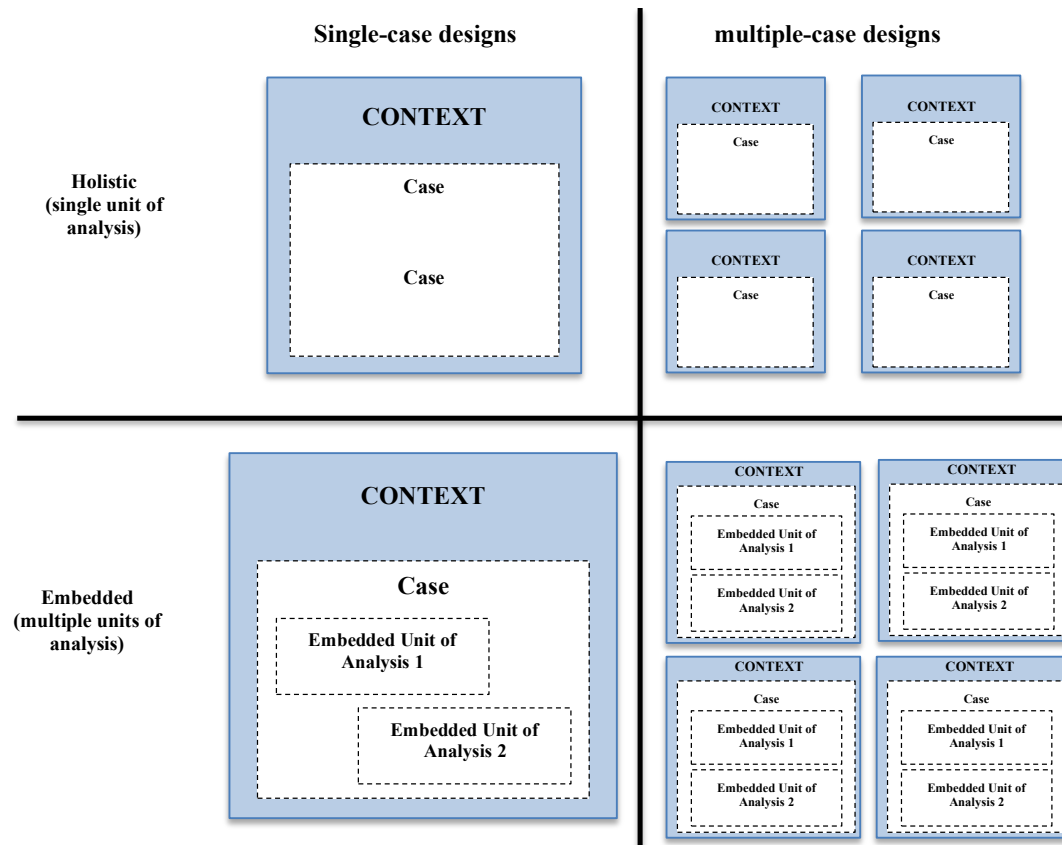
This study is designed as a case study since case study is an appropriate approach when the focus is on a contemporary phenomenon with some real-life context and it is a perfect strategy when “how” or “why” questions are posed (Yin, 2009). Since the present study is focused on getting a deep understanding of the current dynamics with regards to Sri Lanka’s women

entrepreneurship and how quadruple helix model could help to empower the women entrepreneurship, the researcher believes the case study approach is ideal.

4.4 Case Study Design

The case study research strategy is used in many settings to contribute to the knowledge of individual, group, organizational, social, political and related phenomena (Yin, 2009). In designing a case study research Yin (2009) has shown four major types of research designs as portrayed below based on several characteristics.

Figure 6 : Basic Case Study Design



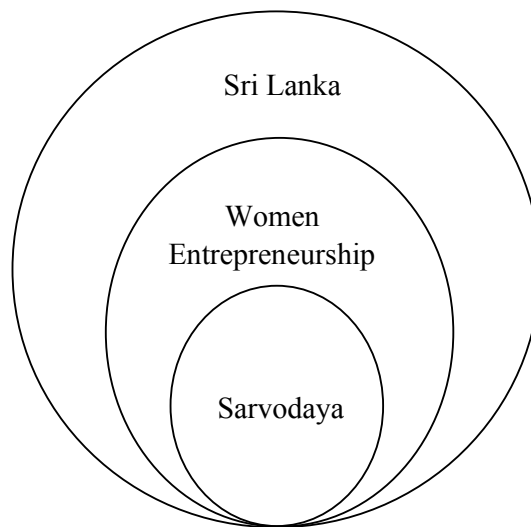
Source: Yin (2009)

The rationale for the choice between a single or a multiple case study depends upon the way the research questions are to be addressed. A single case study design is used when the objectivity of the research is to study circumstances and settings of a certain situation whereas a multiple case study design is preferred when there is the need of exploration of findings beyond the uniqueness of one setting and when ample time is available. Depending on the existence of one

or several unit's relevance to the analysis of the case, the choice between holistic or embedded approach is decided (Yin, 2009).

The research question of this study relates to the circumstance and settings of environment to the women entrepreneurs in Sri Lanka and it addresses the appropriateness of quadruple helix model as a form of empowerment of women entrepreneurship in Sri Lanka. One of the rationals presented by Yin (2009) for single case is that it should be used when the underlying critical case is testing a well formulated theory. Hence, the ideal case study approach to the current study is the single case study, as the research will be addressing the appropriateness of quadruple helix model for a developing country like Sri Lanka in contrast to the triple helix model. Furthermore, with the time constraint prevailing to conduct the research, the researcher believes single case study approach is ideal. To serve the purpose of the research question of this study, the addition agent presented in the quadruple helix model on contrary to the triple helix model; Non-Government Organizations (NGO) is being studied. Moreover, specifically for the current study "Sarvodaya" NGO has been selected as the single unit of analysis as to deeply study in order to come into answer the research questions posed in this study. Hence, according to the case study design types presented by Yin (2009), the holistic single unit design has been chosen for the current study.

Figure 7: Case System for the Study



Source: Author

5 Qualitative Analysis

5.1 Data Collection

As this study is performed as a qualitative research, the qualitative data collection has been utilized. A qualitative researcher typically gather data with the utilization of multiple sources such as interviews, observations, focus group and literature, rather than relying on a single data source (Creswell, 2009). Since the current study is a qualitative case study, the chosen methods of data collection are interviews, focus groups and literature survey. The use of multiple data collection methods also supports the stronger validation to the research (Eisenhardt, 1989)

5.1.1 Interviews

According to Yin (2009) Interviews are considered as one of the crucial sources of data for a case study research. In interviews, there are three fundamental types; structure, semi-structure and unstructured. Structured questions are verbally administrated questionnaires with the guidance or a list of predetermined questions. Semi-structured interviews are interviews where the interviewer uses a guide as a support. However, the questions asked could be rearranged or changed in the course of the interview. Unstructured interviews are conducted with little or no guidance and allows the interviewed object to guide (Höst et al., 2006). In conducting any form of interviews, recording is proven to be crucial as both what and how the interviewed object express themselves is under the study (Bryman, 2002).

In the current study open ended semi-structured interviews has been selected as a source of collection of data. The semi structure interviews were considered more suitable to the current study as it does not limit to a strict structure rather it gives a direction to conduct the interviews and it is more flexible to the researcher. The interview guide was developed by the author by reading literature with regards to context of women entrepreneurship in Sri Lanka and other general literature that are presented for Women entrepreneurship.

5.1.2 Focus Groups

As one of the commonly used data collection methods in qualitative research, this study also utilized the method for data collection. Focus group research is “a way of collecting qualitative data, which—essentially—involves engaging a small number of people in an informal group discussion (or discussions), ‘focused’ around a particular topic or set of issues” (Wilkinson,

2004). A better understanding of the group dynamics that affect the perceptions of individuals can be get through focus groups. In this study, digital focus group was used as to understand the major and common issues faced by women in Sri Lanka, in conducting their own businesses. This method was used as it is ideal as it generated more information, insights and ideas through interactions and discussions among the group.

5.1.3 Literature review

Literature review can be considered as a pathway to knowledge in conducting a deep research. It is a widely used form of data collection methods in qualitative research. It is often an iterative process throughout the study as it acts as a source for validity and reliability (Axelsson & Nilsson, 2017). As shown by (Höst et al., 2006), a well performed literature review assists the researcher with the ability to develop existing theories and reduces the risk of overlooking the conclusions that has been already arrived at.

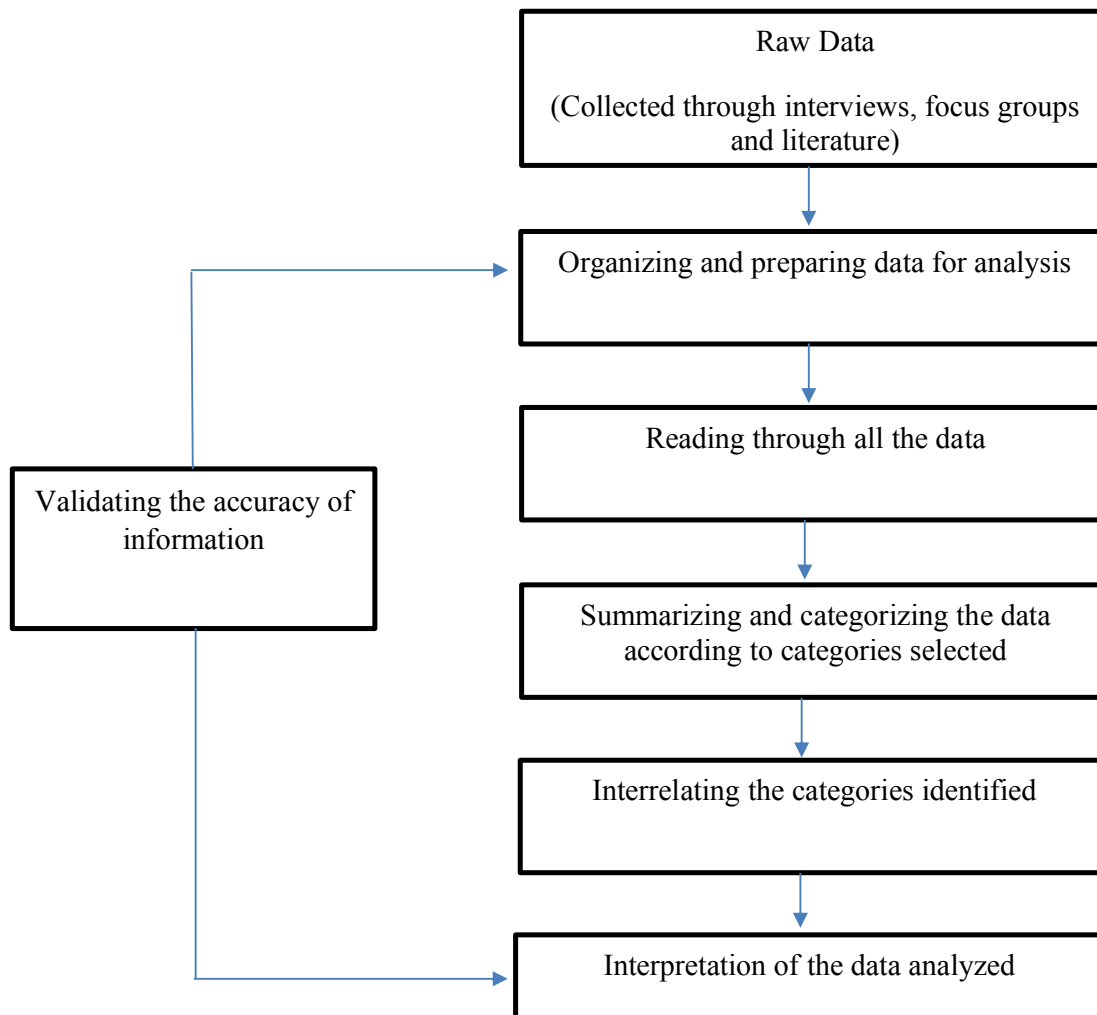
The author conducted a literature review initially in order to gain general knowledge of the field of interest in order to understand the existing theories put forwarded by different scholars as well as to understand the prevailing research gap for the field of interest. Furthermore, the author used a selective process in reviewing the literature in order to identify the most relevant literature available. With performance of the literature review, a deeper understanding of the researched area was gained. The literature consisted of mainly academic articles published by well-known journals and credited non-governmental organizations, books, academic journals and reports presented by renowned institutions. The primary tools that were used in finding the relevant literature were mainly the Lund University database, LUBsearch and Google Scholar webpage. The approach used by the author in finding the most suitable literature was searching for the keywords relevant to the field of interest. The overall areas focused in the literature review were entrepreneurship, entrepreneurial ecosystem, women entrepreneurship in Sri Lanka, social innovation and quadruple helix model.

5.2 Data Analysis

The process of data analysis involves in transformation of collected data into insightful and comprehensible conclusions. The process of analyzing data includes both data handling and interpretations where it involves the preparation of data for analysis, comprehending the data by conducting analysis and finally coming into conclusions (Creswell, 2007). As per Gibbs (2007) handling and sorting the gathered data in an organized manner is crucial for interpretation and analysis of data. A qualitative research analysis process is relatively creative compared to a quantitative research. This involves in the ability of the researcher to understand and recognize patterns in the data that are being analyzed alongside with the conceptual capability.

For the current study, the qualitative data that has been primarily collected through interviews, focus groups and literature will be analyzed using the process described in the figure 8.

Figure 8: Data Analysis Process

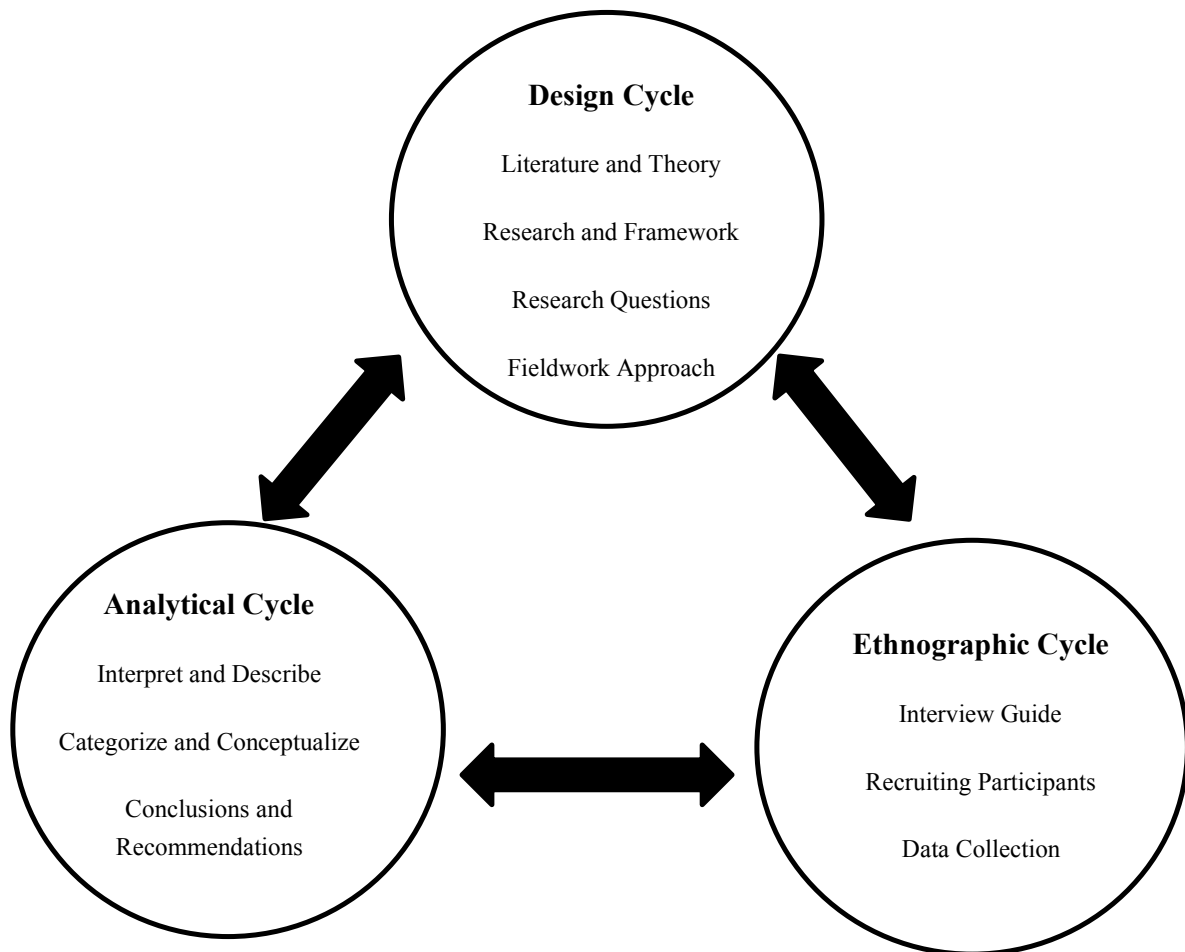


Source : Author

5.3 The Qualitative Research Cycle

This study follows a similar version of the research process cycle utilized by Axelsson and Nilsson (2017). The qualitative research cycle describes how the steps that are being used in a research process are interlinked and performed in a cyclic process (Axelsson & Nilsson, 2017). This qualitative research cycle consists of three iterative cycles namely the design cycle, ethnographic cycle and the analytical cycle. Figure 9 illustrates the qualitative research cycle that is being used in the current study.

Figure 9:Qualitive Research Cycle



Source: Axelsson and Nilsson (2017) and Author

As illustrated in Figure 9, the design cycle involves in studying and reviewing the existing literature and theories. It also involves in designing the research framework and formulating the research questions alongside with the fieldwork approach that is best suited. In the design cycle, the different steps involved were revisited and adjusted as new insights were gained before moving to the next cycle; ethnographic cycle.

In the ethnographic cycle, the focus is given on the field research. Based on the chosen fieldwork approach and formulated research questions, the interview guides will be prepared for different interview groups. The data collection was mainly done through the semi-structure interviews, focus group and the literature survey.

From the collected data, the analytical cycle was processed. This cycle included gathering and interpretation of the data which involved in summarization and categorizing of collected data

to be easily comprehended. The triple helix model and the quadruple helix models were accessed and compared with the help of generated data and conclusions alongside with further recommendations were made.

5.4 Qualitative Interviews and Focus Groups

One of the main sources of data collections in this study is the semi-structured interviews. The interviewed objects were chosen from different categories as per the agents contributed for the quadruple helix model; industry, government, academia and NGOs and furthermore a random selection for the interviewed objects was done for the category of women entrepreneurs to cover the studied population in the focus and to cover different perspectives.

In this study, five different categories were interviews for the purpose of this study. And following represent the five categories and the number of interviews done under them.

- Sri Lankan female entrepreneurs - 3 extensive interviews with marginal women entrepreneurs and 1 focus group with 4 mid-level women entrepreneurs
- Industry - extensive interviews with 3 private institution and bank officials
- Government - extensive interviews with 3 government officials
- Academia – extensive interviews with 2 professors in State Universities
- NGOs - extensive interviews with 3 Sarvodaya officials

The first category included Sri Lankan entrepreneurs and semi-structured interviews were done with three female entrepreneurs coming from three different backgrounds to get an understanding of the prevalence of a gender gap, the current status and any challenges faced by women in conducting their own businesses. A focus group was conducted with four middle income women entrepreneurs in order to get their perspective with regards to the field of interest in the study. The second category included industry experts majorly coming from Private and State banks and interviews were done with the intention of getting the understanding of approachability for women for funds in general, how effective they are being put into use by them and to get a deeper understand on the perspective of the field interest in the research from the interviewee's point of view. The third category includes the government officials and these interviews were done with the intention of understanding of the current status of women entrepreneurship in Sri Lanka and how it has evolved over the time. The fourth category comprises of the academia representation and the interviews were done to get the understanding of their perspective in the field of interest and to get a better understanding on what contribution is being made from the academia for the empowerment of women entrepreneurship in Sri Lanka. Final category included three officials from Sarvodaya representing the Sri Lankan NGO, and the interviews were done in order to understand what contributions are made through the NGOs for the field of interest and how effective they are. A table of all the interviews that were conducted is included below.

Table 4: Summarization of Interviewed Respondents

Type of Interview	Number of Interviews	Interviewee Category	Identification Code
1 Focus Group	4	Mid-income level Female Entrepreneurs	FG1
Extensive Interview	3	Marginal Female Entrepreneurs	FE1, FE2, FE3
Extensive Interview	3	Industry - Private institution and bank officials	Ind1, Ind2, Ind3
Extensive Interview	3	Government officials	Gov1, Gov2, Gov3
Extensive Interview	2	Academia- Professors in State Universities	Uni1, Uni2
Extensive Interview	3	NGOs - Sarvodaya officials	Ngo1, Ngo2, Ngo3

Source: Author

All the interviews and the focus group discussion were conducted as an open ended semi-structured interview. Different interview guides were used for the different categories as the objective were different for each category however, they were developed around the research questions that are being addressed by the current study. All the interviews were done in Sinhalese and were recorded. The interviews were translated by the researcher in the process of documentation. All the interview guides are presented in the Appendix A.

5.5 Credibility of the Research

The transcripts were written for each interview conducted and they were thoroughly read to have a deeper understanding. Next those transcripts were summarized by highlighting key information in each interview conducted. The summarized data scripts were categorized according to the same categorization followed for the interview process. In order to verify the credibility of the data collected the transcripts written were shared with interviewees for their revision and feedbacks were generated. The finalized summarized table of interviews were taken into the further analysis for interpretation and formulation of conclusions and recommendations.

When using a qualitative case study reliability, validity and transferability are significantly important to be addressed to retain the credibility of the research (Yin, 2009 & Höst et al., 2006). The research design must adequately contain a set of logical statements and guidance so the quality of the study can be assessed. According to Yin (2009) by sanctioning the reliability, validity and transferability of the study the researcher took steps to ensure the credibility of the study.

To ensure reliability of the research the data collection was organized to be systematic and structured. As reliability of a study identifies that the random variations are taken into consideration and the same results are achieved if the process is repeated (Höst et al., 2006). The interviews were made to be transliterated and followed an interview analysis framework with response codes to identify various data points. Following this method signified that the data could be easily shared and transliterated whenever it is needed. The research strategy and data collection methods are described in detail so that the reader comprehend the entire processes including varied circumstances. The interviews were rechecked with a local translator to ensure that the data was translated with correct meaning and no information was left behind throughout the interviews. It was communicated in both local language and in study language to identify interview guide made sense and were understood by the responders.

Validity focuses on correct operational measures are undertaken when conducting the study. It is important for the concepts to be in the correct way they are meant to be measured (Höst et al., 2006). It was important to make sure that the research design correctly presented the valid research questions and project scope was relevant to the study. To verify that the correct methods were used to ensure validity of the study, the researcher conducted thorough literature reviews identifying the needed scope for the study. The interviews were thus created in relation to the literature review and the scope that the project aspired to analyze. Different data collection methods were used to deepen the understanding of connectivity of actors as well as how circumstances lead to various conditions (Carter et al., 2014). To understand the differences of responses and to analyze multiple explanations, the same set of interview questions were established via the carefully checked research framework. This framework helped and guided the researcher throughout the study. The semi structured interview framework allowed the study to explore various dimensions of the problem while taking cultural and other demographical nuances into context. In addition, different method of data collection and multiple sources of data collection helped the researcher identify various perspectives as well as achieve broad understanding (Carter et al., 2014).

In identifying if the results can be applied via generalizability and transferability to other contexts Höst et al. (2006) advices to clearly describe and explain the case study. In applying the model to an entire island which is identified as a developing nation by the World bank, the researcher must be cautious to address the risk of low transferability (Yin, 2009). By clarifying every detail of the study, the researcher attests to increase the transferability to other contexts and countries as well. In Sri Lankan context, Sarvodaya and how various actors are entwined to increase entrepreneurship is extensively explained to give the reader a clear understanding of the background context of this case study and research. By understanding the entrepreneurial

ecosystem, work processes, cultural nuances and relationship between involved actors the reader understands when and where this study can be applicable (Höst et al., 2006).

The final result of the study received positive response from Sarvodaya when the study results were presented to the Sarvodaya Headquarters and the female entrepreneurs who contributed to this study. The participants believed that policy changes that this report can support to enhance the quadruple helix in Sri Lanka in fact will strengthen women entrepreneurs and will help to empower social structures for marginal economies this empowering rural entrepreneurial ecosystems. They aspired the suggested incubators to be knowledge creation centers and hubs of innovation. Sarvodaya further saw that implementation and strengthening of the quadruple helix model in Sri Lanka will bring social innovation to the island via marginal communities. This feedback positively strengthens the transferability of the results.

6 Findings and Discussions

This chapter covers three areas: analysis of the data; discussion of the results of the analysis; and how the findings of the study relate to the literature. The descriptive of the interview analysis which was created after conducting interviews is inserted in the appendix for reference. Analysis of data from the actors of the quadruple helix is discussed below.

6.1 Analysis of the Actors

6.1.1 Women Entrepreneurs

In conducting interviews, first the female entrepreneurs (FE1, FE2 and FE3) were interviewed to retain an understanding of the current reality of being a female entrepreneur in Sri Lanka. FE1 and FE2 were connected to Sarvodaya while FE3 were not. However, FE3 was helped by another NGO in her region. According to the findings of the research via interviews and the literature survey, the female entrepreneurs mainly lack support in network, funding, a marketplace to sell their product and mentorship for business development. FE1 mentioned it was difficult for her to find the right network or apply for a business loan until she reached out to her local Sarvodaya Women's Movement (SWM) chapter which then connected her with Sarvodaya Development Finance (SDF) group. Where she applied for a micro loan of LKR10,000 with minimum interest. FE1 conducts a handmade mosquito nets production with her business partner. Her business partner is an unmarried woman from the same region who did not have any financial help from her family. FE1 together with her partner now carries a successful business and hopes to get a new "JUKI" industrial sewing machine to expand operations.

FE2 has been a volunteer with the Sarvodaya "Shramadana" movement. As she was involved in the company, she participated in technology workshops done by the Sarvodaya in collaborations with the regional university. The business management students who conducted the workshop helped her to file a business plan and an application from the "INSPIRE" grant which is a grant created by USAID and Sarvodaya to promote entrepreneurial activities in marginal communities. As she received the grant, she has created sustainable fish chips product that uses sustainable packaging. FE2 states her product stands out in the market as she uses new technology that is recently discovered and taught by the IDB workshop. FE2 travels with her product one a week to the facility that has the machinery that allows her to finalize her food packaging. FE2 states "Innovation is the only way to go forward, us Sri Lankans always cared about nature for thousands of years. Plastic is never the way to go. I wish others had access to

the workshops that distributes this knowledge, maybe the new generation has something to learn from us”. FE2 started her venture to gain financial freedom as she was a victim of domestic abuse. She has been empowered to start her venture through the local community of female entrepreneurs. FE2 mentioned about many social innovations that took place in the region such as distance learning facilities, new technology workshops for science-based crop rotation techniques and establishment of sustainable and ecological tourist guest houses known as eco-tree houses.

FE3 had started her own business in food processing. However, she did not know about the micro financing options or the workshops that were conducted by NEDA, SLIC or IDB. Her friend had recommended her to reach out to “Kantha Sangamaya” which is an NGO that helps with micro loans for entrepreneurship. FE3 states that lack of transparency and lack of awareness is the main issue when it comes to government programs that sponsors entrepreneurship. FE3 states that large amount of foreign aid is received by NGO’s in Sri Lanka, but she has reason to believe the funding is misused. She urges the government should have more control and transparency on how funding is distributed as there are many in need especially in rural communities.

The Focus Group (FG1) was led with four mid-income level women entrepreneurs. A common theme that was prominent in the group was that it was not difficult for them to establish their ventures as they had family help and extensive network that helped with financing, marketing and other aspects of the business. None of the female entrepreneurs in this group had reached out to an NGO yet. One of the female entrepreneurs had a printing press which she started on her own, but her community church helps her clients and marketing.

Through the interviews it was apparent that many of the women entrepreneurs did not know many of the financing options that were available through many private banks and other finance institutions as well as the programs and entrepreneurial help that was given by universities, government or NGOs. Those who knew about the services used them to the highest potential and was grateful for their service.

6.1.2 NGOs

The interviewees from NGO’s extensively discussed about the impact of the female entrepreneurs. They mentioned many females go through domestic abuse and being able to attain financial freedom means a lot to them. NGO1 was a director of a local chapter and he mentioned how the success rate of that chapter for female entrepreneurial projects were in high 99%’s while the male entrepreneurial projects didn’t have that high level of achievements. However, the male entrepreneurial projects seem to develop much expansively than the female projects.

NGO2 mentioned network is a key component as many women help each other during difficult times. “Being an entrepreneur is very difficult, imagine when you are a mother with children and an alcoholic as your husband, there is no other way these women can provide for

themselves, therefore it is an important task we do, we show them the way how to create a business and make an income” – NGO2

It seems when an entrepreneurial cluster is created in a village, so does an entrepreneurial ecosystem. “The women always find a way to help each other – recently we had five women entrepreneurs working on a project, while four of them created a sustainable cement flowerpot and had quite success with it the fifth female entrepreneur started a childcare center to take care of the children of the other ladies, it was so empowering to see how the village cluster grew as many wanted to be part of these new businesses” – NGO1

NGO3 mentioned that social innovations are inevitable when creating entrepreneurial ecosystems. It is a byproduct that one doesn’t anticipate to happen, but it always does. For example, one marginal community built a library for their local school out of the entrepreneurial society they have created. Moreover, the former entrepreneurs who has started when the branch started many years ago now act as mentors to the new female entrepreneurs who join the programs and teaches the new female entrepreneurs about financial literacy. NGO3 states that the alumni network of the village community is a key strength to the new entrepreneur’s success.

6.1.3 Government Agencies

When interviewing government agencies, a Gov1 mentioned that there are many agencies established by the Ministry of Industries such as National Enterprise Development Authority (NEDA) that collaborates on a deeper level with universities and industries to enhance regional development for female entrepreneurs. NEDA helps with market facilitation, access to finance, policy support, technological entrepreneurship and business incubation. However not many citizens seem to approach the said facilities. Gov1 believes COVID-19 pandemic has resulted in decreasing of entrepreneurial activities throughout the country. Furthermore, Gov1 emphasized that Ministry of Industries have also regional branches called Regional Enterprise Forums (REFs) that help entrepreneurs with facilities such as consultation services for micro, small and medium enterprises.

Gov1 further states the lack of female entrepreneurship is due to societal pressures as many women are culturally assigned to be the caretaker of the family needs, therefore has time constraints when it comes to establishing businesses.

Gov2 states that the collaborative efforts between the NGOs, national ministries and innovation agencies have increased the involvement of marginal communities in entrepreneurial activities. However, Gov2 expressed their concern regarding funding that goes towards NGO’s as they believed there is lack of transparency portrayed by various NGOs how the funding is utilized. It seems when NGOs are closely related to government agencies, the effectiveness activities increase.

Gov3 who is an assistant director of a regional secretariat mentioned that majority of the micro businesses fail due to lack of assistance. Therefore, it is vital to provide the necessary training programs and needed loan options for businesses to survive. Gove 3 expressed that the Industrial Development Board (IDB) provides with marketing courses, technical development courses and engineering services in collaboration with local university's engineering faculty. To be selected to a specific course or program the entrepreneurs will need to provide the agency with a proposed business plan and their vision. Once accessed, if the business plan seems feasible, they will be joined to the cohort of the year. However, all three government officials mentioned there is only 20% - 30% female participation in majority of the entrepreneurial development programs.

6.1.4 Academia

The two university lecturers that were interviewed to understand the collaborations of the university with the other helixes mentioned that they gain much more entrepreneurial results from marginal communities by collaborating with government agencies and NGOs rather than from university students who are interested in entrepreneurial ventures. Uni1 mentioned that there is a lack of students who are interested in perusing entrepreneurial careers, however the students are interested in helping marginal communities by volunteering their time as consultants or workshop leaders.

Uni2 mentioned that the entrepreneurial career is not preferred by the younger generation, particularly the academics. Thrikawala (2011) in her study further mentions that the majority of academics preferred to work in public sector, and they ranked entrepreneurship as their second or third choice. Her study revealed that the gender, family business experience, type of the study program and the year of the study program were significantly impinged on entrepreneurial intention among academic while the financial ability of their family is not related to their intention. It is clear societal backgrounds play a major role in entrepreneurship intention(Thrikawala, 2011).

Overall, even with university incubation centers such as the IIVCC by university of Sri Jayawardenapura dedicated solely to university students, universities seem to aid more entrepreneurial growth in marginal communities rather than student populations. There is further more entrepreneurial growth in marginal communities via the involvement of NGOs and industry collaborations with the universities.

6.1.5 Industry

For the industry analysis interviews were conducted with bank managers and industry experts. Bank managers have positive feedback regarding female entrepreneurs as it seems they have paid back entrepreneurial loans very efficiently compared to their male counterparts. However,

Ind1 mentioned not many female entrepreneurs exist according to their knowledge and they rarely get to meet marginal female entrepreneurs.

Ind2 mentioned they constantly hold workshops to expand financial literacy among marginal communities and these efforts are backed by CBSL. If the prospective female entrepreneur participates in the entire series of workshops as a grant the CBSL will allow the bank to deduct 25% off of their business loan. However, Ind2 mentioned not many women know about this effort as there is a lack of communication between communities and industries.

Furthermore, industry experts witness entrepreneurial growth in villages where NGOs facilitated workshops with industry leaders. Ind3 is a facilitator of marketing workshops. The NGO had hosted the marketing workshop along with business management faculty students and the industry experts and he mentioned the “community hall was filled with participants. Everyone was interested in what marketing was and reached back with many questions after the workshop” – Ind3.

6.2 Entrepreneurial Constraints from Male Perspective

Based on the literature survey and interviews analysis, the key areas that are problematic in fostering female entrepreneurship were mainly women entrepreneurs’ limited access to finance, low business capacity, inadequate policy and regulatory framework for women entrepreneurship, poor data and evidence on women entrepreneurs on which to base policies and practices and domestic violence that effected women negatively.

According to discourse analysis, women businesses have higher discontinuance rates and one suggested reason for this problem is that women lack of networking, due to less diverse network, unfair gender biases when it comes to funding applications to regional banks, lack of trust and cultural bias that the business won’t last long (Andersson et al., 2018; Jamali, 2009; Surangi, 2014; Ranasinghe, 2008).

6.3 Reliance of the Quadruple Helix

Due to the difficulty of establishing and running entrepreneurial ventures female entrepreneurs rely on the help of the NGOs, especially if they are from marginal backgrounds.

It especially helps that in these mechanisms, the fourth pillar of quadruple helix may serve as a bridge over the gender gap is not only related to NGOs in general, but also to women’s organizations in particular.

NGOs such as Sarvodaya work seamlessly in initiating public funds for this purpose. The aim of the public funding of Sarvodaya Women's Movement (SWM) and development finance program was initially to increase women's participation in regional development and policy implementation. Later, the aim was reformulated to attain gender equality in regional growth policies by highlighting women's life circumstances and by increasing women's influence. The Sarvodaya Women's Movement have operated with a double strategy of support and counselling to individual women and strategic actions intended to evoke structural change in regional growth policies. Sarvodaya have thus served to bridge the gender gap of entrepreneurship and innovation. Their outcome and strategy portray how the women's movement systematically have organized themselves at the local, regional and national level in developing female entrepreneurship (Sarvodaya, 2021).

Furthermore, Sarvodaya has established core connections with regional development organizations, regional universities, technical collages, and regional industries to create an entrepreneurial ecosystem for the marginal communities. By connecting the innovative industries and technological developments via universities the female entrepreneurs have learned new strategy of conducting business as well as innovative products, methods and sciences such as agricultural knowledge behind successful crop rotations.

Overall, the female entrepreneurs understand the importance of the actors of the quadruple helix. They have been befitted by all four. It seems the impact of the helixes could be heightened as an innovation model if the collaboration and communication between the actors is increased.

6.4 Female Entrepreneurship and Social Innovation

Female entrepreneurship leads to a dynamic concept for the organizations that function with social innovation, while the social innovation ecosystem focuses on "collaborative advantages" (Carayannis et al., 2019). Combination of right resources and relations at the right time, greater social innovations can be created. In general, a social innovation ecosystem can deliver the following value propositions.

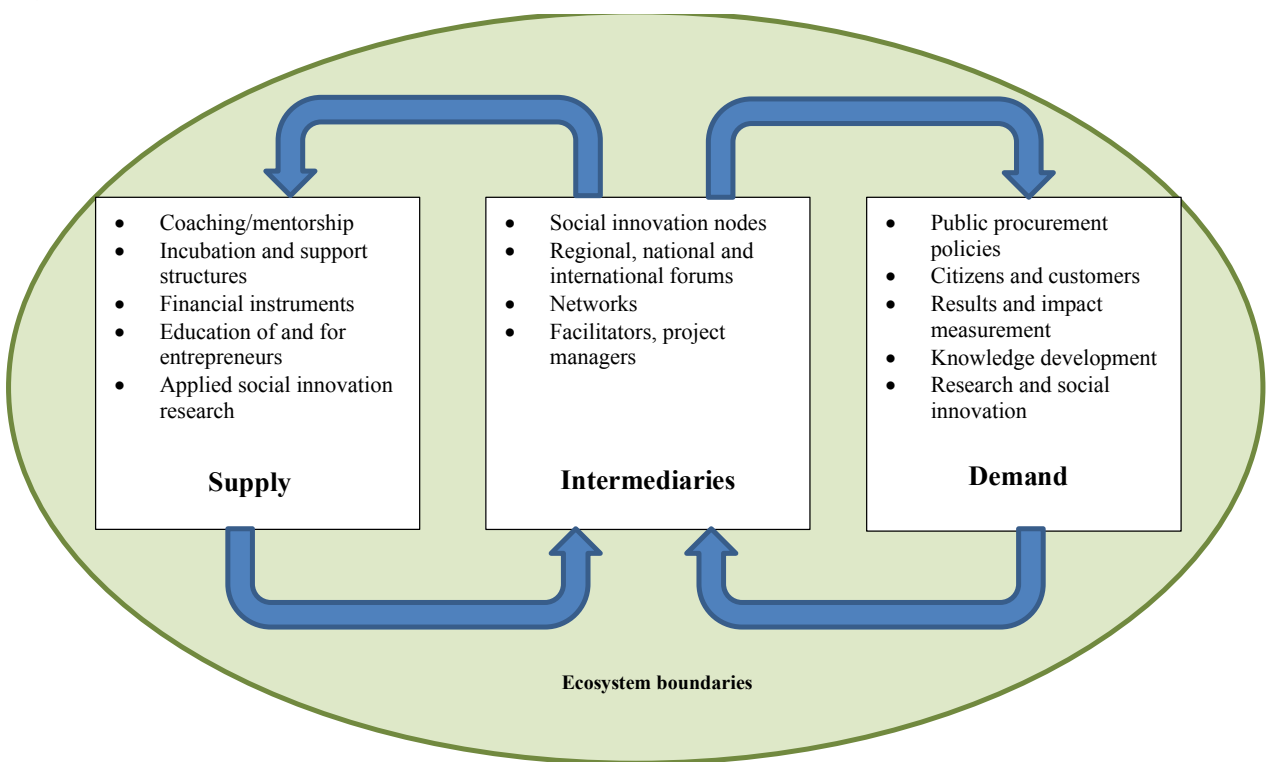
1) Through innovation the creation of new or the alteration of existing ways that give societal value can occur; social innovation may help the stimulation of innovation, which will lead to the societal and sustainable creation of "new products, services, methods and strategies." As have occurred in marginal communities via women entrepreneurs in Sri Lanka.

2) Social innovation has the ability to develop new social relations and address societal, as well as sustainability challenges. In this way the cross-boundary competence can be strengthened, the traditional silos within and between academia, public and private organizations can be broken down, and all these will democratize the production and application of knowledge for social development.

3) The validity of social innovations can be found in the fact that these innovations can address societal needs, lead to sustainable development and can be global depending on the innovation scalability.

Carayannis and Campbell (2012) claim that there should be a “sustainable development perspective that brings together innovation, entrepreneurship, and democracy.” Taking into account that innovation is the outcome of an interactive process involving different spheres of actors, each contributing according to its “institutional” function in society (Cavallini et al., 2016) the quadruple helix innovation model seems the most suitable approach for social innovations. As shown in the figure 10 social innovation ecosystems aid incubation and support of new ventures as well as creating policy changes for public procurement, knowledge development and education for whole ecosystem. The social innovation ecosystem provides a holistic approach to the intermediaries to simultaneously connect with supply and demand while creating collaborative advantages for the whole system (Carayannis et al., 2019).

Figure 10 : Social Innovation Ecosystem



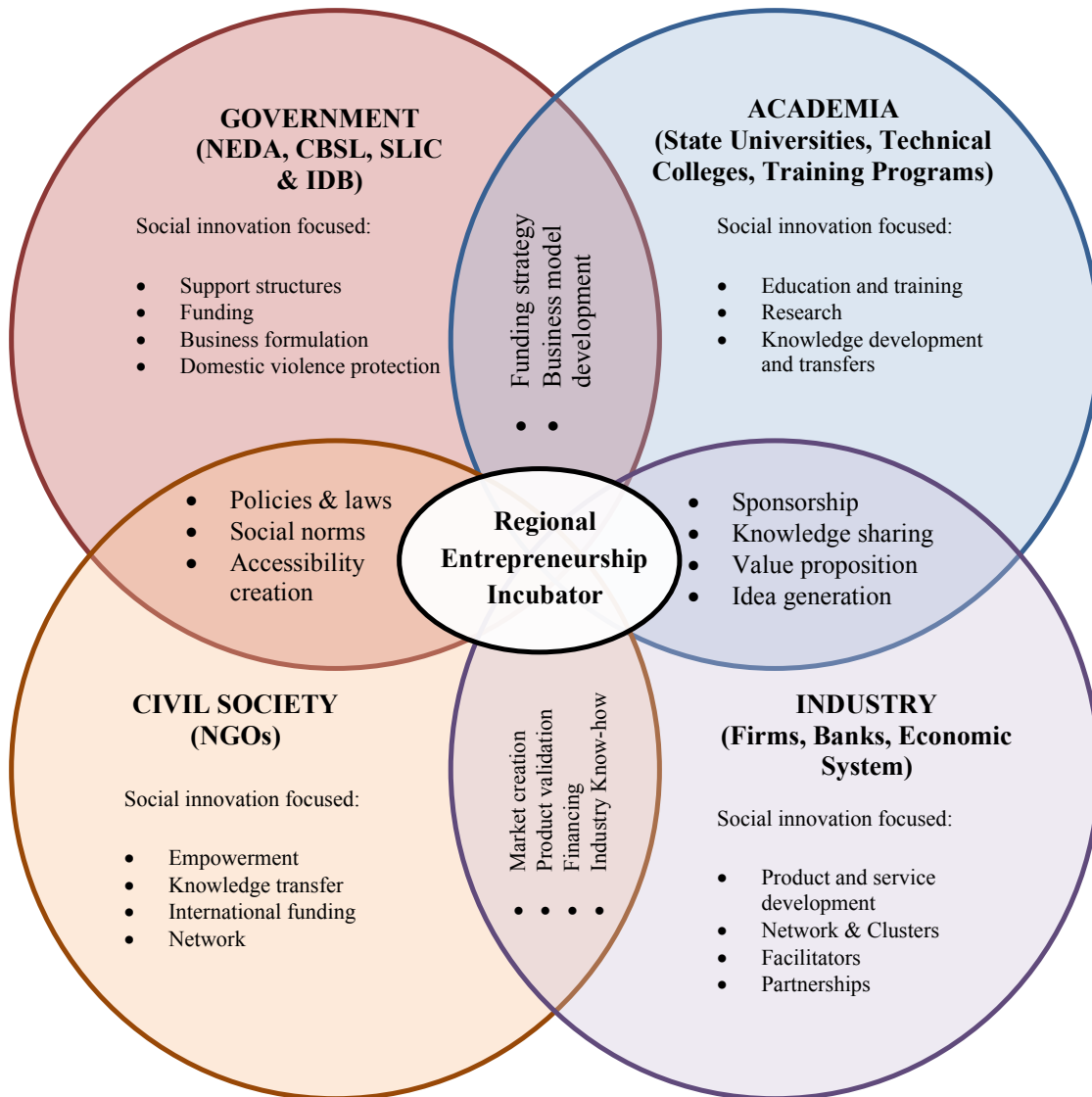
Source : Carayannis et al., (2019) and Author

While this has been the case in context of Sri Lanka, it is worthy to note that quadruple helix model partly overlaps with Lundvall’s (2009) notion of a broad approach to national innovation systems, emphasizing the importance of people, skills, relationships and interactions besides

the importance of basic research, workplace development and low technology sectors (Lundvall et al., 2009). NGOs with limited financial resources are seldom perceived as key actors in the partnerships for local and regional growth. A broader approach to innovation systems, as manifested by the quadruple helix, acknowledges the important role of civil society and the non-profit sector and might bring about a change in the view of the contribution of NGOs within regional growth policies and innovation policies (García-Terán & Skoglund, 2019). It is worthy to consider quadruple helix as an important innovation model for Sri Lanka as it has great potential to increase female entrepreneurship and enhance social innovations.

Given the findings, the researcher calls for amplified collaboration among the helixes and policy reforms to foster female entrepreneurship in marginal communities. An impactful resolution to address this issue would be to create regional entrepreneurial incubators that connect all the actors and their agencies. Figure 11 below showcase how each actor complements and create cohesive ecosystem to create regional entrepreneurial incubators. Furthermore, the quadruple helix innovation model could very well be considered as an agglomeration of firms, institutions, and other stakeholders intertwined via a helical, dynamic, complex, fractal, and cohesive higher order learning architecture of a knowledge production system.

Figure 11: Quadruple Helix Innovation Model for Fostering Regional Entrepreneurship and Social Innovation



Source : Author

7 Conclusion

In this chapter, I present the final conclusions of the thesis. I answer the main research question together with the sub-questions. Then, recommendations for the case policy formulation will be given. Lastly, the contributions to the theory are discussed as well as delimitations and suggestions for future research.

The main research question that this thesis identified was if marginal women entrepreneurship could be fostered through the quadruple helix as a form of social innovation. Given the research evidence, social innovations have been fostered through female entrepreneurship in marginal communities that further create economic development. To create social innovations, communities have relied on the help of the NGOs, universities, government agencies and industries. Which leads to the first sub question formed: how effective is the triple helix model as a form of social innovation in Sri Lanka to foster marginal women entrepreneurship. According to findings, in context of Sri Lanka, the triple helix model cannot be applied due to lack of coordination between the university, government and industry. While triple helix model well adopts to a developed country's innovation systems, a fourth helix that can create collaborative efforts among the other three is of paramount importance in the context of developing nations such as Sri Lanka. Furthermore, with regards to additional value which could be brought forth via the fourth helix relating to the empowerment of marginal women entrepreneurship could be well identified via civil societies. Key values and opportunities such as mentorship, collaborative network, funding opportunities, technical innovations, awareness and empowerment were resonated via the involvement of the fourth helix, the civil society.

In summation, through the study I have employed the quadruple helix innovation model to: (i) analyze collaborative platforms for women-led ventures; (ii) analyze women-led ventures to governmental and academic actors; and (iii) develop competences and process innovations related to entrepreneurial venturing outside traditional triple helix constellations while carrying individual and societal aspects of entrepreneurship. Furthermore, I have analyzed whether female entrepreneurship aid fostering social innovation along with the actors of the quadruple helix in application to Sri Lanka. It has been evident that strong partnership of the quadruple helix can foster economic development for marginal communities and contribute in delimitation of gender gap to foster entrepreneurship and innovation.

7.1 Research Objectives and Policy Recommendations

According to the findings of the research it would create great impact for improvement of entrepreneurship to create regional incubators. According to the findings the actors in the quadruple helix currently act in silos in context of Sri Lanka. However, through interviews and via literature survey it is abundantly clear that they all see the benefits of collaboration. Many actors seem to believe it is the government, especially the CBSL who should oversee financial aspects of the funding that go towards fostering entrepreneurship and development of social innovations (CBSL, 2021; McPhillips, 2017; Karunanayake & Abhayaratne, 2002). The importance of government lead regional incubators were intensified as government takes a significant place in society as the principle creator of public value especially through innovative simulation of funding that generates social value. Furthermore, capacity building structures such as incubators can aid access to networks, engagement with policy makers and accessible legal frameworks.

Furthermore, due to the lack of transparency in NGOs many believe CBSL should have proper guidelines how international and governmental aid is monitored and properly utilized to foster female empowerment and create social innovations. However, throughout the study it was profusely clear that NGOs were the key collaborative unit that connected marginal female entrepreneurs with other actors. Without the support of the NGO's, the marginal communities, especially female entrepreneurs will not have the access to the university sponsored workshops, government agency information, industry information, latest technology and other industrial innovations.

Considering all factors that have been investigated via the length of the study, the researcher calls for policy reformation via recommendations that foreign aid, local public aid and donations should be directed to CBSL as this will create more financial transparency to all the actors involved in economic development and entrepreneurial fostering via the quadruple helix. The said recommendation will mandate that the NGOs should receive funding via CBSL allocated funding methods. Furthermore, additional recognition and awareness should be promoted nationwide regarding the paramount and impactful work of the regional and national NGOs as they are the connective fiber that empowers marginal entrepreneurial ecosystems.

It has been identified that IDB, NEDA and SLIC have strategic overlapping which could lead to miss-use of national resources and lack of impact due to their lack of collaboration. Thus, corrective measures need be taken to perhaps streamline the duties of the government agencies thus resources could be saved. Moreover, universities have generated great potential in fostering entrepreneurship and creating knowledge based economies. Though they do not have much potential to generate entrepreneurship among students, the universities yield great potential in fostering innovative entrepreneurial activities via disseminating technology and innovations to the entrepreneurial ecosystem, especially in the marginal communities.

Private industries, firms and banks seem to have put in much effort to generate entrepreneurial activities as they are a salient believer of entrepreneurship as a key contributor to economic development. However, their efforts are poorly communicated therefore has resulted in lack of awareness in the entrepreneurial ecosystems. Moreover, determined from the study it is clear that women entrepreneurs are key to foster social innovations. Though smaller in statistical representations, time after time, they have proven to not to empower only themselves but the whole community. They are resilient, innovative, and capable of breaking barriers to constantly rebuttal unfair social paradigms. The study has clearly portrayed, through innovation and entrepreneurship, female entrepreneurs can position themselves as pioneers of social and economic development for marginal communities in Sri Lanka.

7.2 Practical Implications

Weerasinghe, R.N., and Jayawardane (2019) in their paper *The Art of Crafting Actionable National Innovation Policy: The Case of Sri Lanka* identify loopholes in assigning strategic actions amongst relevant actors. Such as lack of guidance for resource allocation, and ambiguity in coordination and communication are highlighted as weaknesses in policy initiatives. Therefore, though the Sri Lankan government may recognize the importance of fostering entrepreneurship and the needed coordination for better resource management it will take time for these kinds of policy realizations.

With the current COVID-19 pandemic, many communities including female entrepreneurs are suffering economic hardship due to failing economic activity. Sri Lanka experienced months long national lockdowns with minimal governmental support, increasing unemployment and devaluation of Sri Lankan Rupee against global currencies (Castro & Zermeño, 2020). Marginal communities are among the hardest hit in these difficult times. Therefore, given the current circumstances and past lessons, social innovations are now needed more than ever.

7.3 Delimitations

As per the delimitations of the study, this study is based on the female entrepreneurs in the marginal communities in Sri Lanka. Due to the time and geographical limitations, the interviews done were limited to entrepreneurs in two districts in Sri Lanka. However, the challenges faced by the female entrepreneurs of marginal community is similar island wide.

Furthermore, all interviews were conducted via Zoom web service. Therefore, further information that could have been identified by physical presence on site is missed in this study. As this research is of qualitative nature, it contains a smaller sample size in comparison to a

classic quantitative analysis. However, the eighteen interviewees discussed valuable information that contained eight hundred and ten minutes of reordered and transcribed data that was of utmost value to the research. Though the findings of this study are limited to the collection of empirical material and the choice and reconstruction of events and interactions, through analysis of the said eighteen interviews which had taken a time span of thirty minutes to one hour per interviewee, the researcher is confident regarding the quality of data that has been gathered.

Furthermore, the research is focused on one specific Non-governmental Organization (NGO): Sarvodaya. The analysis is, therefore, built relating to the said organization and the conclusions addressing the research questions is answered relating to Sarvodaya and the actors that were analyzed. However, many non-profit organizations follow similar models to Sarvodaya though they are limited in expansion in Sri Lanka. Therefore, it is plausible to conclude the findings of this study is applicable to other similar NGOs as well as similar contributing agents of the quadruple helix such as other state universities, industries and government agencies as well as developing nations similar to Sri Lanka.

7.4 Future Research

Future research of this study can attribute to conducting a qualitative assessment of actors of the quadruple helix as well as an analysis of embedded national policy change and development of holistic national innovation systems in developing countries such as Sri Lanka. Conducting a quantitative analysis to test the strength of relationships between each of the helixes will be a prerequisite which will add valuable erudition throughout such an implementation. Such a research will take many months to create a statistically feasible data base to render a model that will test the validity and robustness of the relationships between each helix. Should such collaboration be successfully implemented between the helixes, as tertiary development, it would contribute to scholarly knowledge creation to develop an impact analysis model to test impact of social innovation which have been fostered as a result of female entrepreneurship and the collaboration of the quadruple helixes.

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9 Appendices

9.1 Appendix A – Interview Guides

Interview guide for Female Entrepreneurs

1. Demographics:
 - a) Name
 - b) Age
 - c) Region based
 - d) Highest education qualification
 - e) Any professional qualifications
 - f) Married or not
 - g) Any children or not
 - h) Nuclear family or extended family
 - i) Previous careers

2. Describe your micro/small or medium enterprise
 - a) What is the nature of the business venture?
 - b) Reason of establishment?
 - c) Why particularly that business and business plan?
 - d) Whom did you consult or how did you initiate such a business venture?
 - e) How did you invest capital initially or what were the means of funding?
 - f) Did you face any hardships when the business venture was initiated, for example: family/society/culture/financial or otherwise?
 - g) Did or do you have any mentors or advisors for the business venture you have established?
 - h) Were there any obstacles as you have progressed in your business venture

3. Has there been any affiliations with Non-Governmental Organizations to foster your business venture?
 - a. What is the history and involvement of your venture and the NGO?
 - b. How have they helped your venture?
 - c. What are some of the similar or different patterns you see within your community members who may conduct similar ventures to yours
 - d. Do you see connections between other actors via the NGO?

4. Has there been any affiliations with Private organizations or industries to foster your business venture?
5. Has there been any affiliations with governmental agencies to foster your business venture?
6. Has there been any affiliations with local universities or technical colleges to foster your business venture?
7. What are your future business plans?
8. Has there been a lack of guidance for you to conduct your business venture?
 - a. If so, how did you offset this lack of guidance thus far in your journey?
 - b. Do you believe there should be more guidance and help from various authorities than it is right now?
9. How can some other organization help you to build your business?
10. Do you seek for help from others in form of education, advice or financial aspects?
11. Have you seen or been any part of community improvement directly or indirectly because of your business venture?
 - a. If so, can you elaborate what was the reason for the community improvement?
 - b. Who else participated?
 - c. What are the results of this improvement?
 - d. How can such improvements for your community be expanded?

Interviews with University Directors and Professors

1. What is your role in the University?
2. Relationship of University in accord to local community/institutions;
 - a. Community
 - b. NGO's
 - c. Government Agencies
 - d. Industries
3. Role of University in economic development?
4. Has there been attempts to foster entrepreneurship through your university?
 - a) If so, what are the programs that have been created by this initiative
 - b) How many entrepreneurial ventures have been created or aided by this program?

- c) Who reaches out for help more, men or women?
 - d) To the best of your knowledge, from those who reach out for help, what kind of socio-economic backgrounds do they represent?
 - e) What are the hardships the said program/collaborations face?
 - f) How could the said program/collaborations be further developed?
 - g) To the best of your knowledge, has there been any social innovations through the said program/collaboration?
5. Has there been any affiliations with Non-Governmental Organizations to foster entrepreneurship?
 6. Has there been any affiliations with Private organizations or industries to foster entrepreneurship?
 7. Has there been any affiliations with governmental agencies to foster entrepreneurship?
 8. According to the Sri Lankan Bureau of statistics, in 2018 60% of university graduates were women, however only 25% of entrepreneurs are women nation-wide. In your opinion why is there a disconnect between university education and entrepreneurship?

Interviews with local government agency leaders

1. What is your role in the government agency?
2. Can you elaborate what role of the government agency you represent?
3. Relationship of the government agency in accord to local community/institutions;
 - a. Community
 - b. NGO's
 - c. State Universities/ Technical Colleges
 - d. Industries
4. Role of government agency in economic development?
5. Has there been attempts to foster entrepreneurship through your agency?
 - a) If so, what are the programs that have been created by this initiative
 - b) How many entrepreneurial ventures have been created or aided by this program?
 - c) Who reaches out for help more, men or women?
 - d) To the best of your knowledge, from those who reach out for help, what kind of socio-economic backgrounds do they represent?

- e) What are the hardships the said program/collaborations face?
 - f) How could the said program/collaborations be further developed?
 - g) To the best of your knowledge, has there been any social innovations through the said program/collaboration?
6. Has there been any affiliations with Non-Governmental Organizations to foster entrepreneurship?
 7. Has there been any affiliations with Private organizations or industries to foster entrepreneurship?
 8. Has there been any affiliations with Universities and technical colleges to foster entrepreneurship?

Interviews with local Industry leaders

1. What is your role in this industry?
2. Can you elaborate the industry you represent?
3. Relationship of your organization in accord to local community/institutions;
 - a. Community
 - b. NGO's
 - c. State Universities/ Technical Colleges
 - d. Local government agencies
4. Role of your industry in economic development?
5. Has there been attempts to foster entrepreneurship through your industry or your specific organization?
 - a) If so, what are the programs that have been created by this initiative
 - b) How many entrepreneurial ventures have been created or aided by this program?
 - c) Who reaches out for help more, men or women?
 - d) To the best of your knowledge, from those who reach out for help, what kind of socio-economic backgrounds do they represent?
 - e) What are the hardships the said program/collaborations face?
 - f) How could the said program/collaborations can be further developed?

- g) To the best of your knowledge, has there been any social innovations through the said program/collaboration?
6. Has there been any affiliations with Non-Governmental Organizations to foster entrepreneurship?
 7. Has there been any affiliations with local or national government agencies to foster entrepreneurship?
 8. Has there been any affiliations with universities and technical colleges to foster entrepreneurship?

9.2 Appendix B – Coded Interviews

Respond Code	Basic Idea	Points Highlighted	Key Understanding
<p>FE1</p>	<p>Learnt about potential for female entrepreneurship through Sarvodaya workshop done with an industrial supporter in apparel and garment industry</p> <p>Took a micro loan to establish the business</p> <p>Manufactures Mosquito nets, school uniforms and recycles sarees into handbags</p> <p>Funding was allocated by Sarvodaya development finance</p> <p>Expanded business by reaching out to the urban marketplace connected by Sarvodaya</p> <p>FE1 is not married, however she sees women in the</p>	<p>Well connected to Sarvodaya for more than 20 years</p> <p>With help of other female entrepreneurs established community centers for female empowerment</p> <p>Helped establish childcare center for other female entrepreneurs</p> <p>Helps with workshops Sarvodaya does with government agencies and universities</p> <p>Created center for communal resources such as tool kits for plumbing work</p>	<p>Helped community build centers of technology and education transfer centers</p> <p>Act as a mentor for younger female entrepreneurs and foster educational developments throughout community</p> <p>Key social innovator as FE1 is a strong voice against domestic violence</p>

	community being subjected to domestic violence		
FE2	<p>Sarvodaya “Sharamadana” movement alumni</p> <p>Due to the opportunities presented by the NGO she started and continues her “Sustainable Fish-Chips” micro enterprise</p> <p>Participated in Sarvodaya workshops done with collaboration with local University</p> <p>“INSPIRE” grant receiver</p>	<p>Well connected to Sarvodaya</p> <p>Network was important for start the business idea</p> <p>Subjected to domestic violence therefore entrepreneurship was a form of financial liberation</p> <p>University students helped with her business plan</p> <p>Strong advocate of innovative practices and sustainable business ventures</p>	<p>Network with the NGO was a main contributing factor for the establishment of the business venture</p> <p>Financial freedom was sought due to domestic violence</p> <p>Help other female entrepreneurs in the community to empower the village</p> <p>Appreciates the collaboration between Sarvodaya and regional university as it helped her enhance her business plan as well as improve financial literacy via various workshops</p>
FE3	<p>Difficult to find funding</p> <p>Do not have an empowering network</p> <p>Funding was allocated by Kantha Sangamaya</p> <p>Not connected to Sarvodaya but connected with a smaller NGO in the region</p>	<p>Not connected to Sarvodaya however, Helped by a different NGO in the region</p> <p>Lack support in network and mentorship</p>	<p>Identifies lack of transparency and lack of awareness in government sponsored development programs and workshops</p>
NGO1	Maintains a high directorial position in Sarvodaya	Entrepreneurship has been the proven method to help any community	Many are eager to learn a new skill should there be the opportunity

	<p>Helps rural marginal villages by establishing a local chapter</p> <p>Lack of education in marginal communities is a barrier for successful ventures therefore Sar</p> <p>Sarvodaya helps with establishment of entrepreneurial activities such as purchasing the required tool kits for a mechanical repair service startup.</p> <p>Women have been a key force as in the 20 chapters 14 are led by women presidents</p> <p>Success rate of female entrepreneurial projects are in high</p> <p>Male entrepreneurial projects develop much expansively than the female projects</p>	<p>Training workshops has been highly favored and attended by many</p> <p>Sarvodaya helps with micro loans. Especially via their Development Finance Program</p> <p>Entrepreneurial women always seem to figure out a way to create an income by establishing a business</p> <ul style="list-style-type: none"> - e.g : the female entrepreneur who created a milk distribution network by connecting with the local dairy farm <p>The regional banks are well connected with Sarvodaya</p> <p>The government sectors are well connected with Sarvodaya</p> <p>The private institutes are well connected with Sarvodaya</p>	<p>Promotes women's entrepreneurship programs</p> <p>Many women are socially bound to childcare and house chores</p> <p>Sarvodaya promotes regional networks to exchange various types of production</p> <p>Sarvodaya act as a connective force between the banks, private institutions, universities and government entities</p> <p>Sarvodaya's key mission has been to foster entrepreneurship act as an intermediary to breakdown any barriers that might be in the way</p>
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NGO2	<p>Social innovations are fostered as women act as community leaders and help out with community issues</p> <p>Some chapters have become self-sustaining and does not need any additional funding</p>	<p>More than 7000 women have been helped via the organization and 90% of these women have reached out for help to create business ventures</p> <p>Older female entrepreneurs act as mentors to younger generation and create a strong network for the whole village</p>	<p>Network is key as many women help each other during difficult times.</p> <p>Many female entrepreneurs don't have access to government agencies and higher education. The connectivity the NGO's bring are important for the economic development of rural villages</p>
NGO3	<p>Though there are many governmental agencies to improve entrepreneurship and innovation, in reality people who need it the most do not have access due to educational barriers and lack of awareness</p> <p>Industries are willing to help marginal communities if impactful collaborations are created</p> <p>Many female entrepreneurs have become tech savvy due to abundance of technological developments in the nation</p>	<p>Many agents throughout the island wants to see improvement in female entrepreneurship.</p> <p>In reality not much is achieved due to policy failure</p> <p>There have been projects to improve financial literacy and even computer software completely conducted by female entrepreneurs of the region</p>	<p>When women are empowered, social innovations are inevitable</p> <p>Especially when it comes to domestic abuse and other economic burdens, having financial freedom has been very important to marginal communities, especially women.</p>
Gov1	<p>Many agencies established by the Ministry of Industries such as National Enterprise Development Authority (NEDA) that collaborates on a deeper level with Universities and industries to enhance regional development for female entrepreneurs</p> <p>COVID-19 pandemic has resulted in decreasing of</p>	<p>Not many seem to approach government agencies facilities</p> <p>Ministry of Industries have regional branches called Regional Enterprise Forums that help entrepreneurs with facilities such as consultation services</p>	<p>Lack of female entrepreneurship is due to societal pressures</p> <p>Lack of awareness reduces the citizen's participation</p>

	entrepreneurial activities throughout the country		
Gov2	<p>Many of government agencies recognize the importance of entrepreneurship and the gender does not matter. Any entrepreneurship is important for economic development</p> <p>The workshops are held without gender bias.</p>	When NGOs are closely related to government agencies, the effectiveness activities increase	<p>Lack of transparency portrayed by various NGOs how the funding is utilized</p> <p>Collaborative efforts between the NGOs and national ministries and innovation agencies have increased the involvement of marginal communities in entrepreneurial activities</p>
Gov3	To be selected to a specific course or program the entrepreneurs will need to provide the agency with a proposed business plan and their vision	It is vital to provide the necessary training programs and needed loan options for micro and small businesses to survive	<p>Micro businesses fail due to lack of assistance</p> <p>Only 20% - 30% female participation in majority of the entrepreneurial development programs</p>
Uni1	Gain much more entrepreneurial results by collaborating with government agencies and NGOs	Cultural attitudes-wise many women are not encouraged to follow entrepreneurship as it takes a lot of effort to become successful. Instead they are urged to go into academia.	<p>The majority of the female entrepreneurs are not degree holders or those who pursue higher education.</p> <p>There is possibility entrepreneurship serves marginal communities much more.</p>
Uni2	<p>entrepreneurial career is not preferred by the younger generation particularly the academics</p> <p>The regional women consider university students at high standards. They admire those who pursue</p>	Universities have been contributing a great deal to marginal communities by holding information sessions and workshops on new technologies. Especially by the agricultural departments	<p>Interestingly some of the students who help marginal communities with innovative entrepreneurial activities end up being inspired to start their own spinoffs.</p> <p>There is a university incubator for students, but this facility is</p>

	<p>higher education and hopes the same for their children.</p> <p>There is always high engagement in programs done in connection with NGOs to promote innovative food processing methods or agricultural activities</p>	<p>The engineering department of our university always collaborates with regional industries to create new innovations</p>	<p>not available for non-student populations</p>
Ind1	<p>The banks help with advisory positions and help small to medium entrepreneurial ventures</p> <p>Helps with financial advice and promote financial literacy in relation to entrepreneurial activities</p> <p>Only 5% of SME loans have been asked by women</p> <p>Generally female entrepreneurs are really good at managing their financials, however there has been cases where women have been taken advantage of, such as harassment or abuse or neglect where they had to give up their entrepreneurial activities thus defaulting the loan unfortunately this is almost 3% of women from the 5% who are usually struggling with the loan repayment due to lack of support</p>	<p>Hikkaduwa branch and NGO's collaborated was due to mutual connections.</p> <p>They check why the business failed: Is the market? Do they need more money? If it is the latter, they try to advise and restart the project</p>	<p>There is lack of transparency when it comes to foreign investment in NGOs.</p> <p>If various actors could collaborate this could be fixed relatively seamlessly</p>

Ind 2	For any collaboration female entrepreneurs have to present a proper business plan and a revenue generation forecast report.	<p>Sometimes it has been difficult to involve with marginal communities due to lack of connection</p> <p>The pandemic has affected the industries quite badly therefore, it is not foreseeable to do charitable programs at the moment.</p>	<p>Lack of awareness of all the facilities and programs that are offered for new entrepreneurial ventures</p> <p>Willing to help to increase entrepreneurship as it helps the industry as well</p> <p>Social innovations are done through the industry as well</p>
Ind 3	facilitator of marketing workshops	Connected via regional chamber of commerce	<p>Collaborations with female entrepreneurs are lesser than for male entrepreneurs</p> <p>Necessity of a collaborative organization is needed for female entrepreneurship</p>
FG1	<p>Some of the businesses are passed down from previous generation</p> <p>Some business started as a hobby and expanded</p> <p>Some businesses are handed over as the husband passed away, so the female entrepreneur had to take over operations</p> <p>They refer to newspapers to analyze new market potentials and join business circles such as chambers of commerce</p>	<p>No issue getting loans or other financial support due to well-connected family backgrounds</p> <p>They didn't know some of the services which were offered by NGO's and didn't have the need to reach out</p> <p>Well connected to the local church/other organizations and has most business coming through that network</p>	<p>Family support has been key for majority of these female entrepreneurs</p> <p>All four female entrepreneurs in the focus group are well educated</p> <p>Many keen investors/advisories from family and friends circle</p>

9.3 Appendix C – Project Plan

Project Plan

Activity /Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Project Pion	■																	
Document defining the goals	■																	
Define research question		■	■															
Background/introduction			■	■														
Literature review Theory		■	■	■														
Literature review Methodology				■														
Interview guides					■	■												
Collect data						■	■	■	■									
Combine Empirical findings									■	■								
Analysis										■	■							
Write report			■	■	■				■	■	■	■	■					
Hand in first draft													■					
Hand in final draft														■				
Update final draft after feedback															■			
Submit thesis																■		
Prepare presentation																	■	■
Thesis Defense																		■