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"This is our light, we should catch this one"

A story of Women Empowerment through Decentralized Solar Power in Jordan and in Tonga

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Declaration

I, Anna Marie Gjedrem, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature……..

Date……

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Abstract

Women across the globe are limited by barrier-restricting opportunities for their self-development, the right over her body, control over her integrity, and access to her human rights. Addressing and undertaking women empowerment fosters their capabilities, enables development and social justice. The Barefoot College (BC), situated in Tilonia, Rajasthan, India, aims to empower women by training them as Solar-Panel Engineers (Barefoot Solar Engineers (BSE)) in the college's International Solar Training (IST) Program. This thesis analyzes how the IST affects the BSEs' empowerment in Jordan and in Tonga. In addition, it examines how the BSEs' agency, and the structures and relations surrounding the BSEs are facilitating or limiting the BSEs' empowerment process in Jordan and in Tonga. This qualitative research is based on six in-depth interviews; including two Jordanian BSEs, two Tongan BSE, one Jordanian Ground Partner, and one Tongan Ground Partner; five Jordanian interviews and four Tongan interviews with people involved with the IST program; and two Jordanian and nine Tongan key informants. These interviews permitted a broader analysis of the structures and relations that surround the BSEs; the BSEs' agency; a base to examine how the IST Program was facilitated and carried out in Tonga and in Jordan; and an insight into how the respective IST Program affect the Jordanian and Tongan BSEs' empowerment processes. The semi-structured interviews were carried out through an ethnographic approach and a conceptual approach. The Ethnographic approach provides space for program-based, communities' and BSEs' Perspectives and objectives. The conceptual framework that was used to analyze the results is based on CARE's Women's Empowerment Framework. The three Perspectives (i.e. program-based, community and women/BSEs') and the two sites (i.e. Jordan and Tonga) of the study highlight the contextual importance of woman empowerment. This study found that the IST program had limited effects on women empowerment regarding economic independence and sustainability. However, the respective IST programs facilitated increased opportunities for income-work, mobility, skills attainment and augmented self-esteem, which have been of great importance to the BSEs' empowerment process.

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Abbreviations

BC	– The Barefoot College
BSE	– Barefoot Solar Engineer
CARE	– Cooperative for Assistance and Relief Everywhere
JoFoE	– Jordanian Friends of Environment
GCF	– The Green Climate Found
GoJ	– Government of Jordan
GoT	– Government of Tonga
IST Program	– International Solar Training Program
JSSD[1]	– Jordanian Society for Sustainable Development
KoT	– Kingdom of Tonga
MaG	– Manshiat al-Ghayath
MEIDECC	– Ministry of Meteorology, Energy, Information, Disaster Management, Climate Change & Communications
RET	– Renewable Energy Technology
SP	– Stand-Alone Solar Photovoltaic System
TPL	– Tonga Power Limited
WB	– The World Bank

[1] SSPS is used interchangeably with Solar Panels (SP) in this text.

1. Introduction:

The global community is focused on the binary power dimensions of - woman empowerment and renewable energy - looking to turn on a ‘double light switch’. To enable development, environmental- and social justice (UN, 2015; UNWomen, 2018).

Women globally encounter harmful, limiting and undignified barriers in their daily lives (UNWomen, 2018). Problems that women encounter vary from the ability to control their income; ownership over their body; restricted mobility; limited access to decision-making; legal subordinates to men; constrained access to resources; and preventive stereotypes that hinder women’s capability and empowerment (UNWomen, 2018).

Women empowerment, is a process that takes many forms (UNWomen, 2018). Engendering energy transformation initiatives can facilitate women empowerment processes (J. S. Clancy & Feenstra, 2006). J. Clancy (2016) argues that engendered transformations of socio-technical systems globally generate new structures, relations, technologies, and knowledge-production; creating space for women to participate and undergo diverse empowerment processes. In addition, a gendered transformation can shape and channel directions and objectives of renewable energy technologies (J. Clancy, 2016).

Renewable Energy Technology (RET) is put on the global development agenda by actors (such as BC, n.d.-a; GCF, 2018; UN, 2015; USAID, 2015) that highlights renewable energy importance for poor communities and underlines the connectedness of local energy shortage with international issues such as global climate change, fluctuating energy prices and international security. Global attention to the energy-poverty/sustainable-development nexuses inspire private organizations, NGOs, development organizations, and governments to facilitate opportunities for poor communities to get connected to renewable energy technologies (BC, n.d.-a; GCF, 2018; UN, 2015; USAID, 2015).

Energy poverty is omnipresent in rural communities in the developing world (Bouzarovski & Petrova, 2015). Limited access to affordable energy deprives households from social and material necessities with “detrimental impacts on health, gender inequality, education and economic development” (Bouzarovski & Petrova, 2015, p. 32). Therefore, renewable energy implementation in developing communities sought to forego development and social justice (J. Clancy, 2016; Fuller & McCauley, 2016; Pachauri & Spreng, 2004; UN, 2015). Access to renewable energy has potential positive effects on education, health, security, income,

environmental sustainability and woman empowerment (Fuller & McCauley, 2016; Khamati-Njenga & Clancy, 2005; UN, 2015).

The Barefoot College[2] aims at facilitating women empowerment and developing rural communities' renewable-energy supplies throughout the developing world (BC, n.d.-c). Women from a variety of developing countries (such as Jordan and Tonga) travel to the Barefoot College in Rajasthan, India, to enroll in a six-months long solar engineering course, called 'the International Solar Training Program' (BC, n.d.-c). At the college, women learn how to install, maintain and operate solar panels and solar lanterns, so to become Barefoot Solar Engineers (BSEs) (BC, n.d.-c).

The BSEs are selected representatives from their local community (BC, n.d.-a). The BSEs' are selected on the premise that they have strong roots in their area; this often includes that the women are middle-aged and are established (Roy, 2011). Moreover, the BSEs' are in most cases uneducated and illiterate since they come from poor rural areas in developing countries where most services (e.g. education) are limited or unavailable (Roy, 2011).

The research was initiated to explore grassroot development initiatives, and their interconnectedness with global development objectives and the facilitation of social justice. 'Women empowerment' was chosen as the theoretical foundation of the thesis because I find women empowerment a useful and critical lens to analyze reality; this lens provides novel Perspectives to the development discourse. The Barefoot College IST approach to RET was chosen to undertake the amorphous concept of 'women empowerment' from a tangible foothold.

This thesis aims at analyzing whether the four interviewed BSEs have undergone an empowerment process, and if they have, how? In addition, the thesis examines how the context surrounding the BSEs effect their potential empowerment process. By doing so, this thesis underlines that the skills, tools and experience the Barefoot College provided the BSEs are intercoupled with the contextual strings of the structures, relations and agency experienced by each individual BSE forming the empowerment process. This thesis underlines the importance of the contextual lenses used to perceive women empowerment processes and outcomes.

[2] The Barefoot College is a non-profit social enterprise situated in the Desert town Tilonia, Rajasthan, India (BC, n.d.-c).

2. Contextual Background

2.1. The Barefoot College

2.1.1. The Barefoot College – The Vision and the Mission

The Barefoot College was established in 1972 in Tilonia (Rajasthan, India) as a non-profit social enterprise (BC, n.d.-c). The Barefoot College enables poverty reduction programs facilitated and carried out by the poor (BC, n.d.-c). The Barefoot College's ideological foundation is based on Mahatma Gandhi's vision[3] (BC, 2015). The Barefoot College's approach to poverty reduction fronts participatory oriented and community-based solutions for relevant, inclusive and democratic social change for social justice (BC, 2015). The Barefoot College's mission is:

> We believe in the endless potential of the rural poor. Barefoot College forges a first-of-its-kind, women-centered, global network dedicated to sustainable development in every community where poverty exists. (BC, n.d.-b, para. 1)

The Barefoot College provides sustainable international solutions to poverty, environmental degradation and to inequality, through their international IST program (BC, n.d.-c). At the forefront of the Barefoot Colleges Model is the vision that there are great human resources in rural, poor, and illiterate villages globally (O'Brien, 1996). Through the IST Program, the Barefoot College aims at demystifying technologies and knowledge, through making renewable energy technology available for people who otherwise are excluded from modern technology knowledge production mechanisms ((semi-)illiterate, poor, and rural people) (O'Brien, 1996). The people that do not easily access technologies and education are poor (unable to pay school fees or accumulate information or technology); illiterate (limited from perusing education or utilizing education or technologies); and/or rural (living in areas where infrastructure and unavailability of technology and education is an issue) (O'Brien, 1996).

[3] A Gandhian world vision "stresses respect for five "non-negotiable" values: equality, collective decision making, decentralisation, self-reliance and austerity" (BC, n.d.-d, p. 4).

Energy Poverty

The energy poor that are in the center of the Barefoot Colleges IST program do not have other means to access electrical energy (poor areas are excluded from the national power grid, because of economic inaccessibility, physical unavailability; and, poor areas connected to the grid face unstable energy supply or hazardous energy sources (Pachauri & Spreng, 2004)), and the energy poor often use health-depriving, fire-prone and/or expensive light sources, such as kerosene lanterns, candles, or flash lights powered by batteries (Roy, 2011). The Barefoot College (BC, n.d.-a; Roy, 2011) highlights that energy poverty effects on complex net of issues for poor communities - such as health, security, economic activity, access to information, and education. The Barefoot College (BC, n.d.-a; Roy, 2011) perceives solar energy is perceived as a feasible solution to undertake community development (The BC perspective on solar technology is supported up by J. Clancy, 2016; Pachauri & Spreng, 2004).

The Barefoot College argue that energy enable local development (BC, n.d.-d). With special regards to renewable (solar) energy a foregoer of increased opportunities regarding education, social activities, health, economic activities, security, safety, time, access to information, communication, care-taking, and alteration of structures and relations in society (BC, n.d.-d; supported by Bouzarovski & Petrova, 2015; J. Clancy, 2016; J. S. Clancy & Feenstra, 2006; Khamati-Njenga & Clancy, 2005; UN, 2015). The BC IST program poses as a solution to creating sustainable RET initiatives; the IST program has the potential to enhance sustainable development and to foster empowerment for the poor (BC, n.d.-d). The Barefoot approach highlights poor people as agents of change, who ought to be involved in the adaptation of RET in their local communities (BC, n.d.-d; O'Brien, 1996; Roy, 2011).

The BC initiated the IST program as a critique to expert-led top-down solar technology initiatives (BC, 2015, n.d.-a; Roy, 2011; Sharma, 2007). The BC addresses the need of local ownership of communal development initiatives; since many solar panel projects have previously failed because of lack of expertise to carry out maintenance and operation of the solar technologies in rural communities (BC, n.d.-a; Roy, 2011). The BC critique top-down, technocratic expert led organizations that implement RET in poor communities for overlooking physical limitations (e.g. access to markets, limited infrastructure) and social constructions (e.g. culture, norms) which effect the sustainability of RET (O'Brien, 1996; Roy, 2011). The Barefoot College (O'Brien, 1996; Roy, 2011) logic follows: Globally, RET is implemented to foster sustainable development; however, when poor communities are not included in the

decision-making process, regarding implementation of RET in their communities, the development initiatives might not be a sustainable solution for the energy-poverty issues in the developing world. The BC (BC, n.d.-a, n.d.-c; O'Brien, 1996; Roy, 2011) underpins that RET initiatives are not a quick fix for energy-poverty, but need to be coupled, including relevant and democratic processes.

Women Empowerment

The Barefoot College enroll women in the IST Program because they perceive women as "the single most under-developed resource in the developing world" and the Barefoot College further argue: "All communities who aspire to lift themselves from poverty will have women as an essential part of their solutions" (BC, 2015, p. 8). Female BSEs foster sustainable development, and increase welfare in their local communities (Roy, 2011). Nevertheless, the women themselves are empowered through their engagement in the solar project, through connectivity with other women from other cultures and though skills attainment at the Barefoot College, the BSEs "unleash the knowledge, wisdom and power of rural poor communities and transforming them" (BC, 2015; Roy, 2011, p. 6). Highlighted in the Barefoot College (BC, n.d.-d, p. 2): "women invest twice as much of their incomes back into their family than men". Moreover, the BC (n.d.-d) highlights women empowerment as important for the national economy, the communities stability, and children's education.

> As Bunker Roy [the CEO of Barefoot College] puts it, ―We have trained men, and found that they took their training and knowledge to go work in the cities. Women feel responsible for their village. Rural grandmothers have a longer history in the community and have less incentive to migrate. This keeps the knowledge and technology in the community. Their expertise is shared with others, ensuring project sustainability." (BC, n.d.-d; Saxena, 2013, p. 1)

2.1.2. The Barefoot Model – Materializing the Philosophy

In 2008 the Barefoot College had fully established the International Solar Training Program (BC, n.d.-a). The IST program has educated middle-aged, illiterate, poor women with strong

roots[4] in their rural communities in 83 developing countries globally in installing, building, maintaining and repairing solar energy "LED lamps, Charge Controller, Home Lighting System, Solar Lantern" using solar photovoltaic technology (BC, n.d.-a, see para. "Solar lighting, Read more"; n.d.-d). There are no requirements for qualifications, previous education or understanding of English or Hindi; the training is facilitated through a 'Learning by doing' approach using practical demonstrations, sign-language and pictograms (Roy, 2011).

The Barefoot College highlights the importance of including the community at all stages of the ITS program; such as the initiation, facilitation, daily operation and in up-scaling of the project. The community is involved in the program to ensure acceptance of the RET, to enable awareness about RET, to foster sustainability of the project and to enable transformative change (Ali, 2016; BC, n.d.-a; Hailemichael, 2010; Javadi, 2010; O'Brien, 1996; Phiri, 2014; Roy, 2011; Sharma, 2007).

The Barefoot Model entails that the Barefoot College should initiate collaboration with a local ground partner, which provides assistance for electing BSE candidates, and which assist in making possible for the elected BSEs to travel to India (assist in preparing passports, visas, medical check-ups and insurances (BC, n.d.-a). The local ground partner is an institution (a person or an organization) that has previously worked closely with the community or that is a part of the community, with a deep understanding of the contextual setup around the BSEs (BC, n.d.-a). The ground partner's role is desired to be a connection point between the BSEs, the community, the Barefoot College, donor organizations and national instruments (such as the legal system) (BC, n.d.-a). Therefore, the ground partner should have organizational skills and an understanding of how to make the project sustainable (BC, n.d.-a). Furthermore, the Barefoot College, in collaboration with the local ground partner, engages the local community discussions about the ITS program (Phiri, 2014). Previous research on the Barefoot College ITS program (Ali, 2016; Hailemichael, 2010; Javadi, 2010; Phiri, 2014) underpins that including community members at early stages of the program-development provides a sustainable mechanism. The community acceptance of the project provides a gateway for the success story of the implementation of the BSE activities in the respective locations (Ali, 2016). Community willingness to pay, and affordability regarding the RET, can pose as a pitfall for the IST program (Ali, 2016). The target households are the poorest in the villages; therefore, the monthly fees should not extend what the households previously used on light-energy sources

[4] To have strong roots implies that they have family in the village, and that they are well respected in their community (Roy, 2011).

(i.e. kerosene, batteries and/or fuel wood) (Roy, 2011). Ali (2016), in his research on the BC IST program in Tanzania, highlights that it is important to include the communities in agreeing on payment plans and contracts, before the IST program is facilitated in the local context.

The Barefoot College encourages that a Village Solar Committee, also referred to as a Village Electrification Committee (VEC), is formed before the BSEs enrolls in the IST (Phiri, 2014). The VEC responsibility is to oversee the electrification and to collect the fees (Ali, 2016). The VEC is facilitated to provide management assistance to the BSEs, so to enable transparency, efficiency and sustainability of the BSEs activities (Phiri, 2014). In addition, the VEC is sought to safeguard the equipment and to create awareness around RET (Ali, 2016; Phiri, 2014). The VEC should make sure that the solar units stay within the respective village and that they are not stolen (Javadi, 2010). Moreover, the VEC enables awareness of the importance of RET and why the community ought to provide monthly fees to assure the program's economic sustainability (Ali, 2016; Hailemichael, 2010). The VEC is highlighted by previous research as one of the main vectors of the success of the BC program (Ali, 2016; Hailemichael, 2010; Javadi, 2010; O'Brien, 1996; Phiri, 2014).

The first shipment with equipment is facilitated by the Barefoot College, with support from development organizations and national governments (BC, n.d.-a, n.d.-d). The BSEs are provided with equipment to electrify at least 50 homes each (BC, n.d.-d). In the local village, the BSEs are encouraged to set up a Rural Electronic Workshop (REW); a physical location for storing of the equipment; and, to build units (BC, n.d.-a; Sharma, 2007). The role of the BSEs is mainly technical; their responsibility includes the instalment, and the maintenance of the units (Roy, 2011).

Success of the program is measured in terms of sustainability of the program, the economic-, development-, and the environmental sustainability (BC, n.d.-a; Hailemichael, 2010; Phiri, 2014). A variety of factors can potentially restrain or enable the success of the IST in a variety of locations where the program is facilitated (Ali, 2016; BC, n.d.-c; Hailemichael, 2010; Javadi, 2010; Phiri, 2014; Sharma, 2007). As an example, Hailemichael (2010) argues that lack of continued payment from households with Solar Panels poses as one of the greatest limitations of the sustainability of the BC ITS in Ethiopia. The Barefoot encourages the BSE, the ground partner and the VEC to make an agreement with the local costumer households to pay an installation fee, followed by a monthly fee to cover the maintenance of the solar panels, so to provide monthly salaries for the BSEs and to enable sustainability and up-scaling of the program (Ali, 2016; Hailemichael, 2010; Phiri, 2014).

Javadi (2010, p. 5) purposes that partnerships should be introduced to enable donor support, both in terms of financial support and in terms of skills-development; such as "financial management training" and to develop saving and loan systems for the poorest households to access solar units. Javadi (2010), argues through increasing the partnership portfolio, national IST programs can decrease their dependency on the Barefoot College. However, Hailemichael (2010) pinpoints that the success of local BSE programs are dependent on local markets for acquiring equipment for the solar units for enabling sustainability of the project and to decreasing dependency of resource flow from the BC to the local programs.

The development-sustainability of the program refers to the capacity building and empowerment process at the local level. The BC IST program has previously had a positive impact on education, economic activities, health and security dimensions of village-life (Ali, 2016; BC, n.d.-c; Hailemichael, 2010; Javadi, 2010; Phiri, 2014; Roy, 2011; Sharma, 2007). The environmental-sustainability aspects of the program refer to enabling environmental friendly practices, such as implementation of RET, at the expense of non-sustainable resources (fossil-fuels) (Phiri, 2014). The Barefoot College has adopted 14 Sustainable Development Goals in their approach (BC, n.d.-d).

Up-scaling of the project refers to the program's ability to reach out to more households (increase the target-group), to initiate novel economic activities (such as selling energy, in terms of mobile-phone charging (Phiri, 2014), create small-scale businesses, or showing tv programs for a fee (Hailemichael, 2010)), for maintaining or advancing the Rural Electronic Workshop (REW) and/or to develop a small-scale Barefoot College in the area. The Barefoot College aspires that working together with national governments that would fund new Barefoot College Centers in other parts of the world, would contribute to "institutionalize decentralized, community managed clean energy initiatives that empower rural women economically and as environmental stewards" globally (BC, 2015, p. 17).

2.2. Jordan

The study was conducted in Jordan[5], in the village Manshiat al-Ghayath (MaG) in the Governorate Mafraq[6], from early November to early December 2018. Two Jordanian women completed the Barefoot College IST program in 2012.

2.2.1. the Socio-Political-Economic Conditions of Jordan

This section gives a short introduction to the socio-political-economic conditions of Jordan. The Hashemite Kingdom of Jordan is an Islamic parliamentary hereditary[7] monarchy (Milton-Edwards & Hinchcliffe, 2009). The modern state was developed in 1922 (Milton-Edwards & Hinchcliffe, 2009). Jordan is situated in an area that is one of the oldest societies in the world (Milton-Edwards & Hinchcliffe, 2009). The socio-political-economic Sphere is affected by Islamic traditions and clan traditions of the area (Abu Jaber & Garaibeh, 1980; El-Anis, 2012; Sweet, 1965).

The state is small geographically, with limited natural resources, such as oil and gas (Malkawi & Azizi, 2017). The demographic size of the country is relatively small[8], with around 10,3 Million people (GoJ, 2019). Economic conditions place Jordan as a lower middle-income developing country (UN, 2018). However, the UNDP (n.d.-a) ranks Jordan as number 95 at the Human Development Index (HDI), which defines Jordan to have High Human Development, because of the nation's conditions for social-economic factors such as education, health, and security (Malkawi & Azizi, 2017).

The absolute poverty line in Jordan is 814 JD per capita annually[9]; 14,4 per cent of the Jordanian population lives under the poverty line (GoJ, 2018). The Jordanian unemployment rate is 18,3. In Mafraq (where the Barefoot College IST program is situated) the unemployment rate is 19.7 (GoJ, 2018). Nevertheless, Mafraq holds great portions (an rough estimate of 20 per

[5] The Hashemite Kingdom of Jordan is located in the Middle East; the total area of the Kingdom is 89,318 Km2 (GoJ, 2018); of which 78,4 per cent is semi-desert area (GoJ, 2018).
[6] The country is divided into 12 governorates (GoJ, n.d.-a). Mafraq holds 29,9 per cent of the total national area (the second greatest governate in Jordan) and 5,8 per cent of its population (GoJ, 2018).
[7] Hereditary refers to a historical royal family, the royals in Jordan belongs to a family that have held the power domain in the Arab world for centuries (Milton-Edwards & Hinchcliffe, 2009).
[8] Relatively small compared to neighboring countries of Iraq and Syria (Milton-Edwards & Hinchcliffe, 2009).
[9] The absolute poverty line was set in 2010 (GoJ, 2018).

cent) of the nation's livestock (goat, cattle and sheep) (GoJ, 2018). Mafraq experiences a mean annual rainfall of 156,2 mm (GoJ, 2018).

In Jordan, the political decision-making power is to a great extent, held by the King Abdullah (Tobin, 2012). The constitution of Jordan was developed in 1952, and has not undergone many changes since then, which provides the King with the central power (Milton-Edwards & Hinchcliffe, 2009). The King's approach to development shapes the development objectives of the country (Milton-Edwards & Hinchcliffe, 2009). The King and the government are perceived to mediate short-term solutions to keep popular opinion entwined (Milton-Edwards & Hinchcliffe, 2009; Tobin, 2012)). Examples of this is the heavy rotation of political representatives, prime ministers and government officials that are deposited, and temporary laws that are facilitated to satisfy civil unrests (Tobin, 2012). Rapid responses mechanism is used by the King to prevail a situation that could resemble the 'Arab Spring' in Jordan (Tobin, 2012). King Abdullah highlighted that the top most priority of the nation is the unity, especially for the middle-class citizens (that are perceived as the populist group) and challenging economic instabilities (Tobin, 2012). King Abdullah (Tobin, 2012, p. 105) stated that "what keeps me up at night is poverty and unemployment. We have, in the past 10 years, managed to establish a credible middle class. But any shifts in oil prices, economic challenges, and that middle class becomes very fragile".

The socio-political-economic situation for people in Jordan is diverse. The demographic living standards of the population is multiple. The cosmopolitan areas, such as in Amman (the capital) are defined by consumerism (Tobin, 2012). The living-standard of the middle class in the cities around Amman is increasing, making available "consumption habits and patterns of the elite" to the middle class (Tobin, 2012, p. 99). However, on the outskirts of the of the cities and in rural areas, much of the population experiences limited access to means, so to sustain their daily needs.

Several issues are highlighted regarding the Jordanian political system. Tobin (2012) argues that there is little political representation of minorities (Christians, ethnical minorities) and other vulnerable groups (such as women). Milton-Edwards and Hinchcliffe (2009) underline the limited political attention towards human rights violations, leading to the decrease prioritization of such issues by the juridical system. The limited representation of the diversity of ethnicity and of the variety of groups within the country's political system alters the objectives and issues highlighted by the national political framework (Frisch, 2002; Tobin, 2012). The Jordanian government has been under great pressure because of refugees immigrating from neighbor

conflict areas, such as Palestine, Iraq and Syria (Hagberg, 2018; Milton-Edwards & Hinchcliffe, 2009). Effecting the national economy, decreasing job availability, increasing taxation and increasing prices on residential and livelihood costs (personal communication and (Hagberg, 2018; Milton-Edwards & Hinchcliffe, 2009)). There has been positive change regarding political facilitation of social change. Milton-Edwards and Hinchcliffe (2009) highlight that voting is made available for all, women are increasingly included in the political Sphere, press-freedom is enhanced, and increased democratic mechanisms are facilitated (inclusion of political parties and the national assembly in the legislative apparatus).

Milton-Edwards and Hinchcliffe (2009) highlight that although the national resources are limited, the central location places the nation in a central position of power in the region, seated in the center of the Arab world, with the longest border with Israel. In addition, the country is viewed internationally as politically stable and cooperative (Milton-Edwards & Hinchcliffe, 2009). The central position of the country and the political atmosphere within the country attracts foreign cooperation, investment and aid (El-Anis, 2012; GoJ, 2007; Malkawi & Azizi, 2017; Milton-Edwards & Hinchcliffe, 2009). Donor involvement in development initiatives is a normality in Jordan (Milton-Edwards & Hinchcliffe, 2009). International organizations, ideal organizations and NGOs (e.g. (USAID, 2015; WB, 2019a)) are present in development initiatives aiming at tackling economic, social and environmental issues (Milton-Edwards & Hinchcliffe, 2009; Wiktorowicz, 2002). The international development approach and the Jordanian Development approach is interlinked, whereas the Jordanian government relies on both funds from oversees and the programming of development organizations that need government support (GoJ, 2007; Malkawi & Azizi, 2017; Milton-Edwards & Hinchcliffe, 2009; Wiktorowicz, 2002). Milton-Edwards and Hinchcliffe (2009); Wiktorowicz (2002), highlight political motivations of NGO engagement, such as enabling political participatory engagement from all levels of society, and fostering political stability, e.g. anti-terrorism. In addition, Wiktorowicz (2002) highlights economic motives (e.g. access to oil) of donors as an shaper of the political environment.

The donor and the government approach to development uses western-capitalistic framework for monitoring and problematizing development aid. Evaluating the economic sustainability of projects through cost-benefit analysis is prioritized by these big-scale actors, at the expense of holistic analysis of program effects on empowerment processes for the poor (GoJ, 2007; USAID, 2015; Wiktorowicz, 2002). The rural culture of Jordan is driven by values, norms and customs that are not embedded in a capitalism economic rationalization (R. Berger,

Silbiger, Herstein, & Barnes, 2015). This might limit a solely capitalistic approach in analyzing to which extent a development programs are successful or failing. In a Bedouin context, there are several limitations for a westernized-capitalistic approach to development initiatives. Contradictory to the individualistic worldview embedded into westernized-capitalistic systems, the Arab culture embeds "collective societies […] driven by relationships, social networks, face saving, harmony, group orientation and extended family commitment" (R. Berger et al., 2015, p. 454). Patriarchal management, high context culture, implicit and indirect communication, and social objectives shape the orientation of organizations, programs and initiatives implemented and carried out (R. Berger et al., 2015). Social outcomes, people and relationships are valued as end goals, to a greater extent than economic revenue (R. Berger et al., 2015). In a Bedouin context the collective, patriarchal and face-saving conditionalities are hardened (Abu-Lughod, 2008). Bedouins lifestyles are shaped by the "desert zone marked by varying and extreme geographical conditions for human survival"[10]. Highlighting the Bedouins' need to be adaptable and resilient in their lifestyle, a nomadic lifestyle is central in the Bedouin communities, however, settlement is an increasing trend (Abu Jaber & Garaibeh, 1980; GoJ, n.d.-b; Sweet, 1965, p. 1132). The nomadic lifestyle can challenge the sustainability of a development initiative, when the recipients are migrating and immigrating sporadically (Abu-Lughod, 2008; Abu Jaber & Garaibeh, 1980).

2.2.2. Energy Poverty in Jordan

Jordan has a limited amount of accessible national fossil-fuel resources (Malkawi & Azizi, 2017). The national strategy of Jordan aims to decrease the dependency of energy importation from neighboring countries and rely increasingly on sustainable energy sources (Malkawi & Azizi, 2017). The government of Jordan focuses on implementing nuclear power plants (El-Anis, 2012), and alternative (to fossil fuel) energy sources (i.e. Renewable Energy) (GoJ, 2007). El-Anis (2012) argues that the Johannian government's motivations for energy security is threefold: (1.) economic well-being, (2.) political stability, and (3.) military security. Moreover, these motives highlight the interchangeable effects on each other (El-Anis, 2012). The logic

[10] The area experiences a mean annual precipitation is 113.5 mm, and a mean annual temp 18.7 degrees Celsius (WB, 2019b).

follows: Increased economic stability fosters populist satisfaction, and increased support of the government, the king and the military objectives.

Jordan imports 97 per cent of its energy consumption (WB, 2014b). 1,9 per cent of the utilized energy comes from renewable energy (WB, 2014a). GoJ aim to increase the proportion of sustainable energy (El-Tous, 2012; GoJ, 2007). The location of Jordan is 'perfectly' suitable for developing solar energy industries (El-Tous, 2012); Jordan is situated 31.9500° N, 35.9333° E (Energypedia, n.d.). Jordan is exposed to sun conditions most of the year, with an annual sunshine duration of approximately 2,900 h (Jaber, Badran, & Abu-Shikhah, 2004). However, the arid and dusty conditions pose some challenges of Solar PV systems (Hammad, Al–Abed, Al–Ghandoor, Al–Sardeah, & Al–Bashir, 2018). Jordan experiences limitations in adapting renewable energy, and the price of shifting into renewable energy is costly (El-Tous, 2012). Limited populist awareness of RET in Jordan (Zyadin, Puhakka, Ahponen, Cronberg, & Pelkonen, 2012; Zyadin, Puhakka, Ahponen, & Pelkonen, 2014) can affect to what extent the GoJ prioritise development of RET in its political implementation (Jaber et al., 2004; USAID, 2015).

Sustainable energy and environmental sustainability are at the center of many developing organizations' radars and on local governments agenda (GoJ, 2007; UN, 2015; USAID, 2015). Jordan has enrolled in environmental agreements (e.g. the Climate Change-Kyoto Protocol) (Malkawi & Azizi, 2017). The framework that constitutes NGOs and donor priorities is shaped by conceptualizations that capture global attention; e.g. 'buzz-words' (Palmer, Cooper, & Van der Vorst, 1997; Rist, 2007). This can sometimes lead to quick-fix narratives to complex issues, or to a-politization of the development narratives (Palmer et al., 1997; Rowlands, 1997). Underscoring the political situatedness of the development initiative and overemphasizing the global NGO linguistics and objectives of initiatives, can potentially overshadow the priorities of the recipients (Nelson, 1995). In to the GoJ (2007) Summary of Jordan's Renewable Energy Goals for 2020, there is little-to-no evidence that the poorest proportions (the energy poor) are taken in to account regarding the strategy of increasing RETs. So where does this leave the energy poor in the articulation of energy development?

The WB states that 100 per cent of the Jordanian population has access to energy (WB, 2016a), this number is incorrect. There are portions of the Jordanians that do not have access to energy. There are several issues regarding the incorrectly representation of energy access. One issue is: how can energy poor be articulated into development initiatives if they are not acknowledged? Moreover, showing that the statistics lack contextual aspects, by neglecting the

Bedouin lifestyle and the clan traditions (going beyond borders), complicates registration of ID and citizenship (Nanes, 2008). Moreover, gender aspects of energy poverty in Jordan is neglected (USAID, 2015). The WB (2016a) does not provide statistics that enables gendered articulation of energy poverty in Jordan. Women cannot access ID/Citizenship by themselves, and the polygamic traditions might neglect women headed households, because the women headed households might be merged into one household, led by the husband of many (Amawi, 2000). If the WB (2016a) measures are at the forefront of understanding the situation in Jordan, it is questionable to assume that the energy poor are addressed at all in the energy objectives, and problematizations of the GoJ and donors .

2.2.3. Women Empowerment in Jordan

The situation for women in Jordan is diverse (Amawi, 2000; Hagberg, 2018; USAID, 2015). Average measures of the population provide a brief overview over women in Jordan and what challenges they might encounter. According to UNDP (2018), Jordan has a low gender equality. Women score much lower than men in the Gross National Income (GNI) per person, with an approximate Female/Male ratio of 2,5/14,0 (UNDP, 2018). Women have lower HDI then men (0,658/0,767) (UNDP, 2018). Nevertheless, Jordanian women outnumber men in university education (55 per cent of the students are female), but women face barriers in utilizing their education and joining the workforce; only 15 per cent of the total workforce is female (USAID, 2015). A specter of reasons might explain the nuances of restraints that women face in Jordanian society (USAID, 2015). Perceiving marginalization through access to work, helps grounding women empowerment issues that otherwise can be difficult to address.

USAID (2015) highlight gendered challenges women encounter in the renewable energy sector in the capital Amman, Jordan, through a socio-economic lens on women empowerment. USAID (2015) highlighted obstacles such as lack of exposure to the energy sector: few female-role models; harmful assumptions (e.g. 'women do not, themselves, want to participate' or 'women do not/ cannot do the same quality jobs as men'; women's role at home (e.g. her double work-load; and limited time for networking), access to collateral to start business and hostile working environments (e.g. exposure to harassment) [11]. USAID (2015) underpins that including women in the energy sector can rearrange and improve the energy sector and enable women

[11] See video about women's challenges to participate in the energy sector in Jordan (USAID, 2016)

empowerment. USAID (2015), perceives renewable energy as an opportunity for the feminization of technical vocations; the logic behind this is that novelty of RET provides a stage of which the (gender) roles are not previously outlined.

Opportunities, and challenges for including women are complex and contextual. Bedouin women of Jordan tell a story, of which the gender roles are strictly scripted and reinforced by limited opportunities for capacity building (Hundt, Alzaroo, Hasna, & Alsmeiran, 2012; WB, 2019a). WB (2019a, para. 3-4), argues that it is hard for Bedouin women to find employment when they are "illiterate, never went to schools, never read or wrote anything" and because they are "facing a society where women are discouraged from working in public spaces and of having much mobility".

2.3. Tonga

The study was located at Tonga[12] from mid-January until the start of April 2019. Four Tongan BSE' completed the IST program, of which three are still alive and two still live in Tonga.

2.3.1. Socio-Political-Economic Conditions of Tonga

This section gives a short introduction to the socio-political-economic conditions of Tonga. The Kingdom of Tonga constitutes a 650 km2 land area; moreover, the Tongan Exclusive Economic Zone includes 700 000 km2 of the pacific ocean (Taylor, 2010). Tonga was inhabited 2800-3000 years ago (Gillespie & Clague, 2009). The population of Tonga is 108 020[13], of which two-third live on the main island Tongatapu (Gillespie & Clague, 2009; WB, 2019c). The location of Tonga, and the climate (mean annual precipitation of 1 665,6 mm and mean annual temp. of 24.5 degrees Celsius (WB, 2019d)) provides a range of natural resources. Nevertheless, most of the local fishing and farming is subsistent[14], leaving big-scale business initiatives to foreign investors. UN (2018) underlines limitations for foreign direct investments, because of

[12] Tonga is a pacific island group, including 170 islands of which 36 are inhabited with a population of above a 100 000 people, most live in the capital city Nuku'alofa, on the main island Tongatapu (Taylor, 2010). Tonga was inhabited 2800-3000 years ago (Gillespie & Clague, 2009).
[13] Approximately the same number of people has emigrated Tonga (Ma'afu, 2017).
[14] Bush areas are distributed among the population, the waste majority of Tongatapu has own land for housing and farming (Gillespie & Clague, 2009).

the vulnerability to natural disasters and weather-related shocks experienced by small island states. The geographic location increases the cost of business (e.g. limited market access and costly shipping) (Ma'afu, 2017). In addition, economic growth is suspect to swinging international commodity prices, because of lack of economically diversified activities in Tonga (UN, 2018). Job availability is low in Tonga, most jobs available are in the government, other economic activities consist of handicrafts, and service labor (Ma'afu, 2017). The UNDP (n.d.-b) statistics show that there is an employment rate of 58.8 per cent in Tonga. However, these numbers are questionable regarding the great emigration of Tongans, moving aboard for greater economic access to income-work (Ma'afu, 2017).

According to the UN (2018), Tonga is a small-island developing country. Nevertheless, UNDP (n.d.-a) ranks Tonga as number 98 according to the HDI. Tonga has high levels of human development, partly because of high levels of education in the country (UNDP, n.d.-a). Tonga measures poverty in terms of national poverty lines; the national poverty line diverges from the international poverty line on daily Purchasing Power Party 1,9 US $ (ADB, 2018). Tonga's national poverty line aligns the understanding of Hardship (GoT, 2015b). In accordance to Hardship a Basic Needs Poverty Line (BNPL) and a Food Poverty Line (FPL) were integrated as measures for national poverty (GoT, 2015b). According to 2015 estimates, 22.1 per cent of the population lives under the BNPL, while 3.8 per cent of the population lives under the FPL. The FPL is 1546 TOP per person annually, and the BNPL is 2949 TOP per person annually (GoT, 2015b). The concept of Hardship is used because the Tongan society subsistence farming and fishing works as a safety net, which provide a sustainable food supply for Tongans (Abbott & Pollard, 2004). Hardship has greater effects in rural areas (such as Kolomotu'a and Houma) and outer islands of Tonga "due to remoteness and high cost of transportation, lack of employment opportunities, and poor quality of social services and infrastructures" (GoT, 2015b, p. 36).

Tonga is named the Friendly Islands. It is perceived as a peaceful and homogenous society (Powles, 2009). In the early 21st Century, a pro-democratic movement erupted in Tonga (Gillespie & Clague, 2009). In 2005, the royal Prime Minister resigned, and was replaced by the first non-Nobel PM (Powles, 2009). Pro-democracy and pro-human rights movements led to civil unrest in Nukualofa in 2006; large parts of the downtown capital was burned and destroyed (Powles, 2009). Several issues such as "increase in social problems in Tonga such as crime, youth unemployment, income inequality, environmental degradation and cultural erosion" face the society of Tonga (Taylor, 2010, p. 4).

The Kingdom of Tonga is a constitutional hereditary monarchy[15] (Ma'afu, 2017). The Kingdom of Tonga was established in 1875 (Gillespie & Clague, 2009). Century, Nobles still hold many government positions and influence the political sphere in Tonga (Gillespie & Clague, 2009). The present king Tupou VI, follows the bloodline back to Tupou I, the first king and the founder of the Constitution in 1875 (Ma'afu, 2017). The Constitution of Tonga is based on Christian values (KoT, 1988; Powles, 2009); more than 90 per cent of the Tongan population is Christian (Ma'afu, 2017). Moreover, British protestants have been influential in westernizing the Tongan juridical system (Powles, 2009).

The Christian values are a great part of Tongan identity (Ma'afu, 2017). However, the Christian-western values adapted by the Tongan nobles and the society overall have not overshadowed the Tongan customs, traditions and norms (Ma'afu, 2017). The Tongan-Polynesian culture affects the socio-political-economic Spheres' of Tonga (Ma'afu, 2017). Ma'afu (2017, p.) highlights the four golden values of the Tongan: "faka'apa'apa [respect], 'ofa fonua (love of the land), mamahi'i me'a (loyalty; treasuring what is dear to oneself) and lototo (humility)". Prescott and Hooper (2009, p. 290) highlight that "a collective, rather than individualistic, mentality that is harmonised through embedded relationships". The Tongan society is homogenous and social relation is formed by hierarchal structures (Taylor, 2010).

Donors and international organizations have tended to view the development practices of Tonga through westernized binoculars (Ma'afu, 2017). This led to the misunderstanding of the development process and the outcomes of the strategies and plans facilitated (Ma'afu, 2017). Much of the Tongan development initiatives are succumbed to international pressure, both by western and eastern development organizations (GCF, 2018, 2019; GoT, 2010, 2015b; Ma'afu, 2017). Most of the government budgeting constitutes of loans and aid, and many expert government positions are held by international experts (GCF, 2018; GoT, 2010, 2015b; Ma'afu, 2017; Taylor, 2010). At the center of international attention are social issues such as gender, environment and economic development (GCF, 2018; GoT, 2010, 2015b). However, the grassroots communities have, to a great extent, limited power in framing the development discourse (Powles, 2009). Nonetheless, the government and the national development activities are encouraged to undergo transformative changes in relation to including communities in development programs and women in spheres of community development, politics and technical vocations (GCF, 2019; T. a. MEIDECC, 2018).

[15] Before the establishment of the Kingdom of Tonga, the nation was ruled by paramount chiefs (Gillespie & Clague, 2009).

2.3.2. Energy Poverty in Tonga

Tonga imports great proportions of its energy consumption (GoT, 2010); 95 per cent of the country's energy-grid consumption is provided by foreign diesel-fuels (T. a. MEIDECC, 2018). GoT (2010, p.1) outlined a 10 years plan to "reduce Tonga's vulnerability to oil price shocks and achieve an in increase in quality access to modern energy services in an environmentally sustainable manner". GoT responsive measurements to the limited national energy security and to reduce their environmental foot print the GoT (2015a) aim at increasing their renewable energy generation from 9 per cent in 2015 to 50 per cent in 2020 (and 70 per cent in 2030). Today, the reduction is at 12 per cent (personal communication, 2019). The ambitious goal is budgeted to an total of 53.20 US million (Green Climate Fund, GCF, 2018). 83,9 per cent will be provided in terms of foreign grants; majority of the found is provided by the GCF, and the Asian Development Bank (GCF, 2018).

Tonga's situatedness provides good condition for solar electrification. located 15° and 23° lat. s. and 173° and 175° long. w. (Taylor, 2010). Tonga experiences more than 1500 hours of sunshine a year (SMA, n.d.). Nevertheless, the remoteness and the climatic conditions of Tonga poses challenges for renewable energy (GoT, 2015b, 2018; Mannke, Mohee, Schulte, & Surroop, 2013). Remoteness poses challenges for infrastructure and importation costs regarding renewable energy technology (GoT, 2015b). The climatic conditions poses challenges, because heavy storms creates a barrier for the sustainability of the renewable technologies (GoT, 2018; WB, 2019d).

96.6 per cent of the rural population access energy in Tonga (WB, 2016b). GoT, in collaboration with foreign investors, aim at providing renewable energy available for rural energy poor households at the outer islands of Tonga (GoT, 2019). Meanwhile the local power supplier – Tonga Power Limited (TPL) - provide the energy on Tongatapu (T. a. MEIDECC, 2018). The GoT and TPL sought program to help close energy gaps in Tonga, increase economic revenue for the poor communities in of-grid areas on Tonga, and because solar energy is viewed as a great substitute to expensive fossil-based energy imported from abroad (GoT, 2010; T. a. MEIDECC, 2018).

2.3.3. Women Empowerment in Tonga

The population in Tonga is generally socio-economically homogeneous (Powles, 2009). Nevertheless, life is different for men and women in Tonga (Hedditch & Manuel, 2010; Jansen, Johansoon-Fua, Hafoka-Blake, & Illolahia, 2012). Average measures of women empowerment give a short introduction to the limitation's women encounter in Tonga. According to UNDP (2018), Tonga has medium-high gender equality. Women scores lower than men in the GNI per person, with an approximate Female/Male ratio on 3,8/7,3 (UNDP, 2018). Women have lower HDI then men (0,707/0,736) (UNDP, 2018). Secondary and tertiary education have an equal representation of the genders (UNWomen, n.d.). Nevertheless, in the work force women are underrepresented (UNWomen, n.d.). Women account for 43 per cent in subsistence farming/fishing and 39 per cent in the non-agricultural force (UNWomen, n.d.). Women participation in income-work does not directly translate to economic empowerment; whereas the partner, or other family members sometimes exercise power over women's income (Jansen et al., 2012; UNWomen, n.d.). 12 per cent of the women in Tonga have reported economic abusive behavior from an intimate partner. Economic abuse is more prevalent in rural than urban areas (UNWomen, n.d.).

The GoT (2010) aim at being sensitive to groups with special need, such as women, when developing the national renewable energy sector [16]. In addition, the government includes women in rural development initiatives, in managing local solar freezers at the outer islands Vava'u and Ha'apai (GoT, 2019). Moreover, in GoT's (2010) 'Tonga energy road map 2010-2020', highlights that the renewable energy initiatives should not have a negative effect on women, moreover, renewable energy initiatives should aim at meeting the needs of women through mitigating negative climate change affects away from women. The report (GoT, 2010), does not state why and how gender issues should be addressed. GCF (2019) states that addressing women in terms of vulnerability, overlooks women's role as active decision makers. Further, GCF (2019, p.21) highlights that the previous research by UN Women and USAID shows "failure to consider gendered interests, limits the effectiveness and sustainability of energy programmes"; the logic that follows is that to not address women empowerment (e.g. increased access to income-work and inclusion in decision-making) in renewable energy initiatives in Tonga can limit the utility of the renewable technology for the target-group,

[16] See video about women in the renewable energy sector in Tonga (MEIDECC, 2019).

whereas part of the target-group might be unable to access or influence the impacts of the technology.

3. Conceptual Framework

Empowerment is defined as "the expansion of assets and capabilities of poor people to participate in, negotiate with, influence, control, and hold accountable the institutions that affect their lives." (CARE, 2006, p. 4). CAREs lens on women empowerment inform this research: women empowerment is highlighted as enabling 'positive' impacts on structures, relations that surrounds her and conditions her opportunities and choices (CARE, 2006). Moreover, women empowerment is increasing her agency, improving her capabilities and facilitating her human rights (CARE, 2006).

3.1. Why Women Empowerment?

Globally, women encounter structures, and power relations that limit their agency (UNWomen, 2018). Amongst these are discriminating practices that limit women from fulfilling their potential (Nussbaum, 2003; UNWomen, 2018). Women face vulnerability in many cases to a greater extent than men in the same context (UNWomen, 2018). Women experiences powerlessness by restricted access to productive means (i.e. income-work, and resources), economic violence, and gender-based violence, incapability to claim ownership over their own bodies, and limited capacity to fulfill their own agency (Amawi, 2000; GCF, 2019; Jansen et al., 2012; Nussbaum, 2003; UNWomen, 2018). Facilitating women empowerment means challenging the limitations and restrictions faced by women and enabling changes that foster women's overcoming of powerlessness (Sadan, 1997).

The paragraph above highlights the intrinsic motivations of the process of women empowerment (UNWomen, 2018). Moreover, women empowerment poses extrinsic potential for developmental and environmental issues (UN, 2014). Kofi Annan argued that "there is no tool for development more effective than the empowerment of women" (UNNews, 2005, para. 1.). Annan's argument is in line with the general assumptions of women empowerment from

international development actors; highlighted by the UNDP (2012, p. 8) "Women are central actors making the case for the sustainable development triple-win strategy […] – meaning economic growth, social development, and environmental sustainability." International actors such as UN bodies (UN, 2014; UNDP, 2012; UNWomen, 2018) and CARE (2006)[17] argue that empowering women has the foregoing effect of increasing the wellbeing for families and communities; to facilitate national development; and provides global changes favoring social justice and environmental sustainability.

The development of the women empowerment concept is nuanced (Sadan, 1997). The conceptualization of (women) empowerment provides a fountain of insight from different disciplines and viewpoints (CARE, 2006; Sadan, 1997; Solomon, 1976). The next sub-chapters will help pinpoint what 'women empowerment' connotates, and how it can be used in analyzing meaningful social change.

3.2. The Development of the 'Empowerment' Concept

The conceptualization of women empowerment rests on the logic of the concept of empowerment. Empowerment embeds ideas coming from historical power-struggle for social change that sought to enforce social justice.

Empowerment has its historical roots in social struggles in Europe and America. Batliwala (2007) states that empowerment was used by protestant reformists as early as the 16th Century. She (2007) further highlights that empowerment was used as a power-word in "Quakerism, Jeffersonian democracy, early capitalism, and the black-power movements" in Europe and North America (Batliwala, 2007, p. 558). Empowerment was, from the start, used to challenge stratified structures that discriminated people based on 'feudalist' and 'racial' value systems; to improve the life of the marginalized and lower classes in society, such as increasing the access to freedom and increased opportunities (Batliwala, 2007).

Empowerment has been embedded in social justice struggles across the globe and throughout history; as an example Batliwala (2007) underlines the embeddedness of empowerment in the Veera-Shiva struggle to abolish caste and women discrimination throughout 12th-13th century India. Furthermore, empowerment's move through history gave

[17] See video about the highlighted interlinkages between women empowerment and development (CARE, n.d.-a).

the word new and multiple meanings. Empowerment gained a political connotation in the 20th Century when anti-racist, feminist, critical education, and theological liberation movements called for the empowerment of the discriminated and the marginalized, so to include them in "equitable, participatory, and democratic forms of social change and development" (Batliwala, 2007, p. 558).

Empowerment was put on the academic stage in the 1970s by Barbara Bryant Solomon (1976), Peter Berger and Richard Neuhaus (1977) and Julian Rappaport (1981). These scholars highlighted empowerment as a tool to address social issues, in social work and welfare-state social structures, through a holistic and contextual lens. Empowerment for these authors translates into undertaking and implementing social solutions, relevant for and enforced by the groups and individuals at the center of these solutions (P. L. Berger & Neuhaus, 1977; Grosby, 2010; Rappaport, 1981; Sadan, 1997; Solomon, 1976). The concept empowerment developed as a critique of populist values, challenging the contemporary universal acceptance of the needs and rights approaches as the foremost relevant path to undertake social issues (Rappaport, 1981). Empowerment, as a model of social change that sought to be sensitive to the contexts and complexities of human lives, aims at providing relevant, multiple and flexible solutions for the disempowered (Rappaport, 1981).

3.2. The Development of the 'Women Empowerment' Concept

Women empowerment, through a multiplicity of usages, definitions and connotations, addresses the nuances of gendered social issues (Batliwala, 2007; CARE, 2006; Cornwall, 2016; Rowlands, 1997; Sadan, 1997; UN, 2014; UNDP, 2012). Women empowerment is not a single-handed concept, nor a straightforward approach or model of pending social issues (Batliwala, 2007). Women empowerment is used by actors from diverse ideological backgrounds; right-wing motives for women empowerment is economic growth; and, the political left argue that women empowerment is an underlying means for greater societal equality (Rowlands, 1997). Feminists (Batliwala, 2007; Beteta, 2006; Cornwall, 2016; Rowlands, 1997) argue that women empowerment is moving into an 'a-political' domain, utilized by NGOs, private businesses and international organizations as a quick fix for social issues, such as empowering women through micro credit initiatives. The a-political approach, in turn, neglects the transformative changes that the women empowerment concept originally

emphasized (Cornwall, 2016).

Feminists from the third world were at the forefront of the development of the women empowerment concept (Rowlands, 1997). The conceptual tool developed in the 70-80s throughout feminist debates was a critique to contemporary development initiatives (Batliwala, 2007; Rowlands, 1997). Feminist approaches to women empowerment highlights power dynamics and the political dimensions as essential to what women can or cannot do (Cornwall, 2016). Batliwala (2007) highlights that the original feminist approach to "empowerment was a socio-political process, that the critical operating concept within empowerment was power, and that empowerment was about shifts in political, social, and economic power between and across both individuals and social groups".

Powerlessness and unequal power relations have been two core objectives of the development of the women empowerment concept. Women empowerment was, in the early stages of the conceptual development, aiming at challenging power relations (Cornwall, 2016). Fraser (1989) and Cornwall (2016) highlight power in terms of: (1.) power with, (2.) power within, (3.) power to, and (4.) power for of upmost importance regarding women empowerment. (1.) Power with refers to the collectiveness between women. (2.) Power within refers to realizing their agency and challenge limiting external structures and relations. (3.) Power to refers to making decisions and acting on them. And, (4.) power for social change refers to the objective of the empowerment process. In addition, women empowerment challenges the patriarchal 'power over' oppression of women, and puts equality at the center of the women empowerment objective (Khamati-Njenga & Clancy, 2005).

Cornwall (2016, p. 343) states that women empowerment is "about recognizing inequalities in power, asserting the right to have rights and acting to press for and bring about structural change in favour of greater equality". She (2016) highlights that an empowerment process is internal, therefore women empowerment entails the realization of one's own agency, and the structures and relations limiting and enhancing her agency. In this regard, women empowerment is a process where power dynamics and oppression are challenged, providing the powerless with opportunities and capabilities to participate in decision-making and to take control over their life (Batliwala, 2007; Rowlands, 1997). Gita Sen (in UNDP, 1997, p. 96) highlights a twofold approach of the domains of control:

> Empowerment is about change in favour of those who previously exercised little control over their lives. This has two sides. The first is control over resources (financial, physical and human). The second is control over ideology (beliefs,

values and attitudes). (Sen in UNDP, 1997, p. 96)

Power relations and politics are interlinked (Mittelman, Chin, & Amoore, 2005). Politics is the control/influence over ideology and resources (Mittelman et al., 2005). In regard to the ideological transformation, a Gramscian approach to class-struggle is highlighted in the feminist approach to Woman Empowerment (Batliwala, 2007); thereby perceiving the political sphere as a channel to reinforced value systems from a top-down, exclusive imaginary space. Women empowerment is about opening this space for women to take part in shaping ideology. The political underlining of women empowerment conceptualization is highlighted by Batliwala (2007) as a "transformatory idea for struggles that challenged not only patriarchy, but also the mediating structures of class, race, ethnicity […] which determined the nature of women's position and condition in developing societies". Consequently, women empowerment has the potential to shift the political solutions and priorities in regards to "social justice arenas, such as education, health care, rural development, and workers' rights" (Batliwala, 2007, p. 559). The conceptualization of reality is altering the problematization, the solutions and the outcomes of political initiatives (Batliwala, 2007); henceforth, empowering women to take control over ideological decision making will enable transformative shifts in the imaginative political sphere and the prioritization of resources (UNDP, 1997).

A-political refers to removing context, historical and political factors from the conceptualization and materialization of women empowerment. According to Batliwala (2007); Beteta (2006); Cornwall (2016); Nikkhah, Redzuan, and Abu-Samah (2012); and Rowlands (1997), NGOs, international organizations, and private businesses working for women empowerment de-politicize the concept when transformative change is no longer the core objective of the empowerment process. In the move from the feminist Perspective to the donor Perspective, Women Empowerment became a buzz-word - a fashionable replacement of earlier gendered lenses to gender issues in and around development initiatives; such as the Women in Development, Women and Development and Gender and Development approaches (Rowlands, 1997). Context and nuanced meanings of women empowerment was deprioritized, at the benefit of quick fix development initiatives (Rowlands, 1997). The risk of such an limiting approach to women empowerment is that it can result in "consolidate existing power hierarchies as well as create new problems, including manipulation and co-option by dominant political interests, growing indebtedness, doubling and tripling of women's workloads, and new forms of gendered violence" (Batliwala, 2007, p. 652).

Understanding the power dynamics and the political connotations of women empowerment, I will introduce an analytical women empowerment framework utilized by CARE in examining women empowerment in a pragmatic lens.

3.3. CARE's Analytical Framework of Woman Empowerment

CARE is a humanitarian organization, founded in 1945, as a response to humanitarian crisis in Europe post the Second World War (Karim, Picard, Gillingham, & Berkowitz, 2014). Today, CARE's core principles evolve around empowerment for women and girls (CARE, n.d.-c). The global CARE organization assists programming in 95 nations (CARE, 2018).

CARE's longitudinal experience in the humanitarian sector, and with a gender specific approach since the 1980s, have developed an organizational base for women empowerment measurement and evaluations. Amongst these is the CARE Analytical Framework on Women Empowerment, the Strategic Impact Inquiry (SII) 2004-2009, a critical study of the CARE impact evaluation (CARE, 2014). The SII highlighted shortcomings of the CARE evaluation framework (Karim et al., 2014). CARE introduced, the Woman's Empowerment Impact Measurement Initiative (WEIMI) in 2010, as a response to the shortcomings of the SII, with the objective to measure impact of programming (Karim et al., 2014). The WEIMI was established to build a theory of change, to be used for further planning, implementation, monitoring and evaluation of long-term[18]-, sustainable- and transformative poverty reduction programming (Karim et al., 2014).

CARE (n.d.-b) argues that women empowerment shall be addressed through a complex and dimensional lens, with special account to the power dimensions of empowerment. CARE's approach builds on the Capability approach (Nussbaum, 2003). The SII aims at viewing social change through a critical women empowerment lens, considering the multiplicity of what women empowerment can mean in different contexts, and to which extent a potential empowerment process can enable or constrain meaningful social change for the women it is aimed at (CARE, n.d.-b). The WEIMI highlighted the foundation of perceived change in an impact assessment, and that measurement of a program should be centered towards transformative and sustainable change (Karim et al., 2014).

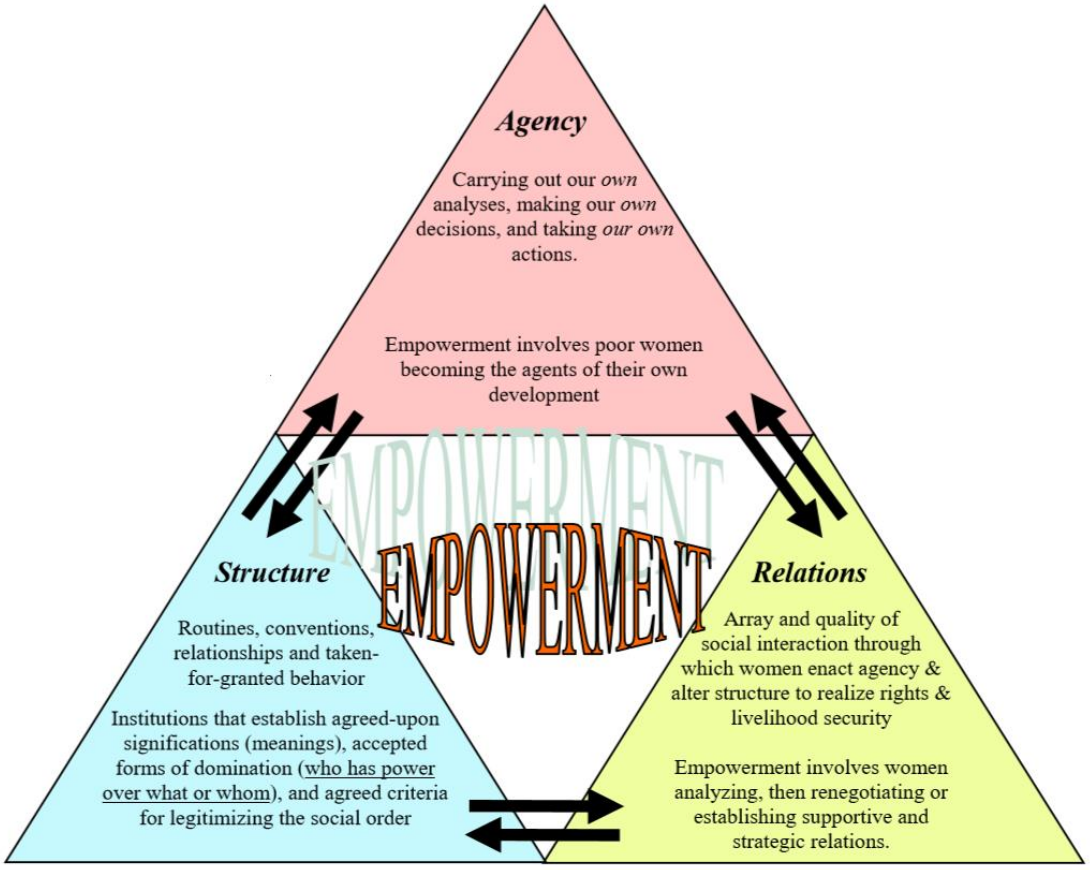
[18] According to the CARE framework a long-term program should at least be 10-15 years (Karim et al., 2014).

CARE (2006) problematization of women empowerment highlights the nuanced set of factors that can improve the life of a person intrinsically and extrinsically; these factors are interchangeably affecting each other. In other words, the factors that enable some dimensions of women empowerment, can also potentially be the factors that diminishes other factors of women empowerment (CARE, n.d.-b). In addition, the measurement of a few factors neglects the holistic insight of the empowerment process, potentially leading to neglecting important factors of empowerment. CARE (n.d.-b, p. 1) provides an example of how the empowerment process can be multidimensional and complicated by analyzing a woman's empowerment process: "She gained greater financial security, decision-making power, negotiation skills and confidence. But, on the other hand, she alone is responsible for all cooking, cleaning and childcare. She hardly speaks with her husband and continues to face violence from him". (CARE, 2014). CARE sheds light on the interconnectedness of relationships in the context of the programming (Karim et al., 2014). Much attention is put towards the power dimensions and the relationship between women and men; and special attention is put on challenging contemporary perception of masculinity that can potentially check the empowerment process (Karim et al., 2014). Moreover, CARE highlights that the empowerment of one person does not necessarily directly translate to the empowerment of others (Karim et al., 2014). Henceforth, a community Perspective of the empowerment process is important for understanding the transformative and sustainable dimensions of women empowerment (Karim et al., 2014).

Women empowerment is a complex issue; analysis of the concept includes normative understandings of 'a better, and dignified life' (CARE, 2006). Women Empowerment, through CARE's lens, highlights women empowerment as a threefold phenomenon; (1.) agency, (2.) relations and (3.) structures guide what a woman in a certain context can and cannot do (CARE, 2006). The CARE framework highlights issues around women empowerment which ought to be considered for facilitating changes that enable women empowerment transformable processes (meaning beyond the facilitation of basic needs); such as altering power relations that restrains her capabilities and facilitate structural change which foregoes gender equality (CARE, 2006).

CARE's (2006) triangle model (see figure 1.) highlight the embeddedness of agency, relations and structure in the conceptualization of women empowerment. Agency underlines the opportunities and the aspirations of a person (CARE, 2006). Structure underlines the context of culture, the environment, the social, the political, and the financial that surrounds a person and that affect the agency and the relations (CARE, 2006). Relations, i.e. power relations,

underlines the individual's specific place in society, in relations to others, that can limit or enhance a person's empowerment, and which can affect people living within the same structure differently (CARE, 2006).



(Figure 1. retreived from CARE, 2014, p. 4)

The CARE Perspective on women empowerment provides a useful tool from an analytical Perspective. The SII (CARE, 2006) and the WEIMI (Karim et al., 2014) point to a conceptual framework for research on programs fronting women empowerment. Women empowerment is a dialectic concept; the conceptualization of 'women empowerment' is amorphous, shaped towards- and shaped by the phenomena it is analyzing (Rowlands, 1997). Women empowerment embeds a nuance of Perspectives, which are not easily measured (Beteta, 2006). The theoretical foundation of the empowerment analysis will never be fully developed because of the complexities of- and the contextual differences between different cases (Karim et al., 2014). Karim et al. (2014, p. 229) highlights "the need to […] not let the 'perfect' be the enemy of the 'practical', and to see the different phases of the process as parallel and iterative, rather than linear.".

3.3. Ethnography and Woman Empowerment

An ethnographic approach to women empowerment highlights the normativity of women empowerment by addressing women's needs, and aspirations, through women's/communities/group's Perspectives which can enrich any empowerment framework (Conquergood, 1992; Hashemi, Schuler, & Riley, 1996; Trethewey, 1997). Furthermore, the multiplicity of normative understandings of empowerment puts dimensions to the empowerment framework, hardening and benchmarking the theoretical framework of women empowerment (Beteta, 2006; Karim et al., 2014). Nevertheless, the conceptualization of women empowerment addresses issues that are normalized in daily life and which are hard to discover, reflect over and discuss through a purely ethnographic approach (CARE, 2014; Karim et al., 2014). Examples of this is the gendered assumptions of masculinity and femininity, and embedded gender roles and relations which are assumed as static ontologies, but often are a result of relativist epistemologies (CARE, 2006; Karim et al., 2014; Nussbaum, 2003). Because of the complexity of the empowerment concept I have rested on the shoulders of theorists and pragmatics that have formulated the CARE approach to women empowerment analysis (CARE, 2006; Karim et al., 2014). Complimentary, to CARE's approach I have provided space for the interviewees to draw links between issues that forms their empowerment process and let the interviewee color the representation of the data through underlining the concepts that the interviewees are focusing on in the interviews (Creswell & Creswell, 2017).

4. Method

4.1. Research Questions

This study is guided by my research questions:

Research Question 1: Does the Barefoot College International Solar Panel Project affect empowerment (agency, structure and relations) of the Barefoot Solar Engineers in Jordan and in Tonga? If yes, how?

Research Question 2: How does the 'agency' of, the 'structure' around and the 'relations' surrounding the Barefoot Solar Engineers affect the Barefoot Solar Engineers empowerment process in Jordan and in Tonga?

4.2. Qualitative Methodology

The approach of this study is Qualitative. Qualitative research aim at exploring social settings and groups or individuals within these settings (Berg & Lune, 2012). Qualitative research aims at exploring social phenomena, and peoples' Perspectives of their daily lives; searching for anomalous incidences, the specific understanding of cases and probing complex interrelationships. This, provides a basis for a nuanced insight into peoples' daily lives[19] (Berg & Lune, 2012).

A qualitative approach was chosen because of the normativity of the concept of women empowerment. This study is explorative; the research aims at understanding what women empowerment consists of in different settings, in Jordan and in Tonga, and at analyzing the effects that women BSE's agency, the structures and the relations surrounding them, has on the empowerment process.

4.3. Research Design – Ethnography

The motivation of this study is based on my empirical interest in understanding the BC IST program effect on women empowerment. The two contexts studied were chosen based on a motivation to broaden the understanding of what contextual implications has on the respective BSEs women empowerment processes. However, the two contexts studied are, complimentary, not comparative; i.e. they inform each other; they do not provide a sound basis of comparing the program's effect on women empowerment.

The ethnographic design[20] was used to understand what 'women empowerment' entails from the view of the interviewees; and to identify how the situatedness of structures, relations

[19] Quantitative research, on the other hand, seeks generational patterns and an overall understanding, that can be pinned down numerically. Quantitative and qualitative research are complementary (Creswell & Creswell, 2017).
[20] Based on social research epistemology (Bryman, 2015; Creswell & Creswell, 2017).

and agency shapes the participants Perspectives. In other words, the thesis aims "to establish the meaning of a phenomenon [the women empowerment processes] from the views of participants. This means identifying a culture-sharing group and studying how it develops shared patterns of behavior over time" (Creswell & Creswell, 2017).

The ethnographic approach investigated three different Perspectives regarding the Barefoot College's effect on the BSEs' women empowerment processes in the two different contexts: The program Perspective, the community Perspective and the women's (i.e. the BSEs') Perspective. The threefold lens was attained to understand what women empowerment entails from different footholds, providing a point of departure for this thesis to understand multiple nuances of the women empowerment phenomenon in the respective contexts.

4.4. Data Collection

The ethnographic research design has informed my data collection methods. Creswell and Creswell (2017) highlight that "Ethnography is a design of inquiry […] in which the researcher studies the shared patterns of behaviors, language, and actions of an intact cultural group in a natural setting over a prolonged period of time. Data collection often involves observations and interviews". The data in this research is collected through participatory-observation and semi-structured-interviews. The participatory-observation approach / my engagement in the field is key to the understanding and the representation of the data. Moreover, semi-structured interviews enabled space for the interviewees to guide the discussions and highlight phenomena of importance of their daily lives.

4.4.1. Semi-Structured interviews

Several semi-structured interview guides were made prior to the field work (see appendix C, D and E): One for the Barefoot Solar Engineers, one for the BC IST Programs contact person, and one for households with and without solar panels. During the field work, more questions were added, and some questions were discarded. Moreover, I made more interview guides in the field, because my engagement in the field provided opportunities for interviewing several key informants.

The interview guides were developed with the aim to analyze the program's facilitation, implementation and the daily operation of the project and to analyze the BSE's empowerment process. The framework of the guides was built up in discussion with my supervisors. The main supervisor has much experience with the Barefoot College IST program, and the co-supervisor has great experience of institutional research. Moreover, literature on Social Bricolage (Archer, Baker, & Mauer, 2009; Baker & Nelson, 2005; Cleaver, 2017; Phillips & Tracey, 2007; Senyard, Baker, Steffens, & Davidsson, 2014) formed my questions (this was my original approach for analyzing the research), giving attention to the BSEs' abilities to shape their surroundings and construct opportunities, and understand how their surrounding shaped them and the opportunities available. Nevertheless, Social Bricolage was discarded later in the process, at the priority of a women empowerment framework for analysis; henceforth agency-based, structural and relational notions of the women's experience with the respective IST programs were prioritized as insight for the analysis of the data.

I chose a semi-structured interview guide as an approach to collect data because this type of interview structure provide flexibility (Bryman, 2015). During the interviews, the wording or concepts used by the participants guided the conversation. I would define key concepts and investigate their meanings by asking probing questions (ex. of this is the concept 'shame' and 'breaking gates' in Jordan and the concept 'hard-working' and 'helping' in Tonga). This sometimes led to excessive time spent; the in-dept interviews varied from 4-8 hours. Moreover, the concepts highlighted by the participants guided the directions of the following interviews.

4.4.2. Sampling

The sampling method of this research is a mix of generic purposive, snowball & convenience sampling (Bryman, 2015; Walliman, 2011). The sample frame consists of the communities that are involved in the respective IST programs, or that have a contextual understanding of the research context – e.g. key informants regarding renewable energy, women empowerment or the IST program in Jordan and in Tonga. Henceforth, the generic purposive method was undertaken to assure that the participants chosen are relevant in terms of the research questions. My engagement in the local communities opened doors to access key informants (snowball). The sampling size depended on how many households I could access through the snowball and convenience sampling method. The interviewees selected have been an outcome of the ground partners and BSEs ability and willingness to introduce me to people in their community

(convenience). Time, convenience, and funds were a limitation of accessing a greater sample size of - and diversity between the respective participants.

I included a diversity of interviewees in my study; I have interviewed people of different ages (although all grown-ups), gender, and, for the purpose of triangulation I included key interviewees in the community that were not involved in the IST programs, but who could support or challenge the answers of the BSEs, the ground partner and the enrolled households. The purpose of triangulation is to get a holistic overview of the results and the consequences of the solar panel project in the 'affected' communities and on the BSEs' empowerment process (Bryman, 2015).

4.4.3. The Research Area, the Timeline and the Interviewees Units

The research areas were contextualized in Jordan and in Tonga. In Jordan the data was collected through 8 recorded interviews, and in Tonga 15 recorded interviews were held. See appendix A and B for overview of recorded interviews.

In Jordan the research was conducted from early November to early December 2018. I spent November in Amman, the capital of Jordan, preparing the fieldwork of this research and engaging in humanitarian work (doing humanitarian work in Amman provided me with insight into Jordanian religious-cultural customs and norms). In December I spent two days in MaG, where the Jordanian BSEs' residents. The Jordanian IST program is implemented in MaG. In MaG I interviewed three - new[21] - female BSEs with SP in their household, the son of Aatifa (one of the BSEs), and one woman who wanted to acquire SP for her household. In addition, during my stay in MaG, I visited one the of BSEs' homes, and one of the BSE's shop, I visited the homes (tents and constructed buildings) of the interviewees, and I visited the town-house, together with the BSEs and the previous Jordanian ground partner, looking for a potential donor, a government official visiting from the Emirates. Moreover, the experience in MaG provided me with the ability to see the locations that the SP were installed. I conducted interviews in Amman with the previous Jordanian ground partner, and with the two Jordanian BSEs. The BSEs traveled to Amman because of the logistical consideration to the research. Manshiat al-Ghayat is located 260 km away from Amman. Both I and the previous ground partner had accommodation in Amman. Time in the car back and forth to MaG I engaged in discussions

[21] The – new – BSEs are trained by the Jordanian BSEs in Jordan.

regarding the Jordanian IST program, and the Jordanian culture. Moreover, I have conducted un-recorded interviews with two previous assimilates of USAID regarding the Jordanian IST program.

In Tonga the research was conducted from mid-January to start of April 2019. Approximately 6 weeks were spent at Tongatapu, where the Tongan BSEs residents. At Tongatapu I conducted 14 interviews. One interview with Papahi (one of the BSEs); two interviews with Lekeleka (the other BSEs) (because we did not complete the interview the first time); one interview with the current Tongan ground partner; and one interview with the Town Officer of Kolomotu'a (where Lekeleka and the current Tongan ground partner residents). All these interviews where held in my accommodation (guest house) in Nukualofa. Interviews with people with SP in their households included one woman from Sia Sia (an island west of Nukualofa), one man in Kolomotu'a, and one woman in Kolomotu'a. To get an nuanced understanding of the lives of people in Tongatapu I conducted one interview with the local chairperson for the local fishing community in Kolomotu'a (which did not have SP), four interviews with three government representatives from the department of Renewable Energy (two of the interviews were held with the gender-specialist in the department), one interview with two male representatives of the energy supplier in Tonga (TPL), and one interview with three female representatives from a local women empowerment NGO (the Talita project). In Tongatapu I stayed at the BSEs households in Kolomotu'a and in Houma, and I visited homes with installed SPs in Kolomotu'a. I experienced a storm that led to power outage when I lived in Kolomotu'a. The current local ground partner assisted me in interviewing community members, driving me to different locations and introducing me to the community. The time spent in the car provided me with insight into the Tongan IST program and the Tongan culture. The rest of the time in Tonga I spent at the island group Vava'u, where I visited several rural (solar freezer) electrification projects carried out by the department of renewable energy, and, during the excursions I held un-recorded interviews with women managers of the solar freezers. This guided my understanding of women's roles in the Tongan society and the utility of solar technology in Tonga. Moreover, the three months in Tonga enabled me to have multiple conversations with people regarding solar energy and gender issues in Tonga.

4.5. Data analysis

The analysis of the data has been an ongoing process, the analysis starting off before the data was collected. The data analysis depends on the questions asked, which guides the approach of the study. The data analysis relates to my reflexivity; the pre-established knowledge I carry, and my ability to reflect over and make decisions regarding the research. The analysis has been an ongoing process; the analysis started off when I investigated and formulated my research topic, when I addressed and hardened my conceptual and contextual background, and when I prepared for and carried out the interviews. As an example, during and after the interviews, I took time to reflect upon the interview results; both by writing reflection notes and through oral discussions with people living in the countries. My analysis of the results in Jordan affected how I was approaching the analyzes of the results in Tonga. The results from Tonga, provided new insight into the research conducted in Jordan. The two contexts formed and shaped the analysis of each other. I transcribed the data from both contexts, and color coded the transcribed records into four categories: one color represented the contextual IST Program development, the three other colors included structural, relational and agency-based proponents of women empowerment. It was problematic to distinguish between the proponents of women empowerment, whereas they are interconnected. The color codes were used to present my results, divided into three parts: The facilitation of the IST programs; the community Perspective; and the women empowerment part (the date from the two contexts was always separated into two different chapters). The results developed into an analysis guided by CARE's women empowerment framework. The data was analyzed thematically using CARE's women empowerment framework. In addition, the Barefoot College Model was utilized as a starting point to understand the Jordan and Tongan IST programs' facilitation and effects in the respective contexts. At this point in the analysis, I brought in the dominating theme of this thesis: how program, community and women's Perspectives have a different, challenging and complimentary approach to the understanding of the BSEs' women empowerment processes. The three Perspectives catalyze how structure, relational and agency-based dimensions affect the BSEs' women empowerment processes. Through CARE's framework, the Barefoot College Model, and country overviews, the results/analysis and the discussion chapters of this thesis highlight themes that form the contextual background. The field data is coupled with the data collected from documents influencing the ethnographic research design for triangulation purposes and to broaden the contextual understanding.

4.6. Data Quality and Ethical Consideration

Data Quality underlines the validity and the reliability of the research (Bryman, 2015). Moreover, ethical considerations underpin the data quality: this entails providing sound and fair representation of the data (Bryman, 2015). Nevertheless, ethical considerations are essential for social research because it is people centered; social research can incline potential life-changing effects for the participants. Bryman (2015) highlights four ethical considerations: do no harm, informed consent, privacy and deception. The data was collected in terms of the Norwegian Center of Research Data guidelines. The participants gave their consent to be part of the research, and to be recorded. I explained to the participants the research purpose and my role as a researcher. In addition, I declared their rights and provided them with my contact information. I have anonymized the participants, because they have provided me with information regarding third parties (that have not been interviewed themselves). Therefore, the four BSEs' are pseudonymized. I have respected the participants time and privacy by giving them the choice of the setting and time of the interviews. Moreover, I made it clear that the interviewees did not need to answer questions they were not comfortable with.

4.6.1. The role of the translators

In Jordan and in Tonga, the ground partners of the IST programs were involved as translators for the research. Neither of the ground partners had professional experience as translators. This affected the research, because in some occasions the ground partners misunderstood the role, leading them to interpret rather than translate (that is why some of the quote is in first person tense and other quotes are in second person tense). The ground partners had three roles in this research: they did translation, they introduced me to the communities (the participants) and they were interviewed. The three roles of the ground partners affected the liability of the data; sometimes the distinction between the translator and the interviewees' opinions was unclear. Nevertheless, engaging the ground partners as translators created an environment in the interviews resembling conversations rather than interviews, which 'eased' the mode and created flowing conversations. The Jordanian translator was a woman; providing an all-female environment in some of the interviews (this includes the interviews of the BSEs), potentially

enabling more openness in regarding sensitive issues (such as marriage practices). In Tonga the translator was a man; he aided interviewees with medium skills in English, and, therefore, they lacked confidence in participating in an interview on their own. The English level of the interviewees in Tonga provided them with the ability to interfere if their information was wrongly represented; nevertheless, other barriers might have limited them from speaking up (e.g. gender relations and hierarchical norms). Because both the translators were ground partners of the Barefoot College the interviewees might have been inclined to share a positive impression of the respective IST programs.

4.6.2. Limitations

Limitations of this study include the representation of the perceptions. In Jordan, there was a skewed representation of men in the sample; only one man was interviewed as a result of the convenience sampling approach. In Jordan and in Tonga the same interviewees were used in the different perception analyzes. The women Perspective included the four respective BSEs; meanwhile, the program Perspective included Perspectives from the respective four BSEs, and the two involved ground partners (moreover, in Jordan USAID were a part of the program Perspective and in Tonga the local town officer was included in the program Perspective). In the community Perspective all the interviewees' point of views was represented. The overlapping roles of the interviewees creates fluctuating Perspectives and they are difficult to differentiate.

Limitations were also encountered regarding the quality of the data. The quality of the records was to some extent, challenging. Background noise (such as heavy rains, and children eating chips) made some content difficult to transcribe. Moreover, participants' represented opinions might have been affected by the conditions of the interviews. In most cases of the interviews, people who were not participants of the research were present in the interview; the participants families were present in both Jordan and Tonga (when the interview was conducted in people's homes). In Jordan one of the BSEs' and the driver were, in most cases, present during the interviews.

There were also limitations regarding comparing the data collected in the two settings, Tonga and Jordan. The main differences are the time spent on the research; number of interviewees; the use of translators; the ability to participate in the daily life of the interviewees;

my pre-knowledge of the different contexts, which affect the ethnographic approach and my reflexivity.

5. Results and Analysis

The Barefoot College has introduced its International Solar Training (IST) Program in Jordan and in Tonga with the ambition to tackle energy poverty and encourage women empowerment in rural communities. The Barefoot College Model includes training illiterate, middle-aged women to become Barefoot Solar Engineers (BSEs) to enable local ownership over decentralized solar energy. The BSEs are trained to install, operate, maintain and repair Small-Scale Solar Photovoltaic Systems (SSPS).

This chapter analyzes if the national IST programs in Jordan and in Tonga have enabled a women empowerment process for the BSEs, and if, how. The potential empowerment process is analyzed through the CARE (2006) analytical framework on women empowerment, using the triangle model – Structural, relational and agency-based empowerment and an ethnographic approach; redeeming the community and women perspectives as the beacon of the analysis. The results and analysis provide evidence that suggests that the Jordanian and the Tongan BSEs have undergone an empowerment process. The national IST programs have encouraged structural, relational and agency-based empowerment.

The structure of this chapter builds on a threefold approach to the BSEs empowerment process – the program Perspective (highlighting the structures around the BSEs), the community Perspective (highlighting relations around the BSEs), and the women Perspective (highlighting the agency of the BSEs). The three different approaches highlight three different objectives regarding the women empowerment process – economic sustainability, community/family development and women empowerment. The perspectives both compliment and critique one-another.

The chapters 5.1.1./5.2.1 – the program Perspective – examine how the national IST programs differentiate/assimilates the Barefoot College's Model; these chapters underline how the contextual structures facilitate and/or limit the BSEs' women empowerment. Next, the chapters 5.1.2./5.2.2. – the community Perspective – examines the national IST program and

the SSPS/solar lanterns impact on the respective communities; this chapter defines community objectives for women empowerment and examines the transferability from the IST program impact on the community regarding the BSEs' empowerment. Finally, chapter 5.1.3./5.2.3. – the women perspective – underlines how the empowerment process is experienced by the respective BSEs.

In Jordan and in Tonga, the national IST programs have enabled social changes regarding community development and empowerment of BSEs; nevertheless, the national IST programs encountered cultural, organizational and market/economic pitfalls that redeem the programs as economically unsustainable. In Jordan, the BSEs experience marginalization in terms of lack of autonomy in decision-making regarding their own lives and denied participation in the public domain. The Jordanian IST program has enabled the BSEs' mobility in public space and their socio-economic independence. Moreover, the Jordanian BSEs are encouraging women engagement in the workforce and in the political space. In Tonga, the BSEs struggle to provide means for their family's needs. The Tongan IST program have provided the BSEs with skills and knowledge of which they have utilized to contribute to their family's socio-economic betterment.

5.1. The Empowerment Process of the BSEs of MaG, Jordan

Situated in MaG[22] a desert village in Jordan, are two BSEs, that joined the Barefoot College's IST Program in 2011. The BSEs, Shazmah and Aatifa of MaG, have undergone an empowerment process; they tell a story of where they started out with bolted gates, which restrained their freedoms. At the Barefoot College the women underwent a change, attaining information about how life might be different for other women from other countries and cultures. Back in MaG the women empowered themselves, bringing with them confidence and skills; they became the hammers that broke bolted gates.

MaG is a Bedouin village. People from this area are traditional herders of Halal (sheep and goats), and the culture is influenced by Sunny-Islamic traditions and customs. There are few job opportunities for people in MaG, besides Halal. Men are traditionally the breadwinners of their families; most men have several wives. Women are often managing the homes. People are

[22] Located in the Ar-Ruwayshid District in Mafraq Governorate in Jordan, 280 km away from the Capital city Amman. Population is around 1000 – 4000 people (Population, 2018); many people live without ID. Therefore, the government statistic might be faulted.

living in tents and houses. Some of the houses are connected to the government electric grid, while many of the tents are not. The government electricity supply is sometimes cut, leaving houses in darkness during night-time. Some of the wires in the houses are hazardous for fires and electrical shocks.

The BSEs' provided 80 tents and houses with a sustainable and safe Solar PV electricity for lights and for mobile charging and made 100 lanterns that were sold in Syria in 2013. The BSEs have trained 18 new BSEs from rural communities all over Jordan. Moreover, the BSEs have contributed in shifting gender stereotypes, increased female participation in local politics, increased female literacy in and fostered physical and social mobility for women in MaG. The Jordanian IST program encounter limitations regarding its economic feasibility; the BSEs have encountered difficulties in making the Jordanian IST program economically sustainable. The Jordanian Model differs from the recommended Barefoot Model (see the Background Chapter on the Barefoot College Model); the adaptation of a novel Jordanian Model was a necessity to meet the cultural/societal context (Bedouin Culture – payment restrictions), an outcome of gendered and hierarchal notions' of management, and community Perspective of the IST program.

5.1.1. The Jordanian IST Program/Model – Catalyzing Enablers and Limitations of the Jordanian BSEs' Empowerment Process

This chapter examines how the Jordanian IST program and model assimilates/differs from the Barefoot College's Model; investigate how the Jordan IST program and model catalyzes the structures, relations around and agency within the BSEs; defining the limitations/strengths the Jordanian IST program and model has in enabling processes for women empowerment; and highlight what the current stakeholders of the Jordanian IST program suggest can be done differently to enable women empowerment for the BSEs. The potential effects on the BSEs women empowerment are analyzed through CARE's empowerment framework. Chapter 5.2.1. is based on interviews with the ground partner, the two Jordanian BSEs and three new BSEs.

The Jordan IST program is economically unsustainable. Currently, the Jordanian ITS program is haltering, there is no equipment, no funds and the Jordanian BSEs are pushed out of their Renewable Energy Workshop. The Jordanian IST model provides limited opportunities for the current BSEs economic empowerment. The BSEs and the previous project manager have

high aspirations about the project's future sustainability. The solutions outlined include a sustainable flow of equipment from a steady and reliable partner and support from donors. An up-scaling of the program involves building a new REW, training more BSEs and increasing people's capabilities, providing jobs to people in the village, and making life better for the next generation.

The Barefoot College Model and CARE's empowerment framework highlight structural and relational enablers and limitations of the Jordanian IST Program. The women empowerment factors visualized by CARE's framework are cultural structures (i.e. patriarchal-hierarchal), organizational structures and market/economic structures that have shaped relational and agency-based limitations and enablers of the BSEs empowerment.

Organizational and Cultural Structures

This section addresses the interlinkages between organizational and cultural structures around the Jordanian IST program/model which enables and/or limits the women empowerment process of the BSEs.

Highlighted by the Barefoot College Model, community involvement (though the Village Electrification Committee (VEC)) is central to enable IST programs' sustainability – community involvement ought to be the backbone of the IST programs' organizational structures. The community ought to be involved in the decision-making regarding rural electrification. Community acceptance and awareness creates an environment for efficiency, transparency and economic sustainability. The organizational set-up of the Jordanian IST program encountered limitations regarding community participation in MaG. From the start of the initiation and facilitation of the BC IST program, the program encountered challenges regarding community acceptance and awareness.

The VEC was established in Jordan to engage the community. The members of the VEC include the BSEs, people from the community, the village leader, and the Jordanian Society of Sustainable Development (JSSD) (the first ground partner). The village leader was appointed as the project manager. Gender norms restricted the BSEs from taking part in any official leadership roles. The BSEs were appointed as technical directors[23], and were responsible for

[23] The role of the technical director include being responsible for instalment, and the maintenance of the solar-equipment.

the daily operation of the REW[24]. JSSD involved target-group coordination and donor cooperation. JSSD was the main-decision maker, which questioned the power the BSEs and the community members had in negotiation of the organizational structures of the Jordanian IST program.

The VEC was quickly dismantled; only 2-3 meetings were held[25]. The Jordanian IST program failed to create an environment for acceptance and awareness for the Jordanian IST program within the respective community. Moreover, the community members did not see their participation as necessary when they discovered that the program had limited economic means and, therefore, could not provide a salary for the members. The community struggled to accept the alteration of gender roles. One of the greatest challenges to engage BSE candidates was that for women to engage in income-work outside her household, and traveling to India was considered shameful, because they would have to communicate with men in their work and in their travel.

The organizational structures of the Jordanian IST program enable space for the Jordanian BSEs to engage in public spaces, to provide access to groups for women, increase women engagement in public space, and provide ability to engage in alliances and negotiation, and foster agency in terms of skills; education attainment; employment; and improved self-image (which are all highlighted by CARE (2006) as enablers of women empowerment processes). CARE's empowerment framework suggests that cultural and organizational structures limit the BSEs from engaging in their community, let alone influence and control decisions-made by the community and hold the powerful (e.g. the village leader) in the community accountable, which are all central aspect of CARE's empowerment objectives.

Market/Economic Structures

This section addresses the market/economic structural enablers and/or limitations around the Jordanian IST program/model which affect the women empowerment process of the BSEs.

[24] The REW is located on the premises of the local primary school in MaG; walking distance from the BSEs' home. The center sought to be used for Community-Meetings, storing of equipment, as a training venue and as the workplace for the BSEs.
[25] Around 30 people were present in the VEC meetings, 1/3 women. The VEC meetings were open for anyone who wanted to participate.

CARE's (2006) empowerment framework highlights the importance of market access for women empowerment. The Jordan IST program encountered two specific problems regarding market accessibility. (1.) The installation of the SP in nomadic households limited the feasibility of monthly payments, restricted the BSEs control over own labor, and restricted the assets of the Jordanian IST Program because of the households' emigration/immigrations patterns, and cultural biases towards female participation in income-work. In addition, (2.) The Jordanian BSEs are dependent on the Barefoot College or other donors to acquire solar equipment because of the Jordanian IST Program's lack of assets and excessive price of solar equipment in the Jordanian market.

(1.) The Jordanian IST program does not follow the Barefoot College Model regarding monthly payments. The energy poor in MaG is Bedouins. Some of the households with SSPSs are therefore traveling with their home, which creates geographical limitations regarding monthly payments. Furthermore, the BSEs do not have the skills to develop contracts and receipts, nor the legal set-up around them to assure the liability of the contracts. In turn, lack of documentations and the herder lifestyle of the target-group has restrictive impacts on the Jordanian BSEs' overview of the households with SSPS, which restricts their ability to control their labor and uphold alliances with the target-group.

To overcome cultural biases towards female participation in income-work, the IST program provided the SP almost free of charge[26] to the energy poor households in MaG. The community was skeptical to the Jordanian IST Project at the initiation stage; people from the village raised concerns about the shame it would incline to send the women to India. In addition, community members were concerns about the ability of two uneducated and illiterate women to learn new skills and develop a successful project.

(2.) The BSEs' lack of access to markets highlights several limitations for the Jordanian IST Program's economic sustainability. The price of the SP is too low, which redeem the Jordanian IST program as economic unsustainable; and there are cheaper alternatives to solar products on the local Jordanian market (although of seemingly lower quality). The alternative solar products and the Jordanian IST (social) model, targeting the poorest in society and limited opportunities for monthly payments, restrains alteration of the price. The Jordanian BSEs have perused possibilities of enabling economic sustainability for the Jordanian IST program: The Jordanian

[26] The households would pay a symbolic price of 35 JD, of which 15 JD would go to each BSE and 5 JD would be put aside as savings for the project itself. For the very poor households' extra arrangements were done, and some of the households would not pay for the systems at all.

BSEs has perused possibilities of buying equipment from the Jordanian market, however the BSEs have learned how to build one specific type of system/lantern, of which parts are expensive to purchase in Jordan (a quick calculation estimates a price of 350 JD for one SP). Moreover, the BSEs have explored possibilities of taking up loans, however, since the BSE has limited resources and economy, the bank will not provide them with assets; there are no micro-finance arrangement in the area. Furthermore, the BSEs have perused the possibility of government sponsorship for the Jordanian IST program. The local government redeems the Jordanian IST program as economically unfit and does therefore not wish to provide any support. Government community development initiatives fronted in MaG area is directed towards halal, road maintenance, irrigation development and conservation of green areas[27]. The economic structures surrounding the women in MaG, restrains women from taking part in the income-generating workforce. Women dependent on male family members (e.g. husband, brother or father) income to sustain daily needs. The BSEs lack of market access makes their work as solar engineers dependent on donor funding.

The IST program in MaG is dependent on funds. Donors have provided for the solar equipment; the REW; salary for the BSEs; capacity building training for the BSE; constructing the BSEs houses; and training of new BSEs. Throughout the project's lifetime in MaG the stakeholders of the Jordanian IST program (i.e. the ground partners (first the JSSD and, later, the Jordanian Friends of Environment (JoFoE)) and the BSEs) have focused on attracting donors and other types of support to make the project sustainable. A range of actors have been involved in the project such as the Jordanian ministry of Environment, the Jordanian Ministry of Educating, the Indian Embassy in Jordan, Aramex, UNWoman, and USAID. In 2012/2013, the BSEs ground partner JSSD ended their collaboration with the BSEs in Jordan, the JoFoE became the new ground partner. With the change of ground partners there was a change in decision-maker roles. Under JSSD the two BSE and the original project manager played a big part as decision-makers. However, under JoFoE, the BSE and the original project manager[28] was excluded from decision-making regarding the project. Because of the short-term involvement of the myriad donor partners, their impact on the long-term development of the program's sustainability is questionable. Problems with the Jordanian IST program's economic sustainability restricts donor engagement with the project. The interviewees aligned with USAID highlights that donors have lacked willingness to sponsor the project because of the

[27] The green areas are protected from people who will use the green fodder to make light and heat in wintertime.
[28] The original project manager ended her contract with the FoE after two years. But she keeps contact with the BSEs.

programs organizational structure (e.g. the business model), expensive products and the prioritization of upscaling of the project, rather than prioritization of facilitating a sound economic bases of the project.

Applying CARE empowerment framework to the Jordanian IST model/program visualizes several limitations/enablers on the Jordanian BSEs empowerment process regarding market/economic structures. The BSEs have limited possibilities regarding influencing the external market forces (regulating costs) and the inability of the target-group to provide monthly fees (limiting economic gain). Moreover, the limited market/economic structures highlight political dimensions of the BSEs women empowerment process in MaG, i.e. the inadequacy of women targeted community development initiatives. Nevertheless, the Jordanian IST model provided the target-group with SP for a seemingly small fee, aiming at enabling community awareness and acceptance towards the Jordanian IST program and the novelty of involving women in income-work; as an effect part of community in MaG shifted their Perspective, enabling them to see poor, illiterate women as a resource for the community's development.

5.1.2. The impact of the Jordanian IST Program on the Local Community and Women's Empowerment

This chapter analyzes the impact of the Jordanian IST Program for the respective communities; defines what development and empowerment objectives are important in the community; and examines the transferability from the IST program impact on the community regarding the BSEs' empowerment. This chapter is based on all the interviews listed in Appendix A (the BSEs, the ground partner, the household with and without SSPS). In addition, my results depend on participatory observations – one example of this was traveling with the BSEs and the previous ground partner to Aurishad to look for a potential donor of the project in the town house.

The development and empowerment objectives are addressed through an ethnographic approach to the community Perspectives. The transferability from the Jordanian IST program's community impact to the BSEs women empowerment is analyzed through CARE's empowerment framework.

The community Perspective highlights the limitations of perceiving the Jordanian IST program from a solely program oriented Perspective (as in chapter 5.1.1.). The program

Perspective contextualize the project from a solely economic lens (indeed, economic revenue is important to attain solar equipment, to foster communal development, and women empowerment). A program-oriented analysis is incomplete in the context of MaG, whereas community objectives are not formed in terms of economic revenue solely. The community Perspective provides tools to understand what women empowerment objectives and process are important for energy poor in MaG. This chapter highlights why the BC solar technology and the Jordanian IST program is important for women empowerment in the community context. The Jordanian IST program highlights that increased access to lights, enable other types of development and encourage women empowerment. The chapter outlined development objectives and empowerment objectives relevant to small-scale - decentralized electrification catalyzing what development and empowerment goals are important to energy poor households in Manshiat al Ghayath.

The community in MaG have highlighted several socio-economic positive impacts of the Jordanian IST program in their daily life. There are multiple factors of which the SP have helped the respective communities. Among them are economic, and social attributes most prevalent. The SPs were highlighted as a catalysator of increased time (for Children's homework, housework and social visits); improved health (from improved inside air quality and improved quality of lights) decreased expenses (on power-bills, or oil); increased security (fire prone kerosene lamps, and electrical shocks hazardous wiring); increased safety (when walking at night time); increased stability of power supply (as an alternative to unstable supply of energy from the official grid) and increased access to information and communication (from charged mobile phones); increased socio-economic independence (in acquiring light sources); and increased availability of work for women (from alteration of gender roles).

CARE highlight women empowerment as conditioned by her context. The community context constitutes the relations and structures effecting women's agency; options and actions. Table 1. below outline the indicators that the community have highlighted as meaningful and relevant in their daily life regarding the SP impact. SP is meaningful for the energy poor in MaG. Energy poverty takes many forms in MaG, poor households experience inaccessibility to energy; and because they are not connected to the grid; (because of unavailability or because they do not have ID papers) and as a result of unsustainable power supply (poor wiring results in power breakages).

The CARE empowerment framework highlights several women empowerment objectives of relevance to SP technology made visible, through the respective communities' perceptions,

of what some fractions of 'development' is relevant and meaningful for them. The objectives highlighted by CAREs empowerment framework and the ethnographic approach cannot be assumed a direct transferability to women empowerment outcomes. The outlined objectives are pinpoints to what constitute meaningful and relevant aspects of the BSEs empowerment process. There are several topics for discussion regarding the outlined empowerment objectives. Women empowerment in MaG is defined as the process enabling women themselves to have a better life and the process of enabling community development. The objectives highlighted in table 1. highlights the women empowerment as a facilitator and an outcome of community development.

Community Development Objective	**SP/ Jordanian IST Program's Community Impact**	**Women Empowerment Objectives (CARE)**
Time Management	More hours of light and less time Spent to acquire alternative light sources freed time for: Children's homework, housework, and self-chosen activities such as social visits	Agency: Decision influence in HH finance & child-rearing Relational: Alliance/Coalition habits
Health	Decreased use of oil/kerosene lamps: Improved raspatory health, and increased quality of light increase eye-sight health	Agency: Body health
Assets Available	Decreased expenses on oil and grid, increased assets available for food stuff and clothes	Agency: Decision influence in HH finance & child-rearing Material assets owned Body health/ integrity Relational: Negotiation/ Accommodation habits Structural: Market/Economic: Market accessibility (labor/credits/goods) Cultural: Marriage/Kinship rules & roles
Security/Safety	Reduced exposure to hazardous wires and fire-prone oil lamps. Available light at night decreases risk of hurting oneself in the darkness. And decreases fright of darkness	Agency: Body health
Stability Power	Decreased effect of power-	Structural:

Supply	breakage from the grid	Market accessibility
Access to Information and Communication	Charged mobile phones: Contact family and friends Mobility Enabled skills (literacy) Globalization Changing perceptions	<u>Agency:</u> Information/skills Educational attainment Mobility in public space <u>Relational:</u> Negotiation habits Alliance habits <u>Structural:</u> New Social forms Market accessibility
Socio-Economic Independence	Economic independence because of increased assets Social independence because of increased access to energy overcoming some barriers of restrictions of lack of ID	<u>Agency:</u> Self-image Material assets owned Body health/integrity <u>Structural:</u> Cultural: Marriage/kinship rules and roles Market/Economic: Market accessibility
Availability of Work for Women	Altering Perspective on women, And decreasing dependency	<u>Agency:</u> Self-image Information/skills Mobility in public space Decision influence in HH fiancé & child-rearing Material assets owned Body health/integrity <u>Relational:</u> Consciousness of self/others as inter-dependent New social forms <u>Structural:</u> Cultural: Marriage/kinship rules & roles Market/Economic: Market accessibility

(Table 1. Community development objectives; SSPS impact on the community and the community women empowerment objectives)

<u>Time Management</u>

The solar lanterns and the SP was useful in people's daily lives because it provided more hours a day with lights and less time used on acquiring alternative light sources (e.g. people from MaG must travel 8 km to the nearest market in Aurishad to purchase kerosene oil). The SP and the solar lanterns freed up time for children to do their homework, women to do housework,

and for women to do self-chosen activities, such as social visits.

Regarding increased ability for time management in MaG the CARE framework highlights several aspects that can translate into rationalizing a community-based notion of women empowerment: decision influence child-rearing and increase Alliance/Coalition opportunities. The increased flexibility of children's time to spend on homework and the increased time for social visits enabled the respective women's coalition habits and decisions regarding child-rearing, because the women would bring their children on social visits.

The time available objective does not visualize other cultural limitations for women to engage in social visits and engage in decision making regarding child-rearing. Such as limited access to public space and limited say in the household decisions because of prevalent patriarchal structures. It is therefore questionable to assume that increased opportunity for time management translate directly into structural and relational changes that increases women's autonomy in these dimensions because of access to light.

Health

The solar lanterns and the SP had positive effects on health because it reduced the usage of Kerosene lamps. The households reported that their raspatory health had improved when they stopped using Kerosene lamps, as an outcome the shift of light source. People also reported positive effect on their sight regarding the improved quality of light.

CARE frames highlight health as an impact on the agency-based empowerment 'bodily health'. Bodily health is seen as a community objective of empowerment, not solely a women empowerment objective. Nevertheless, bodily health highlights the interconnectedness of women's empowerment and the community and family. Bodily health brings about changes that she and the community perceive as important for family wellbeing.

Assets Available

The solar lanterns and the SP had positive impact on the respective households' assets owned. People with solar electrified lights used less money on acquiring other light sources (such as

kerosene oil and official-grid energy[29]), since SP was installed very cheap in people's households, this is a substantial difference.

Through CARE's women empowerment framework available assets in MaG are addressed in terms of: Decision influence in HH finance & child-rearing, material assets owned, body health/ integrity, negotiation options, market accessibility, and marriage rules and roles. For women in MaG increased assets can translate into increased decisions/negotiation power about the household purchases, e.g. school fees, clothes and food, increased assets provide women with increased market access and increased assets provides women with funds to provide food for her family (e.g. bodily health), increased assets provide women with power to influence her and her families' life, enabling relational change regarding marriage rules.

Decreased expenses does not necessarily translate into increased assets, if the light sources are provided by other people, they will not have more means, because they have more lights. Other limitations, such as patriarchal structures, might limit the women empowerment process highlighted by CARE regarding assets available.

Security/Safety

The respective households highlighted increased security as an impact of the solar panels and the solar lanterns, because of reduced use of grid-energy and oil lamps. The wires connecting the houses to the grid in the village are sometimes damaged or not properly installed. Electric shocks are a risk in these houses – and have been reported a source of death and health deprivation for people in MaG. Moreover, oil lamps are fire hazardous. The solar lanterns and the SP had positive effect on safety in MaG. With the lights at night there are decreased probability that people would trip over and hurt themselves. Moreover, when rooming at night with a solar lantern, rather than a kerosene lantern, the chance for fire decreases. In addition, several Children's fear of darkness decreased with the available light from the solar electrified light.

CARE empowerment frame highlights 'bodily health' regarding the SP and the solar lanterns positive affect on security. Alike in the section about 'health'; bodily health is seen as a community objective of empowerment, not solely a women empowerment objective.

[29] Light powered form the official-grid costs approximately 40 JD a month.

Installed SP in households with grid-connection does not necessarily provide increased security, if the wires are still electrified, even though they utilize the SPs.

Stability in Power Supply

Energy supply from the official suppliers is irregular (e.g. weekly and monthly breakages are regular). The houses/tents with SP and solar lanterns have increased stability of power supply.

CARE's empowerment framework highlights that the stable power supplies have positive inferences in the respective households in terms of structural factor of market accessibility. This means that households with SP and solar lanterns still can access to lights nevertheless if official sources fail to provide electricity. Increased market access enables the other objectives of SP, and solar lanterns outlined in this chapter.

Nevertheless, the stability of solar electrification is dependent on weather conditions; e.g. weeks without sun results in decreased availability of solar technology. Moreover, the stability of the energy provided by the SSPS, is limited by the lack of maintenance and repairment from the BSEs.

Access to Information and Communication

Access to mobile phones is an effect of access to electricity. The interviewees highlighted that time on the phones increased after they have installed SP. Phones provided access to information and communication. Electrified mobile phones are important in MaG because people keep in touch with family and friends through their devices, make arrangement for traveling outside MaG, provide tools to learn new skills and because the globalizing effects that social media has on altering local perceptions.

Regarding CAREs empowerment framework increased access to information and communication relates to negotiation habits; alliance habits mobility in public space; market accessibility; information/skills, educational attainment; and new social forms. The mobile device enables women's negotiation and alliance opportunities through upholding contacts with friends and family. Moreover, communication and information increase public mobility for women because they can make arrangement through their phones for traveling outside their

village, and access public spaces and markets. Increased access to charging of phones was reported by several women to improve their Arabic skills though practicing typing on their phone (these women were previously illiterate); which are altering structures of which women are increasing their knowledge and not limited by illiteracy in their personal development. The increased usage of mobile phones and access to globalized communication and information tools have alter people's viewpoints. One woman argued that: "it is different, before everything is shame, no the mind is change and it is open. Because of that to find the knowledge in a different way." She further elaborated "say shame before, the women did not go outside, now they are going. It is easy to move now, [internet] make open minder."

The SP are not the only provider of power to mobile phones, therefore the phones impact on the women's lives is not directly linked to the Jordanian IST program.

Socio-Economic Independence

The SP and the solar lanterns were reported to have positive impact on women's economic and social independence. The households with solar technology are less dependent on support from others, to access electrified lights. Women-headed households (many of the interviewees are either widowed, divorced or not in contact with their husband), are dependent on someone else (such as husband, extended family, or neighbors) to provide them with means for light (oil or gas for generators and lamps, or money for electricity bills). Women without husbands and fathers face limited access to the girt if they do not hold ID papers (women in Jordan cannot obtain ID papers on their own, for themselves or for their children). People without ID-papers have problems registering their houses with the government. People without registered houses sometimes connect their household to the neighbor's energy outreach. They are then dependent on neighbors.

The community objective 'socio-economic independence' directly targeting women empowerment. CARE highlights the dimensions of self-image/self-esteem; material assets owned, body health/integrity; marriage/kinship rules and roles; and market accessibility as relevant in defining the women empowerment process regarding socio-economic independence. The SP and solar lanterns can ease the difficulties that vulnerable women headed households experience. SP and the solar lanterns inexpensiveness provides women with increased autonomy because the women experiences less vulnerability in regard to social

support to sustain themselves and their households regarding accessing energized light – providing the women to change their self-image from dependent to independent, giving the women increased opportunities to challenge hurtful marriage roles and roles and increase their bodily integrity.

CAREs highlighted empowerment processes is not directly translated to all women in MaG, neither can the SP and the solar lanterns directly translate into socio-economic independence, because other factors might help enable this process. Nevertheless, this section only illustrates what some women have experienced in that respective community. Moreover, SP and solar lanterns does not provide structural changes in rendering patriarchal norms in themselves, neither does they target the root causes for socio-economic dependence, and, limited access to obtain ID papers.

Availability of Work for Women

The Jordanian IST program have impact on the social-economic structures of the society, by providing women in the community with access to work. The respective community members of MaG highlighted this as a positive change, although, the Jordanian IST program are currently not providing sustainability in terms of work opportunities.

The Jordanian IST program provided space for women to engage in spaces outside the household. When the Jordanian IST program was introduced it was met by much skepticism from the community. However, the prosperity of increased economic assets convinced people in the community that engagement of women in income-generating activities was indeed positive for family and community development. The previous ground partner of the Jordanian IST program stated that: "The community they love the project. At first, they did not support in the women, then the woman come back and light […]. They think it can help increase their income." (Interview 5). The previous ground partner highlights that enabling development and increasing job availability, is of greater importance for people in MaG, than to hold on to traditions and Perspectives that can halter their economic and social development. Women in MaG highlighted the women Perspective of providing income-work for women: "[Because of] our Bedouin [culture], she said we should jump, not stay in the in the same, we should empowerment, to push the woman. To increase the number of women in the work." (Interview

1) and “The woman, if she has support, she can empower herself. […] Any project for the woman they support her, she can improve and develop the society.” (Interview 8).

The Jordanian IST program facilitates space for structural change in MaG. However, the Barefoot College IST programs impact on structural changes, gender role alteration and enable expectations towards women in a society from a different context might be rendered culturally unacceptable. This discussion is catalyzed by the economic unsustainability of the Jordanian IST program, raising the question of which these structural changes can prevail, if the Jordanian IST program does not.

5.1.3. The Jordanian BSEs' Women Empowerment Processes and Outcomes

This chapter analyzes if the Jordanian BSEs have experienced an empowerment process though the Barefoot College IST program, and if yes, how. This chapter compliments and challenges the chapter 5.1.1. and chapter 5.1.2. Chapter 5.1.1.: ‘the Jordanian IST Model Effects on Women Empowerment’, offers a tool to emphasize what structures, relations and agency-based factors are limiting or enabling the BSEs empowerment process, nevertheless, the program-based analysis lack dimensions of analysis the Jordanian IST program effect on empowerment, therefore chapter 5.1.2. introduces community Perspective. Chapter 5.1.2. ‘The Impact of the Jordanian IST Program Community Impact – Shaping Community Objectives for Development and Empowerment’ provides a tool of which the women empowerment objectives are analyzed through a community-based lens. Limitations of the community Perspective defines women empowerment in terms of community development, and therefore lack dimensions of what women empowerment means to the respective BSEs. This chapter therefore represent agency-based, relational and structural limitations and enablers represented by the BSEs to analyze the impact the Jordanian IST program has on women empowerment.

This chapter aim at defining what empowerment means to the BSEs and to analyze the BSEs’ empowerment process and outcomes. The topics of interest are highlighted by the BSE, Aatifa and Shazmah, their previous ground partner The previous Jordanian ground partner Alnzubi, other BSEs in MaG trained by Aatifa and Shazmah, and people in the village associated with the program. In addition, this analysis was informed by donor organizations Perspectives (i.e. representatives of Deloitte and UN Women), through interviews and CARE’s empowerment framework.

Why is women empowerment important fort the BSEs themselves? The two sub-chapter 'the Jordanian BSEs' Life Stories' and 'the BSEs' Journey to the Barefoot College, India, is presented to provide a contextual understanding of the structural and relational surroundings that shapes the BSEs' agency. The last sub-chapter analyzes the BSEs women empowerment processes and outcomes through CAREs empowerment framework.

The BSEs Context - The Jordanian BSEs' Life Stories

Shazmah, a 40-year-old woman, have lived her entire life in the Bedouin village MaG, a desert village situated in the North-Eastern Jordan. Shazmah is a strong, passionate and hard-working woman. This is part of her life story:

When Shazmah was growing up she started school at age 7. Around age 11 Shazmah had to leave school because the teachers in school where all men. Her parents were determined that it is shameful for girls at Shazmah's age to be around men outside the family. Outside school, 11 years old Shazmah were doing house shores and helping with the Halal (sheep and goats). At home Shazmah learned skills such as milking the Halal and producing traditional Jordanian Yogurt.

After a few years at home with her parents it was time for Shazmah to get married as a second wife to a 21-year-old man in her village, MaG. Shazmah was now 14 years old. Although, the marriage ceremony was fun, with boys and girls celebrating together, and a hired artist preforming song; Shazmah reacted with shock and fright when she was married off. She had no interest in marriage, and no one had thought her about the process of becoming a wife, or of becoming a woman.

Her parents pushed her into a new life with her husband, which Shazmah did not agree with. She escaped her husband, running back to her old family. Her parents kept on persuading her and gave her back to her husband. Shazmah, on the other hand, was determined to escape. Over, and over again her parents were pushing Shazmah back to her husband. Shazmah's husband disagreed with her behavior and punished her; although Shazmah's father in law told him to leave Shazmah be since she was still young. As time went by, Shazmah got her first child when she was 18 years, a girl, followed by four more girls, and her husband got two more wives.

At the start of the marriage, Shazmah lived in a Bedouin tent with her husband, and his first wife. Today, Shazmah is living in her own house, with her four children (the oldest of her

children moved out when she got married). Shazmah and her husband has moved apart as partners, all though they are not divorced; leaving Shazmah alone with the main responsibility for providing for their children, which is a challenge because there are few income generating activities in MaG, and especially for women.

Shazmah, a point in time that encouraged her to find the courage to enroll in the Barefoot College IST program; her courage was enabled by her husband's lack commitment to her family. To the question: "what made you a strong person?". Shazmah replied "life", and elaborated on a point in time that had made here realize that she was the one in charge of her life:

> When she [Shazmah] bringing the fourth children, she was pregnant, he [her husband] left the house and he did not come back after seven months after her children was borne. […] Why did he do that? He is coming only to make me pregnant and go back? Leave us... Where is his responsible about everything? […] She did not hope anything from this man. She should be strong and herself, I support for myself. I should support myself. […] This man will never be again responsible for her family or her daughter. And [at] the same time Bunker Roy [the CEO of the BC] is coming to MaG and start this project [(i.e. the Jordanian IST program)]. (Interview 4)

Shazmah decided to go to the Barefoot College in India the year of 2010, so that she could become a Barfoot Solar Engineer; learn how to build and maintain solar-panels and solar lanterns so that she could get a job and make a living for herself and her children. She encountered many closed gates on her way, of which she had to break open to empower herself.

Aatifa, is around 50-60 year, and she is currently living in MaG. Aatifa is Shazmah's in-wed aunt. Aatifa is an independent, hard-working and proud woman. This a is part of her life story:

Aatifa is from Syria, growing up her family were farmers. Her father had one wife, together they got five daughters, including Aatifa, and one son. Aatifa did not have the chance to go to school. Her father told her that school was only for boys, and it would be shameful for her to go to a school with boys. She spent her childhood contributing to the farm, growing vegetables, milking cows, making chees and yogurt, and doing household chores. Overall Aatifa remembers life in Syria as a good life.

Aatifa moved to Jordan when she was 13 years, to get wed with a man from her extended family in a village near MaG. She was his first wife; the wedding was celebrated with a feast,

and people were dancing. Aatifa remembered people where pressing the car hornet to make noise as she arrived the ceremony. Aatifa and her husband got 2 sons, 6 daughters, and 16 grandchildren. Her husband would later get three more wives, and divorce three of a total four of his wives.

At 20 years old Aatifa moved to MaG, at that time there was nothing in that area. Aatifa's' husband together with his brother formed a small community and decided to buy the land in MaG and to start a community. At the start the village was only inhabited by Aatifa's (and Shazmah's) family members. Whereas MaG was only inhabited with one big family, gender relations were less strict; men and women could stay together in public space and events - such as weddings. As time went by, more people from other families moved into the village, and, relations between men and women became restricted; e.g. weddings became a gender segregated celebration.

Aatifa was introduced to the Barefoot College's program through her husband. He liked the idea and wanted her to develop her skills. Aatifa decided to join the Barefoot project because she wanted "to change her life too be more developed" (Interview 3). Before Aatifa got involved with the Barefoot College's IST Program, in 2010, she had no work to get income. Her husband was the main bread winner in the household, and when that was not enough, other people/family members would contribute with means for them to survive. After Aatifa came back from the Barfoot College, she got divorced from her husband; he did not approve the person she had become after coming back from BC; she enjoys being divorced, it makes her feel in power of her-self.

Aatifa had the opportunity to turn on the woman empowerment light switch through the Barefoot College's ITS Program; Aatifa expressed that she can do anything now that her mind is open to it. She expressed in the interviews that she has made- and she will continue to make changes that improve her life and the life of other women in her village.

Shazmah and Aatifa life stories show two individual women which has their agency (i.e. aspirations and capabilities) shaped by the relations and structures in the context of their life. Restraining structures such as - limited access to education, few income-generating work opportunities for women, economic dependence, forced marriage, and limited control over one's own body restrained the women's agency - disadvantages the women at acting upon their empowerment. Nevertheless, other contextual structures and relations and the women's agency enables the women to act and facilitate empowerment. Supportive relations enabled the women's involvement with the Barefoot College, and through the BC IST the BSEs opened

their minds, and found self-worth which empowered their agency and capability to alter status quo power relations and structures, that are haltering the BSEs women empowerment.

The BSE's Empowerment – 'a Hammer that Crushes Bolted Gates'

"[before the Barefoot training] she looks like, shadow, she is not real.
After that she is human being, exists, [she says] – I am here". (Interview 4)

The BSEs spent 6 months at the Barefoot College, in Tilonia, Rajasthan, India. At the IST they learned how to install, operate and maintain SP and solar lanterns[30]. They expressed that the experience had life-changing impact on them – because the technical skills learned and the coalition with other BSEs from other countries and cultures.

The Barefoot College supported the two BSEs' realization of their own agency. Making the closed gates they encountered more visible and enabled them to take actions which could break these closed gates. The closed gates were both intrinsic and extrinsic to the BSEs; the BSEs were now able to challenge their own preconceptions and their structural and relational 'closed gates'. Aatifa and Shazmah highlights enabling factors the BC IST program had on their self-image and self-esteem: Aatifa (interview 3) expressed that "the women can do anything there" (at the Barefoot College). For her (interview 3) seeing this difference in culture, she realized that "now I discover everything I can do; everything is easy". Shazmah (interview 4) argued that because of her developed skills and exposure to the self-realization of her agency: "Anything she think; she do[es] it. She do[es] not care if there […are] gates or not. She is a hammer now".

The Barefoot College provided a steppingstone for the BSEs increased self-esteem and skills development. Shazmah and Aatifa had become hammers breaking down closed gates. However, relations and structures around the two women would still affect their opportunities and choices. An example of this is that Shazmah had to leave the Barefoot College, 20 days in, before she had completed the training, because her husband kept calling her and telling her that her child was sick, and if she did not come back to MaG, he would leave her child in the street. Shazmah decided to leave the BC to go home and take care of her daughter, but before she left,

[30] In addition, the women learned how to make candles and chalk for writing on blackboards.

she (interview 4) told the people at the BC “I will be back”. In MaG Shazmah realized that her husband only threatened her, but he had no interest in acting on his threats. She therefore chose to travel back to India to complete her studies, and at the final exam she was the top student out of 35 nationalities. However, Shazmah’s actions were stigmatized by some people in her community. “she is going without permission from her husband, she is going direct. She is not a good woman that it means” (interview 4).

The BSEs of Jordan have encountered many closed gates limiting their empowerment processes. The BSEs highlight gates of limited access to education; limited control over their bodily integrity; denied/limited public mobility (i.e. the mosque, and the market); lack of equitable notion of citizenship; and restricted work opportunities. Moreover, through supportive relationships and agency-based phycological capabilities and the BSEs engagement with the Jordanian IST program, the women enabled changes for themselves and their community.

The community development and empowerment objectives highlight the challenges encountered by people in the energy poor households in MaG (see chapter 5.1.1.), the community Perspective highlights limiting conditions that the community, and the BSEs experiences in their daily life, as an outcome of energy poverty. The agency-based, relational and structural stage in MaG are catalyzed by the Jordanian IST program. The Jordanian IST program/model highlighted the BSEs empowerment process as shaped by organizational, cultural and market/economic (and political) structures conditioning the outcomes of the BSE’s empowerment process.

CARE’s women empowerment framework highlights cultural, organizational and market/economic structures that limit the BSEs empowerment process: such as no ability to engage alliances and negotiation relations because of lack of: women’s groups; public mobility; market/labor access; civil society representation; marriage roles; inclusive notions of citizenship; access to services; access to justice; political representation; share of state budgets; self-image; skills; education attainment; employment; and decision influence in household finance and child-rearing; body integrity.

Structures and relations only show parts of the picture, what enables women empowerment is women themselves. Agency is therefore an underlined criterion for women empowerment, of which the women can recreate the structures and the relations in their context. The two BSEs had the power within them to enroll and complete the training at the Barefoot College in India; they challenge patriarchal structures on a daily basis and creating space for women in MaG to

participate in public space, income-work, and politics. The BSE highlights that the empowerment process they experienced through the time at the Barefoot College and the RET-skills they acquired from the IST program, have enlightened their notion of self-worth and helped liberated them from repressing structures.

Shazmah described a process of which she had been a shadow, without the ability to use her agency for 30 years, and now she has become a person, with the ability to make her own choices, act on them by breaking bolted gates on her way. Shazmah (interview 4) stated that: "[before the Barefoot training] she looks like, shadow, she is not real. After that she is human being, exists, [she says] – I am here".

In MaG the BSEs have encountered a variety of bolted gates – external and internal. The women's mobility in public space is restrained because of the condensations shame it inclines for the family, when women are engaging in non-family communication. Moreover, Shazmah highlights that her internal fright of being attacked by strangers outside her village restrained her from traveling beyond the village boundaries. Her experiences from the Barefoot College enabled Shazmah to overcome her fear, and to put trust in her-self: "She did not afraid of anything anymore, and she led her-self." (interview 4.) Moreover, Shazmah traveling unaccompanied outside MaG altered the connotations of 'shame'; Shazmah highlighted the acceptance she now experienced when she traveled by herself. Today, her family members would ask her to go to Amman to fix family related issues, and to acquire household needs, even though it would incline Shazmah to talk to men.

Shazmah experienced a range of opportunities after becoming a BSE. Through the work that Shazmah has done in her village she experiences greater appreciation from her family and community members. Her family trusts her abilities; they showed confidence in Shazmah by giving her full responsibility for arrangements to build her brother's house. The community voted her into a (four years, payed) position at the local government. Shazmah aspires economic independence, she has found opportunities in increased mobility to buy clothes in Amman and sell it in MaG. Shazmah is now in 9th grade. Shazmah's reinvolvement in school have inspired here to encourage her children in doing homework and getting full marks in their exams. Shazmah (interview 4) explains that her increased self-esteem have made her independent in decision making: "I decide I do something I did not back to anybody to ask them. She did not need anyone more to help her".

Aatifa tells a similar story to the one of Shazmah. Shazmah have through her engagement with the Barefoot college increased her self-esteem and become an independent woman. She

has increased decision-making power, increased physical mobility, increased income and, the Jordanian IST program have provided here with a range of opportunities. At the Barefoot College Aatifa (interview 3) experienced that women were autonomous: “The woman can do anything there. She can build, not looks like us”. Aatifa (interview 3) discovered the autonomy in herself: “I discover everything I can do […] everting is easy, I can do everything”.

Aatifa states that her enrolment in the Barefoot College changed her as a person. Her self-image provides Aatifa with the courage to make decisions that facilitated her empowerment process. Aatifa increased independence and self-esteem affected her marriage. Her husband divorced her, because he did not accept who she had become. Aatifa’s husbands disliked that Aatifa made up her own mind and acted about it without conciliating him. Aatifa (interview 4) decided to not care about her husband’s perceptions, “she had the power now”. She knew that she was a good person irrespectively of her husband’s perception: Aatifa (interview 3) stated that: “I love myself because I am a good woman”. The divorce increased Aatifa’s (interview 3) “feeling of safety and comfort”. The divorce increased Aatifa’s autonomy in decision-making regarding herself and her family, whereas she was restrained from making decisions about her children before she was divorced. Leading up to Aatifa’s divorce was her decisiveness to travel freely outside her village. Aatifa (interview 3) redeems physical mobility as important for her feeling of autonomy. “She is now encouraged, more than [in the] past. […Before] she did not leave her house, she did not leave her area. Now she can move to Aurishat, maybe Al-Mafrac, she can come to Amman. She never go to Amman by lonely, now she is coming”

Aatifa highlights her independence as an important factor of her empowerment process. Aatifa (interview 3) argue that her experiences and skills attained from the Barefoot College was important for her independence:

> This is very good for me, because at the end of the day I did not ask favor for anybody. So, I am independent woman. Like that. Yes, independent woman, that is it. I did not ask anybody to help me. Give me money or something like that. (interview 3)

For Aatifa this is a great change in her life, before she was a BSE, she had no other options than to ask for money and food from her husband and other people. Aatifa increased her economic independence, she now has built a small shop at her property where she sells snacks to the community (the shop is electrified with SP from the Jordanian IST program). Aatifa keep on striving for empowerment in terms of self-development, she is in the process of enrolling in

the class for illiterate women to learn how to read and wright (she did not consider education important before the BC).

Aatifa's developed skills and her drive to make changes for her-self and her community have created her recognition in the community; Aatifa is accepted and respected by people in the ministry and municipality, which provided her with a job as a member of the social community – she is responsible for management of the road-cleaning service. Aatifa perceives her role in society as inter-dependent of the community and strives to enable changes for other women in her community. Aatifa (interview 3) aspires that "the woman should be learn, she should not be stay at home to make a mama, a woman in the house, now they should many things". Aatifa argue that the community should attain new knowledge and facilitate development process that includes women. Aatifa argue that the empowerment process of women in MaG has started. Today, women are articulating how they can access employment, this is a change of mindset for women in the community whereas their role was previously restricted to home-rearing. Currently, women are present in public space, this is enabling social changes where shame is not to the same extent a condonation of women mobility in public spaces. Aatifa perceives this change to be possible because the Barefoot College enabled awareness about alternative roles for women – before the Barefoot College the women in MaG did not discuss alternative gender roles and relations, but they are today.

Shazmah and Aatifa have together challenged gender stereotypes, increased female participation in local politics, increased female literacy in and fostered physical and social mobility for women in MaG. They have trained 18 new BSEs from rural communities all over Jordan (10 of them in MaG). They have started a class for elderly women in the village; where the BSEs and other illiterate women can complete their education and learn how to read and wright. They have started an women group and encouraged alliances between women; of where the women are aspiring to start new projects that foster women empowerment. Through the Jordanian IST program donors has supported the empowerment process of the 12 BSEs in MaG by sponsoring capacity building course. Finance course provided the BSEs with skills regarding bookkeeping, receive checks and presenting her objectives professionally. In another course, the BSEs learned how to make an action plan for their business. Shazmah and Aatifa have crushed bolted gates through the empowerment process facilitated by the Jordanian IST program. Nevertheless, the BSEs struggle to keep up the Jordanian IST program because of the assets available (monetary, solar equipment and the REW).

5.2. The Empowerment Process of the BSEs of Kolomotu'a and Houma, Tongatapu

Based in Houma and Kolomotu'a, in the Pacific island Tongatapu are currently two Tongan BSEs that joined the Barefoot College's IST Program in 2016. The two BSEs, Papahi of Houma and Lekeleka of Kolomotu'a have undergone an empowerment process through their engagement with the Barefoot Colleges IST program; of which have enabled the women with skills and knowledge of which they have developed their families in Tonga.

The Tongan BSEs are through the Tongan IST Program aiming to provide energy poor households in Tongatapu with SP. In rural Tonga the community sustains their daily needs from substance farming, and by selling surplus crops. The land (both residential and 'bush') in bush areas are distributed inherently from generation to generation, from father to the oldest son[31]. The mangrove communities mainly sustain their daily needs through fishing activities. (many families in the mangrove area are migrants from the outer islands, therefore they have limited access to bushland). The rural bush and mangrove communities encounter different challenges; however, a common concern are high energy prices and the fluctuating supply of the electricity provided from the official-grid. The Barefoot Colleges' model is target the energy poorest proportion of the Tongan society. Most houses in Tongatapu are connected to the grid; some households with SP have access to the grid, and some does not. Energy poverty comes in many forms; poor households often experience inaccessibility to energy in Tonga, even though they are connected to the grid. Because they are unable to pay their power bill, and because of heavy storms and cyclones, and poor wiring results in power breakages.

The Barefoot College IST program have enrolled four Barefoot Solar Engineers from Tonga and contributed to the solar electrification of 260 houses in the island groups Tongatapu and in Niua, Tonga. In 2011, two Tongan citizens were enrolled in the Barefoot College IST Program. These two BSEs provided 260 SP to electrified light and a mobile phone charger in Off-Grid households in Tonga. The Barefoot SP were provided to the energy poorest proportions of Tonga. The 260 SP were spread over 42 villages in Tongatapu (50%) and shipped to the island group Niua (50%)[32]. In 2016/2017, two new BSEs was trained at the Barefoot College; they

[31] Women are generally not allowed to inherent land, however, in some cases there have been made special arrangements.
[32] Niua is situated roughly 600 km away from the main island Tongatapu

have until this date, not received solar equipment. However, they have contributed in repairing and maintaining part of the solar units that was installed by the original BSEs at Tongatapu.

Today, two out of the four BSEs are involved in the Tongan IST program. One BSE lives in Kolomotu'a and one live in Houma, Tongatapu, Tonga. The two first BSEs, who were trained in 2011/2012, are not included as interviewees because one of them passed away and the other BSE has moved to New Zealand. The two latter BSEs, who were trained in 2016/2017, are currently living in Tonga, they are included as interviewees, and they are the ones of which the empowerment process is analyzed.

5.2.1. The Tongan IST Program/Model – Catalyzing Enablers and Limitations of the Tongan BSEs' Empowerment Process

This chapter examine how the Tongan IST program and model assimilates/differs from the Barefoot College's Model; investigate how the Tongan IST program and model catalyze the structures, relations around and agency within the BSEs; defining the limitations/strengths the Tongan IST program and model has in enabling processes for women empowerment; and highlight what the current stakeholders of the Tongan IST program suggest can be done different to enable women empowerment for the BSEs. The potential effects on the BSEs women empowerment are analyzed through CARE's empowerment framework. Chapter 5.2.1 is based on interviews with the ground partner, the town officer in Kolomotu'a, and the two current BSEs.

The facilitation of the Tongan IST program in 2011 was unsustainable, it faulted within one year of its initiation. Therefore, the 2011 Tongan IST Model materialization provided limited opportunities for the current BSEs women empowerment process. Currently, a new Tongan IST Model is articulated, which aim at altering the limitations of the 2011 Tonga IST Model. The new Tongan IST Model aim at initiating local cooperatives, building two Renewable Energy Workshops; enabling economic sustainability and enhance women empowerment. The new Tongan IST Model will be introduced when the equipment arrives from India.

The Barefoot Model and The CARE empowerment framework highlights agency-based, structural and relational enablers and limitations that the facilitation of the Tongan IST program brought about in 2016. The women empowerment factors visualized by the CARE framework are organizational structures, cultural structures (i.e. patriarchal-hierarchal), market/economic

structures that have shaped relational and agency-based limitations and enablers of the BSEs empowerment.

Cultural and Organizational Structures

This section addresses the interlinkages between organizational and cultural structures around the Tongan IST program/model which enables and/or limit the women empowerment process of the BSEs.

The Barefoot College advice the facilitation of community participation as the main pillar for the program's success. The Tongan IST Program facilitated community participation through the involvement and establishment of women's groups. CARE's empowerment framework suggests that group memberships, particularly women groups that enable alliances and coalitions are enablers of women empowerment (CARE, 2006). Nevertheless, involvement women groups is not a quick fix for the empowerment objective (CARE, 2006). The women's power within the group alliance plays a great role in shaping their opportunities for negotiation, control and hold accountable the group that influence their daily life (CARE, 2006). In 2011, the Tongan IST program highlights that the involvement of women's groups does not necessarily lead to situations that enable women to negotiate the objectives and outcomes of situations that affect their life. The 2011 Tongan IST Model was underlined by structures, and relations of which limited the current BSEs realization of their agency. In 2011, The facilitation of the Tongan IST program included involvement of two women centered groups: (1.) A local women's group and (2.) the 'Kolomotu'a Women's Solar Project'. The local women's group was involved in electing the two first BSEs. The local women's group worked as a stepping-stone for the previous BSEs to get involved in the BC IST program. The Kolomotu'a Women's Solar Project were established by the Tongan IST program, aiming on supporting the BSEs with their activities (alike what the Barefoot College terms the Village Electrification Committee (VEC)). Nevertheless, the local women's group had limited power to influence the Tongan IST program and the engagement of the Kolomotu'a Women's Solar Project did not provide a sound basis for the previous BSEs to control the objectives and outcomes of the Tongan IST program.

The structures that have conditioned the BSEs' limited decision-making power within the women's groups are cultural and organizational. The Tongan society is hierarchal. This is

present in public and private spaces. In the home, the man holds the highest position[33]. Tangible examples of this is that - no one should eat their fathers or husbands left over, and - in family discussions the man has the last word, and he is therefore the final decision-maker of the family. A women's opinion is therefore second range to the man. Depending on the family relation, is to what extent the women's opinion is regarded in decision-making. A 'good' husband would be inclined to step down if the wife's suggestion is better than his. A 'bad' husband could override the situation and neglect his wife's suggestion. Patriarchal-hierarchal structures define parts of the Tongan society. The powerful in society are often men of high positions, such as the nobles, government officials and church ministers. Tongan costumes inclines being respectful to the powerful in society in terms of gifts, sign of appreciation and through respecting their power in decision-making. In the 2011, the women's groups were involved with the main ambition to facilitate support for the first BSEs; the women's groups were not sought to provide the BSEs with tools to control the Tongan IST program affect their work. The control of the objectives and outcomes of the Tongan IST program were held by the local ground partner. The ground partner was assimilated with the local government; therefore, he was a natural manager of the program.

The Barefoot College Model suggest an organizational structure that provide already outlined roles of the different members of the national IST programs. Barefoot College recommend that the BSEs hold a technical role (mainly providing installment, maintenance and repairment services to the target group). The Barefoot College advice that the local ground partners provide management and administrative support to the BSEs. In 2011, the Tongan IST program adapted the Barefoot College recommendations regarding the work-roles, with no room for flexibility. The Tongan BSE did the technical work. The Tongan ground partner did management, budgeting and administrative work. The set-up of the organization was problematic because the BSEs were rejected when they claimed full ownership over the Tongan IST Program. The first BSEs were excluded from decision-making roles and limited from negotiate their role within the organization. Lack of compromise lead to the dismemberment of the Kolomotu'a Women's Solar Project, within one year of the establishment.

The organizational and cultural implications in the 2011/2012 Tongan IST program visualize part of the contextual stage that faulted the Tongan IST program economic sustainability (which will be elaborated on in the next sub-chapter). However, new actors (new

[33] The man holds the highest position in a household; however, his sister has the last word in arrangements of special events such as funerals and weddings. However, today the man's sister would not interfere in other family decisions.

BSEs and a new ground partner) have altered the structures and relations of the program to enable a framework that constitute an improved approach, enabling economic sustainability and women empowerment. The shift in the Tongan IST approach has the potential to enable what CARE (2006) highlights to be important factors for relational factors of empowerment appreciation, flexibility, cooperation and accountability. Enabling these relational factors has the potential to change the organizational structures of the Tongan IST Model and enable factors for the facilitation of the new BSEs agency – such as control of labor, group membership and material assets owned.

The New Tongan IST Model is inspired by the Barefoot College Model, and, the new approach aims at overcoming the limitation the previous Tongan IST Model of 2011/2012. The new Tongan IST model will align a cooperative. A cooperative gives the members the highest authority, alike the structure of the Barefoot Colleges Village Electrification Committee (VEC), which sought to involve the cooperative members in decision-making regarding the SP, to foster an environment of awareness and acceptance towards the solar technology, and the Tongan IST program in general. By engaging the community in decision-making regarding fees, elections and policies; these are (according to the BC) enabling structures for the programs socio-economic sustainability. Flexibility and democracy are underlined in the vision of the new Tongan IST Model. The Tongan IST Program opens a flexible approach to the operation of the program by engaging the community to direct the Tongan IST Program.

The Tongan cooperative should constitute from 50-70 per cent women, enabling alliances between women in the local communities. Women headed communal development initiatives are highlighted as an efficient measure in Tonga; women are sought to bring their management role from the home and apply it to their work. The Barefoot College and CARE alike highlights the importance of involving women in decision-making to enable structures and relations that challenge gender discrimination and enable human rights, access to assets and control of labor is highlighted as important factors enabling women's capabilities. The Tongan IST Model highlights the importance of income-generation for the women.

Market/Economic Structures

This section addresses the market/economic structural enablers and/or limitations around the Tongan IST program/model which affect the women empowerment process of the BSEs.

CAREs empowerment framework highlights the importance market access for women empowerment. The Tongan IST program encountered two specific problems regarding market accessibility. (1.) The installation of the SSPSs were to sparsely divided, constraining coalition between the target group and the BSEs, restricting the BSEs control over own labor, and restricting the assets of the Tongan IST Program. (2.) The Tongan BSEs are dependent on the Barefoot College to acquire solar equipment because the limited infrastructure (limited access to the global markets) in Tonga.

(1.) In 2012, the SP were installed in energy poor households across 42 villages in Tongatapu, and at the island group Niua. The Barefoot College Model target-group is the energy poor, without access to electrical energy supply. The energy poor's households are located sporadically on Tongatapu or they are located on the outer-islands, especially on the Niua island groups where the is no official-grid. The Tongan IST Program sporadic instalment of the SP all over Tongatapu and on Niua constrained community participation (remember, the Barefoot College Model is community oriented, i.e. involving community participation in decisions regarding local IST program is highlighted as a necessity for the program's success). The BSEs and the Tongan IST Program had limited assets to pay for transportation costs restricting them from collecting monthly fees and maintain and repair the SP. Moreover, the installments of the SP was provided without outlined policies, contracts or receipts, which limits the BSEs control of labor and transparency – no records – of the Tongan IST program.

Presently, the Tongan IST Program and the current BSEs does not have the economic means or solar components and are unable to provide services to households with SP. The current ground partner and the current BSEs highlights that the sporadic, undocumented instalment of the SP have restrained their assets because of the excessive transportation costs and the timely process of making an overview over the localities of the SP. Consequently, the current BSEs and the current ground partner have altered their approach regarding the target-group. The new Tongan IST model highlights that in the future, SP will only be installed in the two communities that the BSEs residents (Houma and Kolomotu'a), which will increase the BSEs control over own labor. In addition, the cooperation will be involved in deciding prices of the SP before they are installed, to enable community acceptance. Moreover, the new SP will be provided to the target-group only if a contract is signed and a receipt provided. According to the Barefoot College Model the establishment of a Renewable Energy Workshop is important because the BSEs need a location to store their equipment and build the solar units. The plan for the Tongan REW is that they ought to be situated in each of the BSEs households (one in Houma and one

in Kolomotu'a) to minimize the expenses, otherwise used on of renting a location (previously the program had the equipment in the community house in Kolomotu'a with a land line phone). In Kolomotu'a, the REW will have a medium-sized solar unit to power the equipment used for repairing and building of the SP.

The BSEs and the ground partner highlight the unsustainability of the Tongan IST Program had negative effects on the Tongan IST Programs reputation in the local community. The restricted accountability of the Tongan IST Program to provide services to the respective households has potentially restricted the current BSEs empowerment process, limiting the BSEs self-esteem, employment/control of labor, and, henceforth, assets owned.

(2.) In 2012, shortly after the BSEs had finished their 6 months training at the BC, the SP equipment arrived in Tongatapu [34]. The container was equipped with 260 SP, each system containing 3 lights, a charger and a battery. However, because of shipping-policies, the battery arrived without acid. Consequently, the installation fee of the SP was altered to include the expenses of the acid. Battery-acid is an expensive commodity in Tonga. The installation fee was set at 160 TOP per SP, and the monthly fee 10 TOP per household. The costly affaire of the battery-acid illustrates that the location of Tonga provides limitations for the economic sustainability of the IST program in Tonga, because import of solar equipment is expensive.

Market access poses as a limitation of the current BSEs empowerment process because of the BSEs dependency on the Barefoot Colleges provision of solar equipment. The Barefoot College Model does not address market access as a main limitation of the materialization of the IST program in rural areas globally. The Barefoot College Model assume that the rural assets will override the inaccessibility to markets. Nevertheless, the current Tongan BSEs face challenges regarding facilitating their work as BSEs, because they do not have the assets inclined or the market structures available to carry on the Tongan IST program without assistance from the Barefoot College. The BSEs dependence of top-down facilitation of the Tongan IST program restricts their autonomy in having power to influence and control their empowerment process.

The Barefoot College IST program has faced major challenges in Tonga. Nevertheless, the encountered barriers can provide meaningful insight for the future development of the BSEs activities in Tonga. The current ground partner and the current BSEs have worked out an alternative model, which is inspired and aligned to the Barefoot College Model, and they are

[34] The GoT supported the BC IST program by removing taxation from the shipped equipment.

eager to get the chance to implement it. The new Tongan model highlight community as upmost importance for the sustainability and the success of the Tongan IST program.

5.2.2. The impact of the Tongan IST Program on the Local Community and Women's Empowerment

This chapter analyzes the impact of the Tongan IST Program for the respective communities; defines what development and empowerment objectives are important in the community; and examines the transferability from the IST program impact on the community regarding the BSEs' empowerment. This chapter is based on interviews with all the listed interviewees in Appendix B. (the two BSEs; the ground partner; the town officer in Kolomotu'a; households with the SP in Kolomotu'a and Sia Sia, Tongatapu; the cheer-person of the local fishing association in Kolomotu'a; the representants from the Talita project, and Tongan government officials from the department of Renewable Energy[35]). In addition, my results depend on participatory observations – one example of this was that I was living with a family in Kolomotu'a when the official-electricity was cut during a storm.

The development and empowerment objectives are addressed through an ethnographic approach to the community Perspectives. The transferability from the Tongan IST programs community impact to the BSEs women empowerment is analyzed through CARE's empowerment framework.

The community Perspective highlights the limitations of perceiving the Tongan IST program from a program-oriented Perspective (as in chapter 5.2.1.). The program Perspective contextualization of the project from a solely economic lens. A program-oriented analysis is incomplete in the context of Tonga, whereas community objectives are not formed in terms of economic revenue solely. The community Perspective provides tools to understand what women empowerment objectives and process are important for energy poor in Houma and Kolomotu'a. This chapter highlights why the BC solar technology and the Tongan IST program is important for women empowerment in the community context. The Tongan IST program highlights that increased access to lights, enable other types of development and encourage women empowerment. The chapter outlined development objectives and empowerment

[35] The government representatives do not have experience with the SP provided by the Barefoot College.

objectives relevant to small-scale - decentralized electrification catalyzing what development and empowerment goals are important to energy poor households in Houma and Kolomotu'a.

The respective communities in Tonga have highlighted several socio-economic positive impacts of the Tongan IST program in their daily life. There are multiple factors of which the SP have helped the respective communities. Among them are economic, and social attributes most prevalent. The SP was highlighted as a catalysator of increased time (for leisure, religious activities, homework and work); decreased expenses (on power-bills or batteries); increased security (from theft, and hazardous wiring); increased safety (when walking at night time); increased stability of power supply (in times after rough weather conditions); increased access to information and communication (from charged mobile phones); and increased availability of technical work for women (through changing gender roles).

CARE highlight women empowerment as conditioned by her context. The community context constitutes the relations and structures effecting women's agency; options and actions. Table 2. below outline the indicators that the community have highlighted as meaningful and relevant in their daily life in relevance to the SP impact. SP is meaningful for the energy poor in Tongatapu. Energy poverty takes many forms in Tongatapu, poor households experience inaccessibility to energy; because they are not connected to the grid; because they are unable to pay the power bill, and/or because heavy storms and cyclones, and, poor wiring results in power breakages.

The CARE empowerment framework highlights several women empowerment objectives of relevance to SP technology made visible through the respective communities' perceptions, revealing some fractions, of what 'development' is relevant and meaningful for them. The objectives highlighted by CAREs empowerment framework and the ethnographic approach cannot be assumed a direct transferability to women empowerment outcomes. The outlined objectives are pinpoints to what constitute meaningful and relevant aspects of the BSEs empowerment process. There are several topics for discussion regarding the outlined empowerment objectives. The objective of development and women empowerment, highlighted by the respective community, is family development. The respective communities did not address empowerment for women solely, however, women are sought to part of the unit, the household and the community. The objectives highlighted in table 2. highlights the women empowerment as a facilitator and an outcome of family development.

Community Development Objective	**SP/ Tongan IST Program's Community Impact**	**Women Empowerment Objectives (CARE)**
Time Management	Increased time for leisure, religious activities, work, and children's homework	Agency: Group membership Employment / control of labor Material assets owned Relational: Negotiation/ Accommodation habits Alliance/Coalition habits
Assets Available	Less money spent on power-bills, batteries and candles. More available money for school fees, consumption of goods, and church donations	Agency: Material assets owned, Decision influence in HH finance & child-raring, Group membership, and Body health/integrity Relational: Negotiation/ Accommodation habits Alliance/Coalition habits Structural: Political Cultural Bureaucratic
Security/Safety	Less exposure to theft, and fire (from other energy sources such as candles and hazardous wiring). Safer to walk around in nighttime	Agency: Body health/integrity
Stability of power supply/ environmental concern and economic unavailability	More available light sources in times after rough weather conditions (Cyclones) More sustainable light source when income can't cover energy bill.	
Access to information and communication	More availability of charged mobile phones	Agency: Information / skills Body health / integrity
Technical Work Availability for Women	Women's access to technical vocations	Agency: Self-image Information/Skills Relational: Consciousness of self / others as inter-dependent New social forms Structural: Cultural Market/Economic

(Table 2. Community development objectives; SSPS impact on the community and the community women empowerment objectives)

Time Management

The respective communities highlighted the SP as important for their life because it enabled increased time for leisure, religious activities, work and children's homework. The shift from energy sources such as candles and battery-flashlight to SP enabled the households to enjoy more hours of quality light, of which liberated more leisure time they spend on engaging with the family, in women groups and engage in religious activities such as reading the bible or practice songs for church, in their households or in churches with SP. The SP increased time available for the economic activities, people can prepare fish, and vegetables after sunset. Women specifically, can now make handicrafts during the evening and nighttime both in their households or in the community center with SP with the women group. The improved the light and made it possible for children to do their nighttime preparations for school, which for some households was of upmost importance because the children could pass their exam and contribute with developing the family status/economy.

Regarding women empowerment and increased time management the CARE framework highlights several aspects that can translate into rationalizing a community based notion of women empowerment: group membership is highlighted as a positive impact of the time made available for social interaction; with the potential positive effects of relational-based empowerment objectives such as negotiation and alliance/coalition habits (recall the CARE and Barefoot College highlighted potential positive effects of coalitions on women empowerment). Moreover, increased control of time management is highlighted by the respective community to provide increased control over own labor, by making it possible to do housework and income-generating work during sunlight and after sunset; increasing the income of the households and increasing the assets owned (The highlighted objective of material assets owned will be discussed in more detailed in the section about the Community Development Objective: 'assets'). The ethnographic approach highlights religious activities, and family development (through increased economic means and the opportunities for children to pass their exams) as meaningful objectives of the community development.

More time for housework and economic-activities which enabling agency-related empowerment processes such as employment/control of labor and material assets owned does

not directly translate into women empowerment. Increased assets do not necessarily mean that women have the choices regarding decisions influence in household finance & child raring. On the contrary, women's income is sometimes controlled by her husband, the head of the household, who will control the family income and the family matters. Moreover, the increased time for housework and income-work, can lead to increasing the work burden for women, increasing her active work hours per day.

Assets Available

The respective communities highlighted the SP as important for their life because it increases the assets available. The economic impact of the SP was highlighted as one of the major objectives of the SP. hardship is a concept that describes the condition of where the household struggle to acquire income to pay their bills; school fees, the power bill and water bill, but can still sustain their basic needs of survival. Mortgages and rent are a rare expense in Tonga[36]. Solar energy is needed in the poor households because of the high work unavailability; limited access to bush land; and the high energy prices which poses as a great challenge in many households. The respective communities highlighted that less money was spent on power-bills, batteries and candles. In addition, the SP increased income-generating activities. The SP therefore reduce the respective households' expenses and facilitate for increased income-work, which provide means available for school fees, consumptions of goods (food-stuff) and for church donations. Savings in terms of energy consumption, for households without grid connection, a quick estimate suggests that a box of batteries, usually what a household uses in a month, would cost roughly 29 TOP, meanwhile the monthly cost of the SP is 10 TOP. For household connected to the grid, the monthly power bill would range from 70-200 per month, depending on if households have freezers, washing machines, and other electronic equipment. With a SP, the household can turn of the grid powered lights during the night and save money, potentially reduce he power bill by 40-50 TOP.

Regarding women empowerment and increased assets available the CARE framework highlights several aspects that can translate into rationalizing a community-based notion of women empowerment: increased material assets owned, opportunities to influence decisions in household finance & child-raring, and facilitation of body health/integrity, enabled group

[36] Rent and mortgages are rare, but some people, who cant afford to but land, lease land. In the other islands of Ha'apai and Vava'u

membership and facilitate relational negotiation/accommodation habits, and alliance/coalition habits. Regarding family development, more asset owned from the SP have increased the spending on school fees for children and provided households with more purchasing power. Increased purchasing power was highlighted by proportions of the respective community to potentially enabling the household to access healthy diets, sufficient nutritional food, however, this was not a reported impact of the SP. Being able to afford nutritious and healthy food and being informed about and making the right decisions regarding food choices and health, was perceived as an objective of the empowerment process. The Tongan diet is typically involving starch, carbohydrates excessive sweet and salty food. Diabetes and hart deceases is a big challenge for the Tongan community. Another objective of empowerment is to have assets available for church donation has the effect respect and inclusion in the church community, people are stigmatized if they don't contribute to Misinale, potentially restricting women's negotiation and alliance opportunities.

Limitations in translating the outlined community objectives of empowerment are multiple. As mentioned in the 'time management' section, assets available does not necessarily translate into assets controlled by the women. In the Tongan culture the barriers for a woman to control her assets are not an outcome of the patriarchal structures of society. In addition, hierarchal structures in regards of church and people in general creates social pressure on donation surplus assets to the church, might it can be money, gifts, handicrafts and food. Social pressure is experienced through church donations, termed as Misinale, and social events/celebrations. The Church will use the money to pay for salaries of the ministers, for maintenance of the church facilities and to building more churches[37], and at few occasions the money will be provided to the poor in terms of food or school stipends. Big celebrations and ceremonies are highly prioritized in the Tongan culture; great expenses are related to funerals and weddings. The social pressure was highlighted to be a limitation for budgeting and savings. The family income is sometimes priorities to the church rather than to pay for other expenses such as school fees and the power bill. In addition, the pressure to give to the church halters economic activities, such as newly established businesses and women micro finance groups. One of the BSEs (interview 18) described when she and her husband opened a shop in 2004 and how it failed due to church donations "we have a shop, 2004, but the problem […] the pressure from Church […], we collect [… the salary] and just gave it to the Church and that is how our business fail".

[37] Churches are frequent in Tonga. The government of Tonga have created a law stating that Churches from the same community cannot be build within the distance of…

In addition, the same BSE was involved with starting a micro finance group together with her local women's group in 2008. She addressed how the church sat boundaries for the micro finance group success, because women would lend money from the micro finance initiative and use them on church donations.

Security/Safety

The SP was highlighted as important in people's daily life because of decreased risk of fire. In houses whiteout grid electricity, candles were a frequent source to light before the SP. In addition, the community reported that households without lights were more prone to experience burglary. Increased safety when rooming around in the darkness and children's decreased fright of darkness was highlighted as important impacts of the electrified lights.

CARE empowerment frame highlights 'bodily health' regarding the SP and the solar lanterns positive affect on security. Bodily health is seen as a family objective of empowerment, not solely a women empowerment objective. Nevertheless, bodily health highlights the interconnectedness of women's empowerment and the community and family. Bodily health brings about changes that she and the community perceive as important for family wellbeing.

The gender specialist (interview 13) at the department of renewable energy argue that there are positive impacts on women lives when SP are installed in the households:

> solar panels help you out if you want to go to toilet at night, sanitation, safety for women, streetlight, people want to roam around at night there are light. […] Iron in a clean place, rather than over the fire. More changes it really means to them. More modernized now. (interview 13)

CARE's empowerment framework highlights 'bodily health' regarding the SP and the solar lanterns positive affect on safety, because of the electrified light effect on sanitation, psychosocial and physical health. Alike in the section about 'health'; bodily health is seen as a community objective of empowerment, not solely a women empowerment objective.

Stability of Power Supply/ Environmental Concern and Economic unavailability

The SP was of great importance for times when the household could not afford to pay the power

bill, and the energy supply is shut. In addition, in some areas it solar electrified lights are the only source of lights. The Tongan IST program provides a good alternative for people in Tongatapu to acquire SP (given that there are available systems), because the other alternatives, such as government provided SP is time-consuming and a costly process. Moreover, going through the government to apply for support for solar panels acquire special knowledge about how to fill out application forms. To acquire solar panels through the government could take two years. Poor households with no grid, need firs to connect to the official grid, the connection to the net could cost 1000 TOP. In addition, the SP provides more stable supply of energy, whereas, the hurricanes often disrupt the official power supply. After the cyclone of 2017, Tongatapu was without electricity for 3 months, however, solar streetlights and the houses with functioning SP had good quality light sources, compared to candles.

CARE's empowerment framework highlights that the stable power supplies have positive inferences in the respective households in terms of structural factor of market accessibility. This means that households with SP and solar lanterns still can access to lights nevertheless if official sources fail to provide electricity or if environmental factors are disrupting the energy supply. Increased market access enables the other objectives of SP, and solar lanterns outlined in this chapter.

The SP provided by the Tongan IST program is not meeting the daily energy required by the respective communities, therefore the government solar electrification system provides a favorable alternative to the energy poor (to access refrigerators and washing machines). The negative effects of environmental forces on the SP. In 2017, Tonga was hit by a cyclone, that destroyed and malfunctioned great proportions of the SP. Nevertheless, the stability of solar electrification is dependent on weather conditions; e.g. weeks without sun results in decreased availability of solar technology. Moreover, the stability of the energy provided by the SSPS, is limited by the lack of maintenance and repairment from the BSEs

Access to Information and Communication

The SP had provided meaningful and relevant improvements in people's lives regarding increased access to charged mobile phones. The ground partner argues that one of the basic needs of the communities in Tonga is access to internet. Access to charges phones have several effects in the respective communities. Access to chargers in houses in the Bush have effects on

children's ability to do homework. The ground partner (interview 10) highlights: people who "live in the bush, basic jobs of children going from bush to relatives in town to charge the phone. Because one useful is communication, everyone uses mobile phone now. When battery is low need charger, no electricity in the bush.". In this way, the children lose valuable hours of sunlight that they otherwise could use on doing homework. Children have freed up time from no longer needing to charge the phones outside the household. Moreover, the ground partner (interview 10) highlights that for fishing community's SP has proven important for "the fisher men when they go out fishing, most fishing boat use solar, charging light and mobile phone." The phone can be used to call the weather station and take preventive measures in cases of bad weather forecasts; too increase the security out on the sea [38].

CAREs empowerment framework highlights information/skills and body health/integrity as dimensions of the increased access to information and communication. Nevertheless, increased access to information and communication does not directly translate into women empowerment but constitutes itself as community and family development.

Technical Work Availability for Women

The respective communities highlighted the Tongan IST program as relevant for women empowerment because it provided structural change enabling women to participate in technical and practical work. The shift in gender roles was positively perceived: it "is very new to have women solar engineer. Normally, engineer is just for men. That is wonderful for them [the community] to hear. […They are] happy to have women engineer, not only men" (interview 16). The interviewees generally had a positive impression of the BSEs' involvement in technical work, and of female solar technicians overall. Female vocational workers are a novel trait in Tonga. There is a gendered work shift in Toga; women are not traditionally involved in hard-labor work, such as climbing on to roofs to install solar panels, or to carry around heavy equipment. Tongan women are often encouraged to work as housewife's and to get an office job. However, more and more women are joining the technical workforce.

Regarding women empowerment and increased availability of technical work for women the CARE framework highlights several aspects that can translate into rationalizing a

[38] Unless the boat drives to far out and loses the signal. However, because of heavier and more frequent storms out on the open ocean the chairperson of the local fishing community is skeptical of people going too far beyond the reef. He highlights the change in weather conditions as effects of climate change.

community-based notion of women empowerment: Self-image, information, consciousness of self and others as inter-dependent, new social forms and the possibility for meaningful and relevant cultural change and market/economic structural change. The Tongan IST program, the respective communities in Tonga provided information which enabled gendered Perspective change regarding technical vocations as feminine, as well as masculine: providing a shift for social change, in the realms of cultural and market/economic structures, when enabling more Space for women in practical work. The respective communities sought the empowerment of the women as a positive in relation to the enablement of community and family development, the leverage provide a positive work environment for the Tongan BSEs to provide their services.

People expressed that women in the Tongan society are the most valuable in society. By this it was meant that women have a Special place in the community and in the family. They are respected and cared for. Examples of this is that brothers should not go into a sister's bed rom if she is alone, brothers and sisters should not curse in front of each other, women should not carry heavy things, women should not go out in the rain in case they get sick, and men should provide for the women, both shelter and income. Some interviews argued that women have so much power in the Tongan society, that if they started to inherit land, they would overpower the men.

Men interviewed perceived that there was Space for women in technical vocations, however, that the mentality of women was the main barrier for the women. What did not seem to be accounted for in the interviews with men was other barriers faced by women in the energy sector specifically. Such as for example the lack of encouragement or the discouragement that some women face regarding participating in physical work, which potentially can provide the women with the 'false' impression, of their own 'incapability' to do technical and practical work.

Currently, many households depend on the economic activity of women. They do much of the work, such as canteen work, market stands, fishing (of sea cucumber and shells), cafes and are involved in office work such as working for the government, and in banks. Many women also travel oversees to do farm work in countries such as Australia and New Zealand. The government representatives highlight that women are good managers and cooperators. Women are highly regarded as the managers of the household, keeping track of the resources needed in daily life. Women are increasingly favored in community development work, they are perceived to be better than men to make the 'wheals go around', efficiently and on time. Therefor several

development initiatives are specifically targeting women. Lekeleka argue why there are women micro loan groups that solely target women:

> women people are the ones that working hard to find money for family. The idea is coming true in Tonga. Most family's income is dependent on women, how they make the handicraft, big income, come through the women. That is why they give opportunity for women, not the men (interview 18).

Women are encouraged to take an education, to get a job (most in the government) and to provide income to the households, however, often the income goes directly to the family needs, with little opportunity for the women to save money. In some cases, the women will oversee the household economy, but there are also cases where the women in Tonga need to ask permission, from their husband, to purchase what the family needs. The women's limited decision-making power regarding the family economy, and inaccessibility to land makes them vulnerable to economic dependence of men. Nevertheless, representatives of the Thalita project argues that economic independence is not the first and foremost priority of young girls, getting married still overcomes the aspiration of economic independence.

Highlighted by the gender specialist in the Renewable Energy sector was that women often work harder and more efficiently then her male colleagues, including a woman to the workforce disrupts the status quo structure of the work environment. Some men were sought to step back when women are involved in the work because women are sought as the managers. Discussion with other government representatives from the Renewable Energy department highlighted that the gender role divide provides men with an easy-go approach to work, when they are all male co-workers, they do not have the same incentive to prove their capability at work as women do. In other words, women must prove themselves as capable workers to a greater extent than men, when they are stepping in and doing, what usually have been termed as a masculine job. Regarding the BSE, both men and women have been positive in the interviews about feminizing the technical vocation that the BSEs are involved in. People have been happy to see Female Barefoot Solar Engineers, the community representatives, the government officials, the ground partner and the BSEs have all highlighted the importance of involving women in technical vocations, for the women's empowerment, for the community development and for the national development.

The interviews highlighted that people see the importance of women's contribution in the Tongan society; for her role as the manager of the households and contributor of the family economy. However, through discussions with representatives from the Talitha project (a

Tongan women empowerment NGO) which made visible that: because ‘she’ is often valued extrinsically in relationships and in supportiveness of others, such as family and husband, and seldom valued for ‘her’ intrinsic person and with little focus on ‘her’ independence as an agent of change, the basket ‘she’ carries can become limited or invisible.

The social expectations of women as caretakers of the house, not as economic independent and independent decision-makers can have discouraged women from taking steps for personal development and to see the value of her own person as a shaper of her own development and of family matters.

Technical work is made visible through the Tongan IST program; however, this does not incline that women enrolled themselves in technical vocations. The consciousness of self and others as inter-dependent, which enables a positive work environment for the BSEs, is limited by the mistrust the community has to the Tongan IST program.

5.2.3. The Tongan BSEs’ Women Empowerment Process and Outcomes

The current BSEs highlights that their engagement with the Barefoot College have enabled empowerment processes. The BSEs poses as symbolic change for previously strict gender roles; making space for women to participate in technical vocations in Tonga. Moreover, the knowledge acquired at the Barefoot College, have increased the BSEs self-esteem and enabled their agency. The BSEs argue that they can make changes for themselves and for their family’s development, to a greater extent than before their enrolment with the BC IST.

The Context - The Tongan BSEs’ Life Stories

Lekeleka is 44 years, she grew up in one of the outer island communities of Tonga called Ha’apai. Lekeleka is passionate about helping her community and her family, she enjoys learning new skills and she is working hard to sustain her family’s daily needs. This is parts of Lekeleka’s life story.

Lekeleka grew up in a family as the youngest out of five children at the outer island Ha’apai, Tonga, her father was a fisher man and her mom were a house wife. Most of the family’s livelihood depended on the fathers catches from the fruits of the ocean, however, economic

activities in the household also involved drying coconut meat and selling it out. The family engaged in economic activities mostly to afford the children's education and the church donations, such as the Misinale[39].

Lekeleka's parents encouraged all their children to go to school. However, when Lekeleka finished form 5 (class 11 in secondary school), she had to end her education. Her father got a stroke, because of high blood pressure, and the family was facing economic struggles because of it, being unable to pay Lekeleka's school fees. Lekeleka was worried about the life she would be able to make for herself without completing her education, she worried that she would not be able to marry because she can't support the husband economically. To sustain the family's economic needs Lekeleka's mom did handicrafts, such as waving ta'ovala clothes[40] and one of Lekeleka's older sister opened a dairy store, which Lekeleka worked in from 1998-2000.

In 2000 Lekeleka met her loved one and they got married. Lekeleka moved to Kolomotu'a, Tongatapu to her husband's place. She never got a job, besides being a housewife. However, occasionally Lekeleka would sell handicrafts to support the family economy. Her husband had a job in the government as a civil servant, for 11 years, however in 2004 he resigned from his position to become self-reliant; through fishing and business.

When Lekeleka was carrying her first child in 2001, life was though for the newly wedded couple. Her husband's dad had acquired a big loan for his mechanic business, and much of the family's economy was spent on repaying the loan. Her husband's mom had passed away in 1998, and his dad had moved to New Zealand, leaving Lekeleka's husband as main responsible for his siblings, that were still in school, for the loan to be repaid and, soon after, for his new family. With fortnight payment of 51 TOP from the government position, and because of sudden illness, it was hard for the family to pay their bills and buy food. Lekeleka's husband provided the option for Lekeleka to leave Tongatapu and go back to her family in Ha'apai. In Ha'apai she would have a good life, however, because she had married for love, not money, she wanted to stand by her husband's side in the times of struggle. To help out Lekeleka started making handicrafts, she wowed Pandana leaves, she was happy that she could do something, even though the money from the waving was too little. Lekeleka (interview 18) explained that "Instead of not having an education, but I can use my mind and also my hands to make something for my family." Lekeleka (interview 18) decided to join the Barefoot College's IST

[39] The Misinale is a yearly donation for the church, the household Misinale ranges from 2000- 10 000 TOP.
[40] Ta'ovala clothes is a traditional wowed mat worn by men and women in formal situations, such as work, churches and in funerals, the mat is wrapped around the waist.

in 2016, she explained why: “I want to do it because I know it is very helpful for Tongan people here. And because I like to do something, and I trust myself to do it”.

Papahi is 50 years, she grew up in a village in west Tongatapu called Fahefa, situated two villages away from where she lives now, in Houma. Papahi is dedicated, hardworking and passionate. This is part of Papahi’s life story:

Papahi had three siblings, two sisters, of one is her twin, and a brother. Her twin sister was adopted by their aunt, because her aunt did not have children herself. Papahi describes life as good when she grew up, she had a good and religious family. Her family belonged to the Seventh Day Adventist Church. As a child Papahi life consisted of staying at home and going to school. She helped her parents with household shores such as cooking and cleaning. At 4th form (out of 7 forms) Papahi ended her education. She enjoyed school and found it useful, however, she argues that because she ended her education early, she lacks some skills such as a good level in English.

As 24 years Papahi got married. As married, she enjoyed life, because of the support she and her husband provided for each other and for their children. Papahi explains this:

> it is good, because new life, get married help each other, husband, […], me and my husband we work together, work hard. Because for them to go school. So, they all go up finish school now, go to university. Yes, we help them to go to school. Because not like me, finish only from Form 4. That is why we work hard. (Interview 9)

The family Papahi married into had four patches of land. One of which they have their home and farm animals, and three patches of bush land where they grow vegetables, which they sell in the market. As a woman, Papahi is not able to inherit land in Tonga. Papahi has always been a strong women, and she has always appreciated hard work; a regular day for her consist of taking care of her family (children, grandchild, husband and her father); to do the washing; and the cooking; helping her husband with the animals; working in the bush; and on Saturdays she sells vegetables in the market faire.

One day, when Papahi was living in Houma with her husband the Jehovah Witness came to their door to inform them about Jehovah’s word. Papahi and her husband decided to change their religion. The switch of religion decreased the family’s expenses used on Church donations.

I the Jehovah's Congregation the social pressure for contributing to the church's economy is lower than in most other church communities in Tonga, and Misinale is not practiced.

Papahi (interview 9) wanted to join the BC project "because I want to know how to fix the solar, want to know how to make it. Because when we come back here in Tonga, we sell it to the people, get money." Papahi's dedication to improve the life of her family, and the skills she learned at the Barefoot College have provided opportunities for economic development in her household.

The current Tongan ground partner started to train his wife to become a solar technician so that she could help to develop the project in 2013, and then when the Barefoot College decided to hold a refreshment course in Fiji for the current BSEs from all over the Pacific. The current Tongan ground partner arranged so that his wife, Lekeleka, a family friend, Papahi, could attend the two weeks course in Fiji. The two Tongan ladies impressed the staff from the Barefoot College because they learned technical skills fast and because of their ability to work hard; the BC invited Lekeleka and Papahi to the BC's 6 months IST. In 2016 Papahi and Lekeleka traveled to India to take part in the BC IST, to become solar panel engineers.

The BSE's Empowerment – 'a Full Basket'

> I come to the Barefoot College with an empty basket but now full basket, full of knowledge, full of skills and I want to take it back to my homeland and I want to continue using my knowledge and skills to share with other people. (Interview 18)

The basket is an analogy of agency. The analogy provides an example of how the current BSEs of Tonga experienced a realization of the basket's existence and the materialization of the basket brought about changes in their daily life that enabled their empowerment. The BSEs of Tonga went through a Perspective change in India. Perceiving the ways of which women at the Barefoot College were the agents of change; how women themselves were developing their skills and knowledge, and how they utilized it inspired the Tongan BSEs' to look beyond the roles and relations that has been set up for them in their homeland. Increased self-esteem, increased knowledge-skills, and increased awareness of their agency provided the Tongan BSEs with insight to change their life's and pragmatic tools to change structures and relations that are sought to restrain the women in their communities.

The two Tongan BSEs filled their basket with knowledge and skills at the Barefoot College. Nevertheless, the women have not been able to utilize their training in Tonga, because they have not yet received their equipment from the Barefoot College. Some of the gates that the Tongan BSEs have encountered on their way, are limiting gender roles, restrained confidence over their own agency, social pressure to donate high sums for the church, limited economic independence, and environmental issues effecting home and livelihood.

This chapter focus on understanding the limitation and opportunities that surrounds the BSEs empowerment and the empowerment process undergone by the BSEs. However, because the BSEs have not yet received their equipment the analyzes of the two BSEs empowerment process cannot go beyond the experience they have gathered from the BC and how that have formed their opportunities and choices. There are few generalizations to be made regarding the trickle-down effects the two BSEs' empowerment have had on other women in their society.

For Lekeleka, the basket was empty before her experiences at the Barefoot College. The structures and relations surrounding her had not encouraged here to utilize her agency, to the extent that she now perceived possible. At the Barefoot College Lekeleka observed women stepping outside of her notion of the female role, and this pinpointed her Perspective of 'women as agents of change'. Women at the Barefoot College were building solar systems and welding solar cookers. Lekeleka highlighted the contrast between the BC and the Tongan gendered work roles:

> In Tonga there is no women here doing that kind of job, we have the first women in my mind. First one the women can do this job. Because the opportunity of making solar is only here for the men, not for the women. (interview 18)

The Barefoot College enabled Lekeleka's self-esteem by providing her with information that women can do practical work. Before the Barefoot College, lack of confidence and self-esteem (together with limited aspirations and access to information) limited Lekeleka from stepping-up and taking measures for empowerment and development of her life. Lekeleka shares her personal experience regarding this:

> I just thinking, I always thinking I cannot do anything. […] I dream that I had before I go to Barefoot, honestly, just want to be sit in house without doing something, don't want to spend any time doing something (interview 18)

Lekeleka argue that Barefoot College enables changes of her self-image, encouraging here to do practical work. Lekeleka further explained how the change of her self-image have encouraged her to take actions for her family's development:

> Where I look in the past. I sit in the house, leave all the things for the current Tongan ground partner to do it. […] But now I know this is my function, to help him get money […] not sit on my chare like a princess. […] I know that if I do not step up and do anything, my family will fail in anythings, the school of my children will fail, anything in my family will be failed. Now I have a strong feeling to stand up and do anything for my family. (interview 18)

Lekeleka (interview 18) highlight that her motivation to "stand up"/to be empowered is for her family's and her community's development. Lekeleka highlights health as an important aspect of her empowerment process. In addition to her improved self-esteem and altered Perspective of her role inside the family Lekeleka highlights that skills learned about dietary needs at the Barefoot College and the relations she acquired at the Barefoot College enabled her to take measures for her family and her community. The Barefoot College provided Lekeleka with information regarding the dietary health effects and of the portions of the food, which Lekeleka implemented in her family, whit great impact on how she now prepares food for her family. It has also helped her to reduce food waste. At the Barefoot College, Lekeleka had the opportunity to collaborate with the US Aid. Lekeleka and the current Tongan ground partner are working together with US Aid in creating awareness and measures that will limit land erosions in Kolomotu'a. The UA Aid program provide land filling for households, while Lekeleka and the current Tongan ground partner encourages people to plant trees and crops to limit land erosion from flooding, and to encourage people to grow vegetables.

Papahi (interview 9) tells a different story, her aspirations from childhood was "to work hard and to have a family, nice family". Papahi argue that hard-work and her personal capability to do so have always been there. Her background as a Christian have been important for her personal development, she highlight's values such as being hard-working, family-oriented, humble, and helpful, of upmost importance in her life. Humble means to be giving and loving, in whatever economic situation one is situated. Papahi highlights the skills and information required from the Barefoot College as important for her empowerment process. Papahi highlights that she wants to develop her family and to help people in Tonga, and she underpins food and money as the most important areas for change. She has learned budgeting-saving skills, water saving techniques, and the importance of prioritizing needs and wants in the daily

life. She uses these skills and information in her daily life with her family, which have helped the family to save up money and to expand their economic activities at the farm. In addition, with the information and skills from the Barefoot College, Papahi provides information to people in her community about how to make the best use of their recourse, such as food and money. She provides information to her community about savings, and how it can provide to the development of people's families, rather than the church's development. Papahi argue that:

> they listen, lot of people listen, because learned lots of things when I come back [from the Barefoot College]. […] they are happy to hear that, good idea. Because in here, because in church, they collect money they give the big money, ah the waste money they give. Big money. But the school fee can't pay! The food can't pay! […] But now they save money to use the children to pay school fee and pay the bill. They listen and like the idea I told them. (interview 9)

Lekeleka and Papahi highlight that the Barefoot College provided them with tangible tools to create changes for themselves, their family and their community. CARE highlight the changes in self-esteem (belief in one's ability), information/skills (that are relevant and meaningful for one's objectives), decisions influence in household finance and child-rearing (increased through attained information and skills), group membership/alliances/negotiation (engagement in formal and informal community development), material assets owned (increased through attained information and skills about budgeting and saving), body health (increased through attained information about dietary needs) and the enabling of new social forms (challenging the church hegemony and providing information regarding women's participation in practical work).

6. Discussion

CARE's women empowerment framework and the ethnographic approach of this thesis provide evidence that the four BSEs have undergone empowerment processes though their engagement with the national IST programs in Jordan and in Tonga.

CARE's triangle model highlighting – structural, relational and agency-based – enabling/constraining contextual effects on the BSEs' women empowerment. The ethnographic approach constitutes three dimensions of Perspectives. Including the lens of (1.) the national

IST program, (2.) the community and (3.) the women (the BSEs themselves), which all highlights different properties of the contextual settings constituted by structural, relational and agency-based dimensions of women empowerment, built on complimentary and sometimes challenging objectives of the potential empowerment processes of the BSEs.

In MaG, Jordan, and in Kolomotu'a and Houma, Tonga, the BSEs empowerment processes, objectives, and outcomes are formed by the structures and relations that surrounds them, and the agency within them.

6.1. The Program Perspective – the Economic Objective

The program Perspective connects the Jordanian IST program and the Tongan IST program to the broader picture of international development. The program Perspective is influenced by broader visions of what a successful program should look like. The respective BSE's empowerment process, is then, influenced by international movements; NGO linguistics, objectives, problematization of developing issues, and approaches to measure development programs and initiatives. As an example, this thesis utilizes CARE's empowerment framework and the Barefoot College's IST model as a source of analyzing the BSEs' empowerment process - which both overlooks fragments of women empowerment. The linguistics, problematization and approach to evaluate women empowerment processes fronted by CARE and the Barefoot College defines the issues discussed.

This thesis redeems the Jordanian IST program and the Tongan IST program as economically unsustainable; I argue that cultural, organizational and market/economic limitations of the national IST programs stamped the economic feasibility of the program. In Jordan the Bedouin herder lifestyle stumped purchase liability of the Jordanian IST program's target-group; and the cultural condonations of shame and women in income-work phased down the BSEs' progression for the Jordanian IST program. In Tonga the sporadic instalment over waste distances hindered the BSEs to deliver their service; and miscommunications and disputes between the stakeholders of the Tongan IST program provided pitfalls for the current Tongan BSEs even before they enrolled at the Barefoot College. The program Perspective provides a doomsday insight into the women empowerment processes and outcomes of the Jordanian and the Tongan BSEs. Perceiving women empowerment from the program

Perspective provides a lens that pin-down the conceptualization of women empowerment in regard to economic objective of women empowerment.

Barefoot College is a social enterprise – with economic revenue at its forefront for the sustainability of the materialization of national IST programs; that provides a capitalist-like rationalization of the economic facilitation of the national IST programs. The Barefoot College Model provide limited rationalisation and measures for societies that does not base their worldviews in market economies. The Barefoot College Model rationalization does not match the societies of which it aims to implement development and empowerment. In MaG, Jordan and in Houma and Kolomotu'a, Tonga the communities are based upon unity of relations, and people's survival rests on safety-nets provided by the family and/or community. In addition, in Jordan, it is considered unethical to prioritize economic revenue before social relations. Meanwhile, in Tonga economic surplus sought to be delivered to the unities of the churches and the family, of which is a challenge saving/budgeting. But, is there alternative – to economic - routs to the IST programs' survival? Maybe not, economic revenue is important to attain solar equipment, to foster communal development, and women empowerment. Nevertheless, I will suggest that the first step for realizing economically liable IST programs in Jordan and in Tonga is for the Barefoot College to acknowledge the limitations posed by market access, e.g. excessive local prices on solar equipment; and to lighten up the burden of the national IST programs to attain equipment. In addition, the Barefoot College and the respective national IST programs should attain extra attention to the BSEs' decision-making power in the organizational structures of the national IST programs. Highlighted in the two cases, women involvement does not directly translate into women inclusion - i.e. the capability to participate, negotiate, influence, control and hold accountable situations that affect their life (paraphrased CARE (2006).

6.2. The Community Perspective – the Development Objective

The community perspective addresses why women involvement does not necessarily translate into women inclusion in the perspective communities. The societies of both Kingdoms are based on communal, rather than individualistic values, where providing for each and other in the society is prioritized on the expense of individualistic attainments.

Women empowerment is justified by the community in MaG at the premises for its positive impact on the local community. The restraints and stigma the women in MaG are encountering in a daily basis becomes all the more apparent, when they are tangible limitation for the opportunity for community development and people to increase their income. The haltering practices and perceptions (e.g. women's limited mobility or access to work) of community development becomes more visible when pragmatic and tangible steps are taken to increase the community's wellbeing.

Women empowerment is justified by the communities in Tongatapu at the premises for its positive impact on the family development. The community perspective suggest perceiving the women empowerment objective in term of family development, doing so can limit the focus on structural and relational changes that can enable women's control over situations that affect her life, such as control over her own actions and choices in regard to labor, assets, time management, alliance and negotiation habits, group involvement and family development.

Shortcomings of the current BC IST model regarding facilitating women empowerment is that - women capability expansion - is sidelined at the benefit of family and community development in Jordan and in Tonga. It is therefore questionable to assume that the new Tongan IST model has the potential, by itself, to enable structural change that challenges persistent patriarchal hegemony in the respective communities.

Limitations of community participation, awareness and acceptance towards the Jordanian IST program and the Tongan IST program perceived through the community lens can be explained by perceived notions of masculinity and femininity. The BC aim to engage women in technical income-work was a novelty for the community especially in MaG, but also to some extent in Tongatapu. Engaging the acceptance of the community towards the Jordanian IST program and the Tongan IST programs were halted by cultural and patriarchal structures of society, of where in Jordan women were perceived to participate solely in the private realm, at home, not engage in public spaces, and let alone in income-work. The challenges that the women (the perspective Barefoot Solar Engineers) face in the different contexts provide them with divergent challenges and enablers regarding enabling empowerment processes. Cultural structures underline much of what the women can or cannot do in MaG. The roles, relations and norms are sometimes perceived as static, and are not easily challenged. In other words, 'women are not traditionally breadwinners of the household; therefore, women are not supposed to be the breadwinners of the household'. The BC IST program is challenging the understanding of a woman's role in the Bedouin society. The interviews highlighted that the cultural/religious-

based concept of ‘shame’ was a connotation of the empowerment of women. Henceforth, education, and income-work was perceived as shameful for women to engage in. The women in MaG were discouraged from participating in the IST-program because of the shame it would incline for the women personally, and for their family. The perceived gender roles in MaG is highlighted as a limitation to the BSEs’ empowerment. Women’s empowerment some appear like a treat to the status quo, which can affect the development of the Jordanian IST program and the empowerment of the BSEs, examples of this is that women are discouraged from developing skills or traveling outside the village.

The community perspective addresses the objectives and impact of the small-scale decentralized energy in MaG in Jordan, and Houma and Kolomuto’a in Tonga. There are multiple social aspects of the project that are relevant and meaningful for the perspective communities, which should be emphasized in further work with the national IST programs. The solar panels contribute to substantial differences in people’s lives and the program fosters socio-economic benefits beyond, what was discussed in the previous section as a program-based cost-benefit approach. Nevertheless, the community perspective, have not facilitated conceptualizing the national IST program regarding women empowerment for women themselves, which leaves out an important dimension of the BSEs’ women empowerment process and in understanding what structural, relational and agency-based enable and limits the BSEs’ empowerment.

6.3. The Women Perspective – the Empowerment Objective

Women empowerment for whom, if not for the BSEs themselves? How can the program perspective neglect the impact of the national IST programs on the BSEs themselves? How can the community perspective stop-short in defining women empowerment in and for the women themselves? Women empowerment falls short from a program perspective and a community perspective, because the lenses provided from these direction lack emphasizing the agency of the individual BSEs, nor does the perspectives acknowledge women as individual agents of change, outside the unity of their family and community realm in the perspective contexts analyzed; the contextual lens provides an understanding of how basic needs forms the situatedness of the BSEs. Nevertheless, it neglects rationalization about the structural

discriminations and the relational barriers experiences by the BSEs, of which the women perspective is addressed.

The goal of the thesis was to unpack contextual embeddedness that have enabled/restricted the BSEs empowerment process; to understand how the BSEs empowerment process. This thesis has been unable to unfold the all complexities of the contexts that surrounds the BSEs. The analysis of the impact the perspective national IST program have on the BSEs' women empowerment is complicated by the structures and relations surrounding the BSEs and agency of the BSEs. The implications on the BSEs empowerment process is limitless, meaning that structural, relational and agency-based dimensions, fragments and perspectives of women empowerment can be unraveled time and time again, discovering novel insights on every occasion. Can women empowerment objectives stand on its own feet without the broader context? I argue that multi-perspectives (program, community and women perspectives) on women empowerment can unravel and enable processes that are indeed relevant and meaningless for women themselves, if it be for the development of their families or challenging status-quo power relations. Women empowerment is a process bases concept, aiming at facilitating relevant and meaningful objectives for the perspective women in their perspective environments. This study highlights that women empowerment in this is not a linear process, but a dialectic amorphous process. Therefore, I argue that multiple perspectives and a continuation of exploring the women empowerment process should be at the forefront of any program, or initiative that aim at facilitation women empowerment.

7. Conclusion

The Barefoot College aims to develop rural communities and enable women empowerment through its IST program (BC, n.d.-d). The Barefoot College IST program shines a light on the binary power dimensions of - woman empowerment and renewable energy: looking to turn on the 'double light switch' through providing local women's and communities' ownership over renewable energy technology and enabled women empowerment processes.

Women in Jordan and in Tonga have, through their attainment in the Barefoot College IST program, developed skills to build, install, maintain, operate and repair SSPS and solar lanterns. These women/BSEs utilized their new knowledge-skills augmenting their communities' access

to renewable energy, which had positive impacts on peoples' lives. In Jordan the solar technology created opportunities for decreased use of health-deprivation light sources (such as kerosene), attained assets, and access to information and communication (because of increased opportunities to charge mobile phones). In Tonga solar technology created opportunities for increased income-generation, attained assets, and increased hours available for children's schoolwork.

The Jordanian and the Tongan IST program highlight positive impacts of putting women in the center of community development programming. The respective IST programs highlight gendered dimensions that unfolds throughout the process of introducing decentralized renewable energy in local contexts. For women in Jordan, access to renewable energy meant decreasing their dependency on others to provide them with means for electricity. In addition, more hours with light provided the women with opportunities to engage in outside-house coalitions with other women, which in turn created opportunities for women to attain education and income-work. More access to charged mobile phones increased women's access to information and communication, which was used as an educational tool to learn how to read and write in Arabic. Moreover, The Jordanian BSEs altered local gender perspectives, enabling imagination of women's role to expand beyond the realm of the household; this enabled acceptance for women's mobility, and increased women's engagement in politics and income-work. The Jordanian BSEs' engagement in the Barefoot College IST program and the facilitation of the Jordanian IST program have facilitated their empowerment process – the women have improved their agency, and altered relations and structures that surrounds them (e.g. through skills, knowledge, and asset attainment; fostering their courage and self-esteem; increased their independence, mobility and social network; and, enabled their engagement in income-work and in political decision-making).

For women in Tonga access to renewable energy meant increased time available for income-generating work (such as handicrafts), for children's homework, and for family- and religious activities. The women highlighted renewable technology of importance of their families' development, and for its impact to ease the women's time pressure to fulfill their household tasks. Furthermore, the Tongan BSEs challenge local gender perspectives, by making visible that women can and are willing to engage in practical vocations. Moreover, the Tongan BSEs challenge the religious-hegemonic structures by informing their community that family budgeting and saving should be prioritized at the expense of church donations. The Tongan BSEs' engagement in the Barefoot College IST program and the facilitation of the

Tongan IST program have facilitated their empowerment process – the women have improved their agency, and altered relations and structures that surrounds them (e.g. through skills, knowledge, and asset attainment; fostering of their courage and self-esteem; and by increased engagement and influence in the community).

The Jordanian and the Tongan IST programs are limited by economic constraints - the respective programs lack of means or assets for maintenance and repairment of the solar technology. The Barefoot College Model is not suficiant in the context of MaG, Jordan, Houma and Kolomotu'a, Tonga. The households with installed SSPS do not pay monthly fees in neither context. In Jordan, the nomadic lifestyle and the liability to assure accountability of payments, requires the BSEs to gather one-time payments. In Tonga, the waste distances of the installed SSPS; the lack of continuous maintenance of the SSPS, over the past 7 years, and, the destroying effects of the cyclone 'Gita' in 2017 provide challenges for the BSEs to request the households with installed SSPS to pay. In Jordan and in Tonga the program face challenges regarding market access; as solar technologies are expensive to import. In Jordan, high taxation because of international pressures on the economy is a barrier. In Tonga, the remote location puts excessive shipping costs on importation. The situatedness of the two countries creates dependency from the national IST programs on the BC to provide them with solar equipment.

The Barefoot College conceptualizes and materializes women empowerment through a program perspective of communal development. The Barefoot College argues that women are the foremost under-developed resource in rural communities worldwide, assuming empowerment of women will lead to increased community development. The community perspectives in Jordan and in Tonga catalyzes the Barefoot College perspective of women empowerment. In the local context of MaG, Houma and Kolomotu'a women empowerment is justified in terms of community and family development.

The four BSEs involved themselves in the Barefoot College with the aspiration, to develop new skills, engage in income-work, enable community development and to better the lives of their families. The women have encountered barriers in facilitating their aspirations – the Barefoot College does not match the contextual settings of which the BSEs operate. Barefoot College women empowerment perspective is not formulized in terms of the discriminatory and marginalizing practices and structures that enforce vulnerability and powerlessness impacts on women, and in their capabilities to control/influence their lives (e.g. violence, and restricted mobility). This inspires me to ask the question: How successful can a development program be if it does not put the recipient, or in the case of the BSEs (i.e. the recipient and the mediator) at

the center of problematization, objectives and facilitation of the programming? If women are not at the center of the women empowerment objective, who is women empowerment for?

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Appendices

Appendix A

Interviews conducted - JORDAN

Name	Interview No.	Time SPan[41]	Role	Location of the Interview	Date
Woman 1	1	Medium interview	New BSE – Solar Panels installed in household	MaG	03.12.18
Woman 2	2	Medium interview	New BSE – Solar Panels installed in household	MaG	03.12.18
Aatifa – Jordanian BSE	3	In-dept interview	BSE - Solar Panels installed in household	Amman	04.12.18
Shazmah – Jordanian BSE	4	In-dept interview	BSE - Solar Panels installed in household	Amman	05.12.18
The previous Jordanian ground partner	5	In-dept interview	Previous ground partner of the BSE Program in Jordan.	Amman	07.12.18
Man	6	Short interview	Unofficial New BSE – Solar Panels installed in household	MaG	08.12.18
Woman 3	7	Short interview	Not involved in the project. Does not have Solar Panels installed in household	MaG.	08.12.18
Woman 4	8	Short interview	New BSE – Solar Panels installed in household	MaG.	08.12.18

[41] Short interview (Below one hour), Medium interview (Between one-three) hours, In-dept interview (above four hours).

Appendix B

Interviews conducted - Tonga

Name	Interview No.	Time Span[42]	Role	Location of the interview	Date
Papahi – current Tongan BSE	9	In-dept interview	BSE – does not have Solar Panels installed in household – previously lantern	Nukualofa, guesthouse	21.01.19
The current Tongan ground partner	10	In-dept interview	Ground Partner of the BSE project	Nukualofa, guesthouse	23.01.19
Man 1	11	Short interview	Government official Ministry of Environmental Development renewable energy climate change.	Tongan Department of Renewable Energy Office	25.01.19
Man 2 and man 3	12	Short interview	Representatives of TPL	TPL Office	25.01.19
Woman 1	13	Short interview	Gender specialist Tongan Department of Renewable Energy	Tongan Department of Renewable Energy Office	28.01.19
Woman 2, woman 3, and women 4	14	Medium interview	Representatives of the Talita Project	Talita Office	28.01.19
Town Officer	15	Short interview	Town Officer in Kolomotu'a	Nukualofa, Guest house	30.01.19
Women 5	16	Short interview	Women with solar panels in her house in Sia Sia	Church in Nukualofa	30.01.19
Man 4	17	Short interview	Cheer person of fishing community in Kolomotu'a	Kolomotu'a	30.01.19
Lekeleka – current Tongan BSE. Part one	18	In-dept interview	BSE – no solar panels, but previously lantern	Nukualofa, Guesthouse	05.02.19
Lekeleka – current Tongan BSE. Part two	19	In-dept interview	BSE – no solar panels, but previously lantern	Kolomotu'a	12.03.19
Man 6	20	Short interview	Government official Ministry of Environmental Development renewable energy climate change.	Tongan Department of Renewable Energy office	14.03.19
Woman 1 part two	21	Short interview	Gender specialist MEDECC	Tongan Department of Renewable Energy office	14.03.19
Man 5	22	Short interview	Household with SP in Kolomotu'a	Kolomotu'a	15.03.19
Women 6	23	Short interview	Household with SP in Kolomotu'a	Kolomotu'a	15.03.19

[42] Short interview (Below one hour), Medium interview (Between one-three) hours, In-dept interview (above four hours).

Appendix C

Master Thesis – Semi-Structured Interviews

Questions for - Barefoot Solar Engineers (BSE)

Background Story
General questions:
Can you tell me your life story? From you grew up until now: Can you describe yourself? (in three words if difficult to answer) What are your **strengths as a person**? - Has these changed after you became a BSE? - Does that help you to carry out work? What is the main income generating activities for you?
Process to become a Barefoot Solar Engineer:
Why did you decide to become a BSE? Why did your community decide to pick you to become a BSE? How did your family/community react to you becoming a BSE? Why? Has their opinion changed? Which year where you enrolled at the Barefoot College (BC)? What was the best experience (best memory) at the BC? What skills did you learn at the BC?
Back in the community: challenges/problems vs. opportunities
How did your community/family welcome you when you came back home? How was it to introduce the solar panels to your community? How is a regular day for you now? Can you tell me how you go to people's houses, how you install and maintain the solar technology? How often for maintenance? How did you use what you learned when you came back home? Do you receive a salary from the involved households for your work? Regularly and how much? What is the most rewarding part/important of becoming a BSE? (1-5 topics) What is the most difficult/problems/challenges parts of becoming a BSE? (1-5 topics) Was the to become a BSE a good investment for you? Why/why not? Is the solar technology working as you thought they should? If no, why not? What do people think/express of the Solar Panels? Are they useful in their daily life? Why?
The sustainability of the project
How many households were provided with solar technologies from India? When? How many of them are still working properly today? How does new BSE become selected? By who? What is important? How did you train newly selected BSEs? What happens when you run out of solar tools/equipment? What are your future aSPirations for the BSE project? How can more people in the village access solar technology? How can will payment be arranged in the future? How many have invested in solar technology through their own money? Could there be alternative set up of the IST program in your village? What are the alternative?

EMPOWERMENT

Agency

Have there been any **changes** in your life after you became a BSE? How was it before and how is it now? (*Open question, but elaborated on topics below*):

What are your main **needs** in your daily life?

- Has these changed after you became a BSE?
- Does the SP-project help you achieving these?

What is your **aSPiration** for life?

- Has these changed after you became a BSE?
- Does the SP-project help you achieve your aSPirations?

Have you experienced that you have more **opportunities** after becoming a BSE?

- Which?
- How has these affected your life?

Do you have more to say in **decision-making** (in community/ family/ other places)?

- which topics/which not?
- Can you choose when to work? How often? Where? Which households?
- Do you participate in any **leadership role**?
    - Do you participate in the VEC, other social work, community, religious activities, politics or other organizations/ institutions?
    - How does this affect your position in society?

Have you experienced increased **status** in your community after becoming a BSE?

- How?

Have you experienced increased **income**? (Are you in demand for paid services outside the village?)

- Do you have control over this income?
- Can you decide what this income is used on?

Have you experienced increased **resources**?

- Which?
    - For example, increased social network/reSPect in community, other material resources?

How is your **time management**?

- Do you have more time for what you want to use it on or do you have to work even more than before?

Do you have greater **confidence/self-esteem** after becoming a BSE?

Have you taken more **education** or developed other **skills** after becoming a BSE?

Defining Empowerment:

- How would you define empowerment/ better life?
- What aSPects is important for you?

Change Perspectives:

- Do you think you can make changes that improve your life or make life better in your village?
    - Did you think you could make changes that improve your life or make life better in your before you became a BSE?
- What changes can you make in the future? Why/why not?
    - What changes can you not make?
- How do you perceive change?
- Are there other changes you wish to happen in your community/ for you?
    - Do you have any thoughts about how you or others could go about this?

Structure

What is your communities' main needs?

- Do the SP-project help facilitate these?
- How has the situation for people in your village changed after they have installed SP?

(open questions, elaborated):

- Education
- Health (inside climate/sight)
- Security
- Income
- Women's role
- Light/energy sources
- Access to information
- More opportunities? To what?

What kind of **obstacles/opportunities** does your environment provide you with?

- **Environment** (physical mobility, infrastructure, markets to find what is needed),
- **culture** (patriarchy),
  - As a woman, which limitations do you face in your community?
  - And which benefits do you experience?
  - How is a woman supposed to behave in your community?
  - Did expectations towards women change after you became a BSE? If yes, how?
  - Can female do more now than before you became a BSE? What?
  - What do you think about that only women can become BSE?
  - Do you think men would have different priorities than women if they were BSEs? Which?
  - What does females in your community express regarding their future? Have this changed after you became a BSE? How? (what about the men and their expectation for women's future?)
- **social** (family relations, other institutions that could facilitate SP projects in the community),
  - Did you get help from family/community to start the project? If yes, how?
  - Were there other women who wanted to go to the Barefoot College? If no, why not? If yes, why were they not elected?
  - Do you think you inSPire others in your community to do some projects/ start business/ develop new skills?
- **political** (structures that are limiting the SP-project).
  - Is the government in any way involved in the SP-project? How?
- **Financial**
  - How does the low income and lack of purchasing abilities ?
  - Is there available of microcredit?

Relations

What **role** does your family have in your community?
Who makes **decisions** in your community? Why?
How do you **influence** family/ community decisions? Do people listen to your opinion regarding community/family issues? Did they do that before you became a BSE?
How do you see your **role** in society? Was it different before you became a BSE? How?
Who is supporting you and who makes your work difficult?

Appendix D

Master Thesis – Semi-Structured Interviews

Questions for - Barefoot Representatives/contact persons

Process

Can you tell me about the startup of the project in the village?
Why was this **village selected**?
How was the **BSE elected**? (the original and the newer). (was there a Village Wide consultative meeting?)
Why did the **community decide** to become involved with solar panels?
Who was in charge? How were decisions made? (are there any changes today?)
What are the limitations/greatest challenges for facilitating and conducting the project?
What changes has the project brought about?
(e.g. education, health, security, decision making, opportunities, income increased, resource control, leadership/ social engagement, Time management etc.)
 	
Can you tell me about the VEC/REW/workshops?
- **VEC**
  o How often are the meetings?
  o What do they decide, who decides?
  o Structure, member ratio gender
  o Who has elected VEC members?
  o Has there been any major challenges?
- **REW**
  o How does it work?
  o How was it facilitated? (built/bought/rented/given)
  o How does the BSE get new tools/equipment/parts for installation and maintenance? From where?
- **Workshops (Training of new BSEs)**
  o How many workshops to train new BSE has there been?
  o Where was the trainings? Why?
  o How was they facilitated?
  o Who was involved/what was their roles?
  o How does the new BSE get trained?
 	
Technical questions:
What Wat does the solar technology have?
How many lamps per HH are installed? How many solar lanterns are provided to how many HH?
Are they only used for indoor lighting or for other purposes like starting up small businesses like hairdressing, petty trade, mobile charging etc.?
What types of solar panels/battery/converter do you use?
How many solar panels are installed per house?
- Has there been any changes regarding this?
What source of energy was used before?
What does people pay for solar panels and solar lanterns? (instalment/monthly fee)
- Why this amount?
- How often

- What happens if people do not pay?

What is the plan regarding the sustainability of the project?

- Is there a plan to scale up the project?
    - How can other people (more people in the village/other villages) get access to the panels?
    - Where can they buy panels locally?
    - What about quality insurance of locally bought panels? Who assures this?
    - Is there a big demand for the solar technology in and outside the villages?
    - Why are some households able to complete the process while others do not?

- How do the BSE get parts?
    - How does shipping expenses affect the accessibility to the renewable technology?
    - Is it possible for the BSE to connect with someone who can import SP parts closer to the villages, rather than to import parts from India?
- Does the project work as expect? Why/why not?

EMPOWERMENT

Structure

What is the communities' main needs? Does the BSE project facilitate for them to be met?
What is the main income generating activities in the village?
How many people lives in the village?
How many households have gotten SP installed?
Does the government support the project? How, why?
What type of religion/culture is there in the village?

- Does the religious inst./Mosque/society effect the project? Help/restrict/ or both?

What are the norms and traditions in?

- Marriage (Polygamy/monogamy)
- How does the norms and traditions effect the women?

How is life for women in village? (has there been changes because of the BSE project?)

- Do women have the same access to/utility of education as men?

Relations

Does the BSE collaborate with each other? With other people in the village?
What main relations effect the BSE? (family/VEC/etc.?) how, why?
Who benefits from the project? Why?

Agency

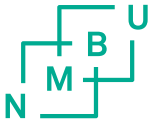
How would you describe the BSEs as people?
Do the women have other income generative activates on the side of the SP- project?

Appendix E

Master Thesis – Semi-Structured Interviews

Questions for – 1. Households that have gotten installed solar panels/solar lanterns and 2. households that have not gotten solar panels/solar lanterns installed

Questions for 1. Solar electrified households
Why is there a solar technology installed in your house? Are the SP working as they should?
Questions for both (1. and 2.)
What do you think about the solar technology? What do you think of the work the BSE does? Could it be different? How? What is your communities main need? - are those needs facilitated with the solar technology? Why/ why not? What changes has there been in your village after the solar technology was installed? Open question - Elaborated: - Health - Security - Education - Income - Role of women - Access to info. - Change of energy source? - Other?
Questions for 2. Non-solar electrified households
Why is there not installed solar technology in your house? Are you interested in getting solar technology? If no, why? If yes, explain why you don't have any. How can you get solar technology?



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