University of St.Gallen

Master Thesis

Going to Scale with Safe Water

Analyzing the Business Model of Hydrologic Social Enterprise in Cambodia

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Abstract

This thesis discusses potential scaling strategies for Hydrologic Social Enterprise. The Cambodian based for-profit company alleviates poverty using a market approach, which is the current trend in development aid. It involves the poor communities living at the Bottom of the Pyramid (BOP) in their business activity consisting of producing and disseminating ceramic water filters in a pioneering way to provide safe water to the BOP. This way of doing business considers the poor as innovative entrepreneurs, producers and resilient consumers. This paper focuses on the various facets of Hydrologic Social Enterprise's innovative business model and the different elements and difficulties in relation to Cambodia's water sector. The goal is to identify strategies to scale up the company in another country. Finally, this thesis provides helpful, praxis-oriented insights into the development, the needs, the challenges and potentials of the company, which could attract impact investors to support the scaling process.

Acknowledgement

About a decade ago, the social enterprise Hydrologic started its journey towards a sustainable, profitable company generating impact for the rural poor in Cambodia living at the bottom of the pyramid.

This study is the outcome of a two-month fieldtrip and intense collaboration between the author of this thesis and the company.

I would like to express my gratitude to Professor U. Heierli, who made this rich experience possible. Without his practical engagement and intellectual support, it would not have been possible to gain such close and trustful insights into the company in Phnom Penh, Cambodia.

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List of Abbreviations

ATL	Above-The-Line
BTL	Below-The-Line
BM	Business Model
BMC	Business Model Canvas
BOP	Base or Bottom of the Pyramid
CAPEX	Capital Expenditure
CPI	Corruption Perception Index
CQC	CWF Quality Controller
CWE	Clean Water Experts
CWF	Ceramic Water Filter
DFID	Department for International Development
FDI	Foreign Direct Investment
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HWTS	Household Water Treatment Solution
ICT	Information and Communication Technology
IDE	International Development Enterprise
IFC	International Finance Corporation
JMP	WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation
MDG	Millennium Development Goal
MNC	Multinational Corporation
MSE	Micro-and Small Enterprises
M&A	Mergers and Acquisitions
NGO	Non-Government Organization
NPO	Non-Profit Organization
OECD	Organisation für wirtschaftliche Zusammenarbeit und Entwicklung
OT	Original Tunsai
PfP	Potters for Peace
P&G	Procter and Gamble
POU	Point-of-Use
PPP	Power Purchasing Parity
PSM	Provincial Sales Manager
ROI	Return on Investment
SDC	Swiss Develop Cooperation
SDG	Sustainable Development Goals
SE	Social Enterprise
ST	Super Tunsai
UNDP	United Nations Development Program
UNO	United Nations Organization
USAID	U.S. Government Agency for International Development
USD	US Dollar
WRI	World Resources Institute

1 Introduction

How can a successful business model of a social enterprise be scaled in another developing country? If yes, which components can be scaled and under what conditions? What is the role of the market in poverty alleviation?

Nowadays, more and more actors in the development aid sector have shifted towards a new paradigm, which sees the poor and marginalized communities as active participants in the market economy. This has modified the view of the poor people from a top down to a bottom up perspective. This thesis will show that creating a market for a product the poor need has a high potential to lift them out of the poverty cycle. Instead of being aid recipients and in total dependence from donors, the poor become part of the economy and contribute to the market as consumers that buy products based on their needs.

This thesis focuses on one specific business case in Cambodia active in the water sector, which has proven successful in creating and disseminating a product for the poor including them in this way into the market economy. The profit-oriented firm Hydrologic Social Enterprise[1] produces low-cost point-of-use water filters for rural households. Despite the fact that Cambodia has achieved its millennium goal of halving the population without access to safe water sources at 72%, there is still one third of Cambodians, especially those living in rural areas, who lack access to safe drinking water. Reaching approximately 6% of the total population, the social enterprise has a considerable impact on society and contributes substantially to the provision of safe water. The company has established a promising business model that could serve as a base for other organizations working in the same field. Thus, this paper seeks to analyze the different components of Hydrologic's business model and to create an international scaling strategy for the firm to increase its socio-economic impact.

2 Research Objective

Hydrologic Social Enterprise's goal is to reduce poverty by improving the lives of the rural poor through the market creation of products tailored to their needs. So far, the company has disseminated more than 400'000 ceramic water filters and affects the life of almost one million people living at the bottom of the pyramid (Roberts, 2015, p.1). This study examines in which way this specific social enterprise can scale its activities in another country, expanding organizational growth but also impact. This paper contains a detailed analysis of the firm's business model in Cambodia and will show (1) how this firm makes a difference through the production and country-wide dissemination of its product, the "Tunsai" point-of-use water filter, as well as (2) how it effectively reaches the target groups, especially the rural poor living at the bottom of the pyramid. The research objective is to scrutinize this project through the eyes of a

[1] In this thesis Hydrologic Social Enterprise (formerly International Development Enterprises, Cambodia) is also referred to as Hydrologic.

business analyst and to discuss the different components of the firm's business model in order to contribute to assess the scalability of a successful social enterprise in another country. This will be done by identifying and elaborating appropriate strategies for going to scale.
Since the market approach in development aid is considered by many as a sustainable way of lifting the poor out of poverty, the author seeks to demonstrate the positive impact of this paradigm on the rural poor in Cambodia. First, this thesis assumes that social enterprises can contribute to development aid in a sustainable way if certain conditions are fulfilled. Second, it will be shown that such firms are indispensable for Cambodia's water sector. Third, the author claims there is high potential for Hydrologic Social Enterprise to go to scale using strategies tailored to its business model. This leads to the following research question:

"Based on the business model of Hydrologic Social Enterprise, how can the firm best scale up its activities in another developing country?"

3 Research Design

This part refers to the overall strategy used to answer the research question. Therefore, it will discuss the different approaches applied to attain the research objective.

3.1 Single Case Study

When examining a socio-economic phenomenon in its real-life context, the boundaries between the object (Hydrologic Social Enterprise) and its environment may not be clearly evident. Thus, the case study approach is most appropriate as "a case study is an empirical enquiry that investigates a contemporary phenomenon within its real life context" (Yin, 2003, p.13). This approach is suitable to prevent the object of the study and its context from being manipulated (Yin, 2003, p.14). Further, it is especially useful when questions like "how" and "why" about existing events are asked, over which the investigator has little or no control (Yin, 2008, p.18). The practice-oriented view generates knowledge about the practitioner (Hydrologic Social Enterprise) responsible for a specific practice and has direct implications for the firm's options for action. Finally, it permits "the systematic, methodologically correct collection and evaluation of observable facts in the organization by which it is proven that success[2] occurred as the result of an intervention." (Dul & Hak, 2008, p.31).
For this thesis, the data from one instance is enough to answer the research question (Dul & Hak, 2008, p.31). The following six reasons show that Hydrologic Social Enterprise fits the single case design:

[2] Dul and Hak (2008) define success as the reach of an empirically correct conclusion about a practical object of study (p.31).

- The pioneering role of Hydrologic Social Enterprise makes it possible to depict a best case scenario for Cambodia. It was the first organization that imported the know-how of the water filter technology in order to ensure clean drinking water and alleviate poverty to Cambodia.
- The NGO spin-off is one of the largest and most successful household water treatment producer and distributer in Cambodia for the rural poor. It has been awarded with prizes (Annex I) and hence gained attention internationally.

- The company's multitude of collaborations with partners and customers shows the human centered design approach and the network aspect, which are crucial elements in successfully implementing an initiative to alleviate poverty.

- Hydrologic provides a great example of successful switching from a non-profit into a for-profit venture. The company explicitly takes a market-based approach to poverty alleviation by employing business principles used by private sector. This creates commercial sustainability besides social impact. However, at the same time, the firm also has a long tradition of the rural development approach focusing on poor and vulnerable rural population.

- Hydrologic Social Enterprise combines the three most cited market approaches (SME, microfinance and BOP): First, it acts as a profit-oriented company that employs local skilled work force. Second, the product is tailored to customers from the base of the pyramid. Third, the collaboration and establishment of an in-house micro-finance institution relieves the buyers.

3.2 Qualitative Research Method

Although the qualitative research is difficult to define as it has no clear theory (Denzin & Lincoln, 2011, p.6), this approach is useful to describe variables that emphasize the company's innovative and scalable aspects of Hydrologic Social Enterprise. As the firm's outcome is shaped by the actions and contributions of many internal and external factors, the author needs to explore the various facets of the company's business model in detail (Koh, Hegde & Karamchandani, 2014, p.18).

The researcher combined different methodological practices to collect empirical material in order to deeply understand and explore the richness and complexity of the phenomenon in question (Flick, 2009, p.207). These methods of data gathering are explained subsequently:

The theoretical part is grounded on comprehensive literature research of written documents such as books, academic research papers, journals, magazines, newspaper articles and websites. This existing information serves as a solid base that complements the practical part, where data

was gathered in the form of internal firm documents, field reports through direct observation and via individual in-depth interviews.

The purpose of the one-on-one interviews with key people was to probe the ideas of the interviewees about the phenomenon of interest (Mack, Woodsong, Mac Queen, Guest & Namey, 2005, p.29). To this end, an open-ended question format was used. The questions were not worded in the same way with each participant as they are often more complex to respond to than closed ones. The main benefit is that the interviewed person can respond in their own words (Mack et al., 2005, p.1). This is crucial since the language level differed among the study participants and the researcher. Especially in rural Cambodia, the majority of the population speaks Khmer as a first language and only knows little English. In some cases, a translator needed to step in, which additionally challenged the interviewer to correctly understand its counterpart and this clearly increased the risk of some bias. However, the interviewer has "the opportunity to respond immediately to what participants say by tailoring subsequent questions to information the participant has provided" (Mack et al., 2005, p.4). The most valuable advantage is the ability to evoke responses which are meaningful and culturally most important to the participant and therefore rich and explanatory in nature (Mack et al., 2005, p.4). Further, the responses are unanticipated by the researcher, which can be considered as a respectful way to approach the interviewer with questions in a cross-cultural context. Additionally, it creates a basis of trust and understanding towards the reference person through adapted interaction.

The direct observation method, which was used to write field reports differs from interviewing in that the observer does not actively query the respondent strives to be as unobtrusive as possible. It is a suitable method when the researcher lives in another context or culture for a period of time to observe certain sampled situations in order to illustrate some aspects of the phenomenon (Mack et al., 2005, p.14). This can minimize bias as the researcher watches from a more detached perspective instead of directly participating (Trochim, 2006, middle).

As the researcher was in contact with people that are not easily accessible and often hard to reach, the researcher applied the snowball sampling method, which is also called referral sampling (Mack et al., 2005, p.5). In this method, the researcher reaches other people through his previous contact person. Hence, the researcher needs to pay a lot of respect to local experts and community leaders, as their advice and guidance is needed. Because of the limited time frame for data collection, it was even more important to work closely with the local key people to access new research participants (Mack et al, 2005, p.5).

Finally, the practical data resulted from videos, audio tapes, field notes and raw data (e.g. internal firm numbers). To attain the research objective, two tools will be used to analyze the data: First, the existing phenomenon will be explained with the Business Model Canvas (BMC). This will structure the business model of Hydrologic Social Enterprise and its complex environment and map the main actors involved. One of the advantages of the BMC applied for qualitative research is that its procedures are visible, comprehensive and replicable. The theoretical elements of the

BMC are further described in section 4.2.3. Second, existing scaling routes will be presented to identify and elaborate possible strategies for going to scale. This qualitative research thus depicts aspects, which are directly applicable in practical contexts. However, there are some limitations that need to be considered.

3.3 Limitations

Not only the distinctive case of this company but also the various socio-economic, cultural political and historical factors are very country specific (e.g. the genocide or the Kingdom of Angkor Wat) and have marked the country in a very peculiar way. Other factors, like Cambodia's specific regulations and laws in the development aid and water sector as well as the multiple bi- and multilateral country relations influence the possibilities and activities of the company.

Therefore, the findings are based on a particular context of time and place. Due to this fact, transferability, which refers to the degree to which the results of a qualitative case study can be generalized or transferred to other contexts or settings, is rather low. The researcher needs to be aware of the ever-changing context in which the research takes place, which may lead to cultural bias of the results as countries and industries develop their own business cultures (House et al., 2004). The specific circumstances make it not only difficult to generalize the findings for any other project in the same field but also question the repeatability of the research (Mack et al, 2005, p.83). Further, if a business case looks into the future, the parties involved should be aware that predictions come with uncertainty (Business Case Analysis, 2016, middle). This applies especially when identifying potential scaling strategies for Hydrologic.

Another limitation is the duration of the monitoring period. The aspects highlighted and treated in this thesis are non-exhaustive. For a more in-depth analysis, the enterprise would have to be consulted over a longer period. This would generate more reliable information on results about the implementation of new structures and sustainable long-term strategies. However, the firm's existence of a minimum of ten years provides valuable information for a set-up of a similar program in another country.

Finally, as scaling strategies are numerous, due to the scope of this thesis, the author limited the analysis to two scaling strategies focusing only on relevant aspects respective to the research question.

4 Theoretical Background and Concepts

This part will explain the most important theoretical concepts to clarify the boundaries in which this single case study is embedded. The first part will describe poverty and the BOP market segment. Secondly, the concept of a business model and a social enterprise will be explained to gain a better understanding of the unit of analysis and how it is related to the field of development aid.

4.1 Poverty and Market Approaches

"Social and economic inequalities are to be arranged so that they are to the greatest benefit of the least advantaged members of society." (Rawls, 1971, p.83).

As described by the World Bank, poverty is a multidimensional social phenomenon and there are multiple definitions for poverty (World Bank, 2004, p.33). According to the Encyclopedia Britannica, poverty is "the state of one who lacks a usual or socially acceptable amount of money or material possessions. Poverty is said to exist when people lack the means to satisfy their basic needs. In this context, the identification of poor people first requires a determination of what constitutes basic needs. These may be defined as narrowly as those necessary for survival or as broadly as those reflecting the prevailing standard of living in the community." (Britannica, 2016).

When it comes to poverty alleviation in development aid, the interest in market approaches has grown considerably in the last two decades (Hammond, Kramer, Tran, Katz & Walker, 2007, p.6; McKague, 2012, p.1). They involve the private sector, to complement aid activities, thus contributing to a more comprehensive solution by mobilizing the resources of more agents (Zaefarian, Tasavori & Ghauri, 2015, p.320). Further, the market approaches involve poor communities, which trade labour or cash to meet their basic needs, as consumers, producers and entrepreneurs into markets (McKague & Oliver, 2012, p.99). Thus, while following a social goal they encourage market-oriented behavior of the poor (Hammond et al., 2007, p.6). Making the market more inclusive for poor households can increase their living standard by fostering income growth and creating employment - not only through human development but also through economic empowerment and the provision of wider choices of goods and services at less cost (Cooney & Williams Shanks, 2010, p.29; Humphrey, 2014, p.4; Zaefarian et al., 2015, p.324). As Heierli (2008a) states: "The better the poor are integrated into markets, the more they will be able to step out of poverty." (p.35). Markets thus have a high potential for providing many benefits to those able to gain access and participate successfully in them (Mendoza & Thelen, 2008, p.427).

4.1.1 The BOP

The "Base of the Pyramid" (BOP) market approach in particular has opened the discussion on including the private sector in development aid (McKague & Oliver, 2012, p.99). The core idea is that poverty can be reduced by companies selling goods and services to communities living at the BOP in ways that are more affordable and accessible than alternatives (Mc Kagan, 2012, p.8). Thus, the initial focus of the BOP approach is on the supply side of a value chain and sees the poor primarily as consumers (Vachani & Smith, 2008). The term was initially defined by Prahalad and Hart in 2002 (Prahalad & Hart, 2002)[3] and became popular in 2004 with the book

[3] The term is based on the working paper "Raising the Bottom of the Pyramid" written by the same authors in 1998.

"The Fortune at the Bottom of the Pyramid" (Prahalad, 2004), in which the author divides the entire world population into a pyramid of four socioeconomic segments according to the per capita income adjusted for Purchasing Power Parity (PPP)[4] (London & Hart, 2011, p.6). The individuals that live at the base of this socioeconomic pyramid are referred to as the "Base of the Pyramid" (BOP)[5] (Koh, Karamchandani & Katz, 2012, p.58). Defining poverty by solely using income and expenditure values has led to wide variations in stipulating appropriate PPP values, because the BOP segment is heterogeneous (Hart, 2011, p.6). The PPP lines range from USD 1'500 to USD 3'000 per year and USD 1 to USD 4 per day per capita (London & Hart, 2011, p.6). To reduce these inconsistencies, the World Resources Institute (WRI) together with the International Finance Corporation (IFC) defined the BOP segment consisting of approximately four billion people, who earn incomes not higher than USD 3000 per capita per year in local purchasing power (based on the 2002 PPP)[6] (Hammond et al., 2007, p.1; Koh et al., 2012, p.58; London & Hart 2011, p.6-7). This means the BOP includes "the majority of humanity with the least amount of income" (Hart, 2011, p.6). However, their aggregate purchasing power consists of approximately USD 5 trillion, which creates a significant global consumer market (Hammond et al, 2007, p.3; London & Hart, 2011, p.7).

Further, J.P. Morgan measured the potential scale of invested capital and profit for businesses active in the BOP sector in 2010. They found that over the next ten years (until 2020), this market segment potentially offers USD 400 billion to USD 1 trillion invested capital and USD 183 to USD 667 billion profit (O'Donohoe, Leijonhufvud, Saltuk, 2010, p.6). Of all the BOP regions examined worldwide, Asia (based on 19 countries, including the Middle East) has the largest BOP market share with 2.86 billion people that have an aggregate income of USD 3.47 trillion (Hammond et al., 2007, p.19). Although the maximum annual BOP income threshold is fixed at USD 3'000, the majority of Asia's BOP market earns only between USD 1'000 to 1'500 per year (Figure 1).

In addition, these two income segments also spend most (Figure 2). A similar tendency is observed in the Cambodian BOP market, where more than one third (36%) have an income of USD 1000 per year per capita. This most populated BOP segment also has the highest purchasing power, and is responsible for spending 21% out of the total Cambodian BOP market (Figure 3) (Hammond et al, 2007, p.18).

[4] PPP provides a standardized comparison of real prices, as it equates the price of a basket of identically traded goods and services across countries. This measure serves as a useful tool to assign the global population to different income levels.

[5] Following terms referring to the people living at the BOP will be used interchangeably: The poor, vulnerable, marginalized or low-income individuals.

[6] These numbers are based on data from household consumption surveys from Africa, Asia, Eastern Europe, Latin America, and the Caribbean.

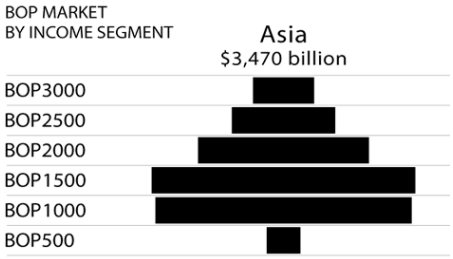

Figure 1 Asian BOP Market.
Source: Hammond et al, 2007, p.19.

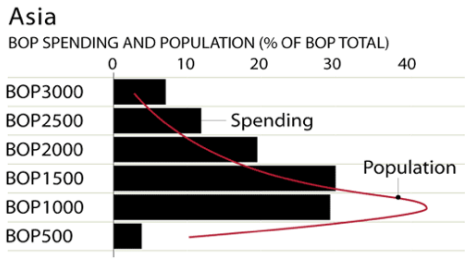

Figure 2 BOP Spending and Population (Asia).
Source: Hammond et al., 2007, p.18.

BOP segment	Population Total (millions)	Population Share (% of national)	Population Urban (% of segment)	Annual expenditure Total ($ millions)	Annual expenditure Share (% of national)	Annual expenditure Urban (% of segment)
BOP3000	0.4	3.0	40.0	1,094.4	6.4	40.1
BOP2500	0.7	5.5	31.1	1,669.9	9.8	31.2
BOP2000	1.4	10.7	19.8	2,490.4	14.6	19.9
BOP1500	2.7	20.5	13.7	3,413.6	20.1	14.0
BOP1000	4.7	36.2	7.1	3,619.0	21.3	7.4
BOP500	2.3	18.0	4.2	828.9	4.9	4.3
BOP total	12.2	93.8	11.9	13,116.2	77.1	17.0

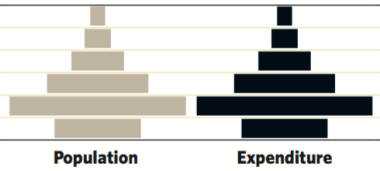

Figure 3 Cambodia BOP Segments and Spending. Source: Hammond et al., 2007, p.120.

4.1.2 Criticism

Although the BOP features underline the potential for economic opportunities at the BOP (Bornstein & Davis, 2010, p.102; Heierli, 2008a, p.31; Prahalad & Hart, 2002, p.54; Levinsohn, 2013, p.2), the consumer-based view of the BOP has been criticized in several ways.

Opponents claim that the initial idea of the BOP include the so called “utopian optimism” that is said to make large multinationals responsible for the reduction of global poverty (Karnani, 2011). Further, Banerjee and Duflo (2007) as well as Karnani (2009b) claim that the poor are being romanticized. According to Karnani (2009b), the “rosy view of poverty-stricken people is harmful as it allows corporations, governments, and nonprofits to deny the protections this vulnerable population needs and hobbles realistic interventions for alleviating poverty.” (p.38). A further criticism is the marketization of social welfare at the expense of civil society and government organizations (Munir, Ansari & Gregg, 2010, p.247). Lastly, the definition of the term BOP is fuzzy. Although a potentially useful empirical indicator, the PPP income levels do not apprehend the whole picture of the heterogeneous, informal, and variable BOP market environment. The reality looks much more complex, especially since poverty itself is difficult to define[7]. This limitation pushes to look beyond numbers defining consumer value and find other ways that capture the BOP (Hart, 2007, p.101; Hart, 2011, p.7).

[7] For a detailed discussion on the multidimensional nature of poverty, see A. Sen, 1999.

4.1.3 BOP 2.0

In the wake of criticism, a new BOP generation called the BOP 2.0 has emerged. The BOP 2.0 switches from a "fortune-finding" to a "fortune-creating" mentality, which considers doing business *with* four billion and emphasizes the aspect of co-creation (Hart & Clayton, 2002; Hart, 2011; Simanis & Hart, 2008)[8]. Instead of seeing low-income communities purely as customers, the BOP 2.0 regards them as business partners with shared commitments (Ramachandran, Pant & Pani, 2012, p.33). The new approach focuses on the skill-development of the poor to incorporate them into a company's operations and increase their real income to lift them out of poverty (Karnani, 2007, p.103-105; Munir et al., 2010, p.257). Karnani (2011) believes that poverty can best be reduced by Small and Medium-sized Enterprises (SMEs) creating employment opportunities for low-skilled and low-income workers, which is especially important in developing countries. The main advantage of the SMEs is that they are less capital-intensive, more flexible, labor-intensive and geographically dispersed within a country than a large company (Karnani, 2009a, p.19). However, this requires a business-enabling environment, which needs to be supported by the government in place. Governments need to take responsibility, for example, for the implementation essential regulations or counteracting market failures. Another way of including the poor into the market economy consists of giving them access to micro finance, which encourages the poor to entrepreneurial activities (Yunus, 2007). Finally, while the focus was initially drawn on seeing the poor exclusively as consumers (Hart and Prahalad 2002; Prahalad, 2004), the view today has changed towards a more inclusive BOP market approach which sees the poor also as entrepreneurs and producers (Hart, 2011; Heierli, 2008a; London & Hart, 2011).

The BOP 2.0 connects the BOP community with enterprises leading to shared resources, capabilities and synergies. This development gives way to new business ideas and specific models that emphasize innovation in product and process technologies (Simanis & Hart, 2008, p.2).

The succeeding section first frames the understanding of a business model in general. Subsequently, the specific nature of a social enterprise will be introduced to combine the two aspects into a social business model. Finally, the Business Model Canvas (BMC) will be presented, which will help to structure Hydrologic's business model.

4.2 Business Models

Globalization, the development of the Information and Communication Technology (ICT) sector and the multitude of interactions are considered as some of the main drivers responsible for the increased complexity in today's business environment. Although the term „business model" had first appeared in 1960 in an accounting review (Jones, 1960), it was only in the 1990s that the

[8] For more literature on the distinction between BOP searching and BOP co-creation, see S. A., Alvarez & J. B., Barney, 2008 or S. D., Sarasvathy, 2001.

concept gained widespread attention. With the rise of the Internet and innovations in science and technology, new forms of businesses like high tech or e-commerce companies emerged (Zott, Amit & Massa, 2011, p.1022; Osterwalder 2004, p.12, 23). This development led to an unprecedented "clock speed"[9] cutting down product lifecycles and increasing competition (Osterwalder, 2004, p.13). The consistent rapid growth, especially in emerging markets, and the recent interest in the inclusion of the BOP into the market economy have considerably extended the use of the concept "business model" since the 1990s (Seelos & Mair 2007, p.49; Thompson & MacMillan, 2010, p.305).

The advances in different fields such as economy, marketing and management have contributed to the diversity in the definition of business models. Due to the lack of consensus (Nicholls, 2010, p.611), terms like business model, economic model, revenue model, strategy and business concept (Morris, Schindehutte & Allen, 2005, p.721; Zott, 2011, p.1022) will be used interchangeably.

Nevertheless, a business model explains "how a firm will make money and sustain its profit stream over time" (Stewart & Zhao, 2000, p.290). Thus, it concisely represents "how an interrelated set of decision variables in the areas of venture strategy, economics and architecture is addressed to create a sustainable competitive advantage in a defined market'' (Morris et al., 2005, p.727). Some authors provide an even more inclusive view by putting customers' needs at the core. Hence, a business model maps how a company captures, creates and delivers value to its customers by providing new products and services but also illustrates how the created value is converted into profits (Teece, 2010, p.172-173; TEC Club, 2012, sec: 20:25; Osterwalder & Pigneur, 2010, p.14; Zott et al., 2011, p.1037; Yunus et al., 2010, p. 311-312).

Customers are increasingly seen as a "critically important operant resource for firms - not only as the ultimate determinant of customer value but as a source of creative, knowledgeable, and motivated resources" that can be included in the firm through the process of co-creation (Saarijärvi, Kannan & Kuusela, 2013, p.7). Value co-creation between customer and firms is of growing importance nowadays, where different actors are interconnected and embedded in a complex network of relationships (Clinton & Whisnant, 2014, p.17; Normann & Ramirez, 2000, p.65; Zott et al., 2011, p.1031-1032) [10]. Not like traditionally centered around goods, value creation today is concerning whole systems (Saarijärvi et al., 2013, p.7). Seddon, Lewis and Shanks (2004) perfectly summarize the recurring elements which crystallize through literature: "A business model outlines the essential details of a firm's value proposition for its various stakeholders and the activity system the firm uses to create and deliver value to its customers" (Seddon et al., 2004, p.440). Finally, a business model needs to be "simple, measurable, logical, operationally meaningful and comprehensive" to analyze it (Morris et al., 2005, p.269; Osterwalder & Pigneur, 2010, p.15).

[9] The term "clock speed" was originally described by Charles Fine in 1998.
[10] For more information on the customer-centric view, see S.G., Blank, 2006.

In the last decades, the business model of social enterprises has gained attention in relation to its emergence in BOP markets. The next section describes the nature of social enterprises operating in development aid and the nature of their business model.

4.2.1 The Concept of Social Enterprises

Although the phenomenon of social entrepreneurship is not new, it has gained increased attention, especially since the 1980s. According to scholarly literature, a social enterprise[11] is regarded as a multidimensional construct that can be classified as a hybrid organization (Martin & Osberg, 2007, p.38) because it attempts to combine the best of two worlds (Weerawardena & Mort, 2006, p.22) and it creates value for society in areas where markets and governments are failing or impede solutions (Levander, 2010; Santos, 2012).

Further, it develops financially sustainable operations that leverage commercial activities (Santos, Pache & Birkholz, 2015, p.36). Social enterprises bridge different institutional fields ranging from market (private), to not-for-profit (civil society), to government (public) sector (De Moura et al., 2015; Doherty et al. 2014; Jäger & Schröder, 2014; Pache & Santos, 2012). Social entrepreneurship research is still largely phenomenon-driven, meaning most studies are based on descriptive statistics and case studies (Parkinson & Howorth, 2008, p.286). Real life observations not only apply different research designs and methods but also introduce insights from other disciplines (Weerawardena & Mort, 2006, p.22).

Despite the dispersed literature and the fluidity of the concept of social entrepreneurship (Shane & Venkataraman, 2000, p.217), some authors and institutions have attempted to formulate a definition of these hybrids (Weerawardena & Mort, 2006, p.21). According to Dees[12] (1998), social enterprises create “new combinations of people and resources that significantly improve society’s capacity to address problems. Social entrepreneurs create public value, pursue new opportunities, innovate and adapt” (in Bornstein & Davis, 2010, p.1). Yunus (2007) emphasizes that the primary focus of a social enterprise is “to serve society and improve the lot of the poor” (p.82). Thus, social value creation is a social venture’s essential goal, while the economic value creation is considered as a necessary condition to ensure financial viability (Mair & Marti 2006, p.39). This understanding is consistent with Porter and Kramer (2011), who emphasize the creation of shared value, "which involves creating economic value in a way that also creates value for society by addressing its needs and challenges" (Porter & Kramer, 2011, p.64). Finally, the Organization for Economic Cooperation and Development (OECD) defines social enterprise as “a private activity conducted in the public interest, organized with an entrepreneurial strategy but whose main purpose is not to maximize profit but the attainment of certain economic and

[11] The different terms for social enterprise, such as social business hybrid (Santos et al., 2015), hybrids (Jäger & Schröer, 2014), social business (Yunus, 2007; Quarter & Sherida, 2015; Wilson & Post, 2013) social purpose businesses (Young & Lecy, 2012) and social ventures (Blundel & Lyon 2015, p.82) will be used interchangeably in this thesis.

[12] Greg Dees is one of the principal thinker in the field of social entrepreneurship.

social goals, and which has a capacity of bringing innovative solutions to the problems of social exclusion and unemployment" (OECD, 1999, p.10).

Some authors separate social enterprises into subtypes ranging from socially responsible corporations, to public-private partnerships, commercial non-profits and social purpose businesses (Jack & Sherida, 2015; Santos et al., 2015; Young & Lecy, 2012). Others have tried to reduce the complexity of existing literature by distinguishing three different branches of social enterprises: The European perspective is rooted in the field of social economy (e.g.: associations and cooperatives) and strongly encourages businesses to carry out public duties. The North American view considers their role in trying to solve social problems by using market logic. The third stream, which is in line with Hydrologic Social Enterprises, emphasizes business initiatives in developing countries, which aim at reducing poverty and transforming the social conditions of marginalized individuals (Young & Lecy, 2012; De Moura et al, 2015).

For-profit, business-oriented social ventures operating in BOP markets, create specific models for the provision of products and services that cover the basic human needs, like access to safe water (Mair & Marti, 2006, p.39; Young, 2007, p.8). However, it can be challenging to combine the demands of the market with the social welfare goal as the two aims might compete each other (Paché & Santos, 2012, p.972; Jay, 2013, p.173). Thus, the idea of merging social and economic value creation within the same organizational structure involves fundamentally innovative and entrepreneurial approaches (Wilson & Post, 2014, p.717). Therefore, social enterprises are forced to think of innovative business models fitting the BOP market environment.

Two important reasons for the growing interest in and success of social business models are: (1) First, because of the desire for a better world, which can be seen by the recently launched Sustainable Development Goals (SDG's) by the United Nations Organization (UNO) (Seelos & Mair, 2005, p.244), and the various philanthropic agents engaged in the development aid sector (Yunus, Moingeon & Lehmann-Ortega, 2010, p.319). (2) Second, because the objective of social businesses is to share and spread best practices and the know-how for making refined social business models accessible and replicable to other global partners, "which may merge and thus become a stronger social force in the world" (Yunus et al., 2010, p.319). These motivations embolden scaling strategies for spreading the innovative business model of social enterprises.

4.2.2 Going to Scale

"We have learned to create the small exceptions that can change the lives of hundreds. But we have not learned how to make the exceptions the rule, to change the lives of millions." (Lisbeth Schorr)[13]

[13] Lisbeth Schorr, 1998 in G., Dees, B., Anderson, & J. Wei-Skillern, 2004, p.26.

To identify scaling strategies for a social business in another country, it is crucial to understand that "going to scale" in this thesis is considered as a combination of both, increasing impact and organizational growth.

There are different strategies to maximize social impact and growth and they depend on many factors such as the resources and support, the founding conditions, the context, the various political, social and cultural windows of opportunity and choices made about partners and strategies (Moore, Riddell & Vocisano, 2015, p.74). Common forms of increasing value creation are diversification, scaling across, scaling deep, scaling out and scaling up[14]. However, scaling up is the most evident and widely used (Marchione, 2013, p.72; Dees, Anderson & Wei-Skillern, 2004, p.26). Marchione (2013) further points out four different subtypes, which often go together but are not identical: functional, political, organizational, and quantitative scaling-up[15] (p.72). Based on the detailed classification, our type used for this case study will be quantitative scaling up, which happens when a social enterprise designs a way to spread its local initiative giving access to their products and services to a wider base of beneficiaries in different geographical locations and thus increases impact (Dees et al., 2004, p.31; Marchione, 2013, p.72). "When entering this phase, the social entrepreneur turns his attention towards quantitative growth." (André & Pache, 2014, p.2).

For a social business to grow internationally, it requires innovation to replace outdated models - especially since international contexts vary widely (Osterwader & Pigneur, 2010, p.4; Clinton & Whisnant, 2014, p.16; Yunus et al., 2010, p.312). Sometimes, the business model itself can be a source of innovation or it can be a vehicle for innovation (Zott et al., 2011, p.1031-1032). Since this case study focuses on scaling possibilities for companies on the organizational level, innovation is understood as a new method of doing business to introduce a firm's blueprint in a new country. It consists of adapting a standardized model to the local environment of the new geographical market area aiming to maximize effectiveness (Szulanski & Jensen, 2008, p.1733). Thus, the key for a successful scaling process consists in leveraging prior innovations and lowering the threshold required for successful innovations (Szulanski & Jensen 2008, p. 1739). Innovation thus complements a firm's growth process in another country (Aspara, 2010; Dees et al., 2004). As innovative business models ensure firm existence and allow effective scaling in different countries, they are increasingly considered as a fundamental source of competitive advantage (Porter & Kramer, 2015; Szulanski & Jensen, 2008, p.1733) and may lead to inclusive businesses[16] (Koh et al., 2014).

However, imitation requires more than a merely repeated application of a new business model formula (Aspara et al. 2010, p.42-43; Moore et al., 2015, p.71). It is crucial to develop a business

[14] For a more detailed description see Moore et al., 2015, p.67; Aandré & Pache 2014, p.2.
[15] For further explanation on the different types see Th. J. Marchione, 2013.
[16] Definition of "inclusive business": A business that provides a product or service that is clearly socially beneficial to the BOP, based on a business model that is commercially viable and ideally scalable (Koh et al., 2012, p.58).

model tailored to the circumstances of low-income markets (Chandy et al., 2013, p.35-36). Once having discovered and refined a new business model, further effort is needed to explore the necessary components to replicate that model in suitable geographical locations (Winter & Szulanski, 2001, p.730-731). This involves a lot of discovering and learning about the complex and interwoven processes and customer-valued aspects to reproduce such a "recipe" (Aspara et al. 2010, p.43). The difficult part is the recreation of knowledge at the new site (Szulanski & Jensen, 2008, p.1733) and the maintenance of the model in operation once it has been replicated (Aspara et al., 2010, p.4).

Szulanski and Jensen (2008) mention two forms of knowledge to be incorporated when going to scale: The one from the firm but also the knowledge of the new local environment (p.1733). This knowledge needs to be recombined to create innovation and change. As Bornstein and Davis state: "New recipes are needed, not just more cooking." (Bornstein & Davis, 2010, p.73). In a society where knowledge is fragmented, entrepreneurs play a critical integrating role in bringing together the multiple pieces of information.

4.2.3 Business Model Canvas

To map the innovative aspects of Hydrologic's business model and identify scalable elements of the company, the Business Model Canvas (BMC) developed by Osterwalder and Pigneur (2010) offers a practical tool by describing nine building blocks. The book is based on a previous work that divides a business model into four overarching sections (value proposition, customer interface, infrastructure and finance) (Osterwalder, 2004, p.43). In the current version, the pre-structured canvas integrates the four pillars. The left side gives an internal view, by discussing the key resources, key activities and key partners it requires to create value. The right side of the canvas pictures the external perspective of a business, such as customer segments, customer channel and customer relationships. The third element lists the financial aspects consisting of a company's cost and revenue structure. The centerpiece of the analysis is the value proposition, which is also at the heart of Hydrologic's commercial activity: the "Tunsai" ceramic water filter. Eventually, the four sections can be divided further into a total of nine building blocks.

This canvas[17] serves as a strategic management and entrepreneurial tool that helps design and map the business model of Hydrologic, which will be described from chapter 5-7. Three reasons explain why the BMC is especially useful for this single case study:

First, as highlighted above, social value creation, innovation and the focus on customers and product are crucial elements of a social business model and are important elements for identifying scaling-strategies for a social business model. As the BMC places the value proposition at its core and also focuses a lot on the customer side of value creation, this tool is perfectly suitable for Hydrologic's business model analysis, because its product and the

[17] See Annex I for the BMC applied on Hydrologic Social Enterprise.

customers are also the core of the firm's business.
Second, as Hydrologic mainly implements a Western understanding of strategic management, it fits the BMC logic. The simple and practical oriented inclusive tool is clearly understood and helpful for further investigations and modifications on the firm's replication process.
Third, the BMC is flexible and allows adoptions and variations of the nine elements included in the blueprint. As the aim of the canvas is to move beyond product-centered thinking, it allows the inclusion of the multiple facets of the company, giving it a more holistic approach (e.g.: by including former marketing concepts established in the past which focused specifically on sustainability and social business aspects in the development field like the four A's). Further, its widespread application by various public and private enterprises[18] shows that the BMC is useful. Finally, the BMC's simple, relevant and functional classifications allow a clear structure and a comprehensive representation of Hydrologic's business model (see Annex I).

The theoretical part has provided a basis for the understanding of our unit of analysis and has given insights about the field of study in which this master thesis is embedded. This presented know-how will be applied to Hydrologic Social Enterprise and the Cambodian context in the course of the following chapters.

5 Context

A firm's strategic decisions depend on diverse factors. Therefore, this section will describe the context in which Hydrologic Social Enterprise operates.

5.1 Worldwide Access to Safe Water

Access to safe drinking water is crucial to achieve development objectives like ending poverty and has been officially recognized as a human right since 2010 by the United Nations General Assembly. In 2000, the member states of the United Nations declared the Millennium Development Goals (MDGs). Goal 7, ensuring environmental sustainability, included the target of halving the proportion of people without sustainable access to safe drinking water by 2015. This was already met in 2010 (WHO/UNICEF, 2015, p.2). Today, an estimated 91% of the world's population - a total of 147 countries - have access to improved[19] drinking water sources. Although the gap in coverage between rural and urban areas has steadily decreased since 1990, the percentage of the urban population using improved water sources with an estimated 96% is still higher than the 84% of the rural population (WHO/UNICEF, 2015, p.4). Despite the progress, at the end of 2015 still around 9% of the world population (663 million) use unimproved drinking water sources from unprotected springs, wells and surface water. Rural populations (79%) in particular lack access to improved drinking water, of which the majority (93%) uses unimproved surface water and thus face the greatest health risks (WHO/UNICEF 2015, p.11).

[18] Such as public authorities from Canada, Start-Ups, established multinationals like P&G, but also the OECD.
[19] The difference between improved and unimproved water sources is described in Table 1.

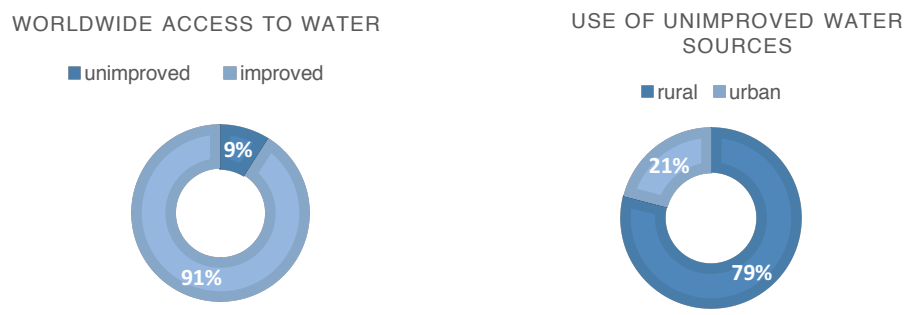

Figure 4 Access to Safe Drinking Water. Source: WHO / UNICEF, 2015 (own illustration).

The classification of improved and unimproved water is based on quality and safety of the water source and thus the number of people using water from unimproved water sources might seem low. However, the persisting problem is that microbially unsafe water is delivered through fecal contamination of improved or protected water sources. Although water from improved sources can be safe when leaving treatment plant or when collected, the lack of standardized delivery systems, low water pressure due to seasonal weather fluctuations and the informal market segment allowing illegal connection to distribution systems are often an opportunity for bacteria to contaminate safe drinking water at the point of use (Sobsey, 2002, p.1). Further, water from improved sources can be recontaminated with pathogens due to unsafe storage and usage practices, unhygienic conditions in households and animal fouling (Shaheed, Orgill, Ratana, Montgomery, Jeuland & Brown, 2014, p.192; Sobsey, 2002, p.2). Thus, the percentage of people consuming unsafe water cannot only be limited to the people using water from unimproved sources. This urges actors active in the water sector to think of alternative and effective solutions that can complement the access to safe water and contribute to the well-being of the population (Clasen, 2009, p.viii).

Table 1 Definition of “Improved" and "Unimproved" Water Supply. Source: WHO / UNICEF, 2015, p.30 (own illustration).

Improved Drinking Water Sources	Unimproved Drinking Water Sources
• Piped water (into dwelling, plot, yard) • Public tap or standpipe • Tube well or borehole • Protected dug well • Protected spring • Rainwater collection	• Tanker truck • Bottled water[20] • Cart with small tank/drum • Unprotected dug well • Unprotected spring • Surface water (River, dam, lake, pond, stream, canal, irrigation, channels)

[20] Bottled water is considered “improved” for drinking only when the household uses an improved source for cooking and personal hygiene (WHO / UNICEF, 2015, p.50).

5.2 Cambodia Facts and Figures

Figure 5 Map of Cambodia. Source: CIA World Factbook, 2016.

Zooming in, from the worldwide perspective to the Southeast Asian region, Cambodia, also known as the Kingdom of Cambodia, is bordering the Gulf of Thailand and bordering Vietnam, Laos and Thailand. The country size (181'035 km2) is roughly four times (x 4.3) the surface of Switzerland (41'277 km2) and the population accounts for 15.4 mio. (World Bank, 2016b, p.6). While the majority of 79% lives in rural areas, only one fifth is urban (21%) (World Bank, 2016a). Real GDP grows fast, with 7.1%, and Foreign Direct Investments (FDIs) from Vietnam and China are increasing (World Bank, 2015a, p.1). Further, the construction and real estate sector has become "the most dynamic engine of economic growth" (World Bank, 2015a, p.7). However, together with tourism and the textile industry, the agricultural sector is still a vital sector for the country and the most essential contributor to pro-poor growth, contributing to one third of the total GDP (30.4%) (World Bank, 2015a, p.22). More than 60% of the poverty reduction can be attributed to this segment. Reasons are the exceptional agricultural GDP growth rate during 2004 to 2012 of an annual average of 5.3%, being among the highest in the world (World Bank, 2015a, p.24). What is more, as most of the country's workforce is still employed in subsistence farming most poverty reduction took place in rural areas (World Bank, 2015a, p.1). Nevertheless, land concessions to agro-industrial business interests cause dispossession of land from farmers that receive little adequate compensation and resettlement packages (Human Rights Watch, 2015). While poverty remains particularly high in the countryside, urban workers also suffer from low wages. The official minimum wage declared by the government in October 2015 is USD 140 per month from 1st January 2016 (BBC, October 8, 2015). Because the use of credit for personal products is rare, commercial actors are risk-averse making it difficult for the company to sell the product at the right price (PATH, 2009b, p.2). According to the World Bank, Cambodia is classified as a low income level country with a GNI per capita of UDS 1'010 (World Bank, 2016b, p.6).

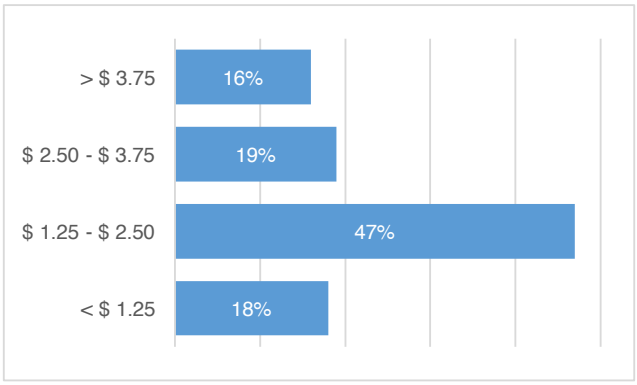

Figure 6 Daily Income Level per Customer Segment, Cambodia 2014 in % from total Population. Source: Roberts, 2015 (own illustration).

Cambodia's daily income distribution can be divided into four categories. Although the poverty headcount ratio at national poverty lines has almost halved from 2008 to 2012, the pace of poverty reduction has slowed down (World Bank, 2015b). Today, only 16% earn above USD 3.75 per day and 19% live with a daily income of USD 2.50 to USD 3.75. Almost 18% still live on less than USD 1.25 per day (17.7%, around 3 mio. people). Over 8.1 million (47%) earn between USD 1.25 to USD 2.50 per day and are thus considered vulnerable or near-poor[21] (World Bank, 2015b). The reason why the share of the near-poor has risen is that households have escaped poverty but only by small margins. According to the World Bank, "about 90% of them live in the countryside" (World Bank, 2015b).

Finally, Cambodia is still one of the world's poorest countries (BBC, September 4, 2015) and corruption is still deep-rooted. According to the Corruption Perception Index (CPI)[22] defined by Transparency International, the global coalition against corruption, Cambodia is ranked 150 out of 168 countries together with Burundi and Zimbabwe and has "the worst possible score among Southeast Asian countries with a dismal 21 out of a possible 100 points"[23] (The Diplomat, February 2, 2016). The lower the score, the higher bribery, the less likely is the act of punishment for corruption and the lower is the response of public institutions to citizens' needs.

Further, Cambodia's Human Development Index (HDI) value of 0.555 (2014) can be categorized in the medium human development category (UNDP, 2015, p.2). Cambodia particularly focuses on developing the crucial areas of health and education. This might be one reason why the country achieved the UN target of providing access to safe drinking water to more than half of the population with 76% (WHO/ UNICEF, 2015, p.59). However, still 24% of the total population live with unimproved water access. While everyone in the urban setting uses improved water sources, more than one third of the rural population (31%) are still concerned with the problem of untreated water (WHO/ UNICEF, 2015, p.59). Rural Cambodian households get their drinking water from multiple sources and they commonly mix improved (like rainwater collection, protected wells and local vendors who deliver water by pipe, truck, or wagon) with unimproved

[21] According to the World Bank (2015a) the poor are those living below $1.15 per day (poverty line) and the near poor are those living above USD 1.15 but below USD 2.30 per day (p.27). For practical matters, the classification in the graph was done on 0.25 margin.
[22] "The CPI is a composite index which relies on a combination of surveys and assessments of corruption from a variety of reputable institutions, is based on perceptions because absolute levels of corruption are difficult to measure - corruption by nature comprises illegal activities, which are deliberately hidden." (The Diplomat, February 2, 2016).
[23] A country or territory's score indicates the perceived level of public sector corruption on a scale of 0 - 100, where 0 means that a country is perceived as highly corrupt and 100 means it is perceived as very clean. A country's rank indicates its position relative to the other countries and territories included in the index (Transparency International, 2014).

(like unprotected dug wells or surface water from rivers, lakes, ponds) sources depending on the season and location of sources. Cambodia has water in abundance with its many rivers and its groundwater (Aguilar, 2010, p.28). So the problem is not the insufficient quantity but the safety of collected and stored water to cover the daily need. Therefore, the rural households are dependent on a combination of self-supply (like rain water collection), private provision, or community-run systems (Sy, Warner & Jamieson, 2014, p.15-16). Recontamination of improved water sources due to the reasons listed previously is a prevalent problem in Cambodia (Shaheed et al., 2014, p.192).

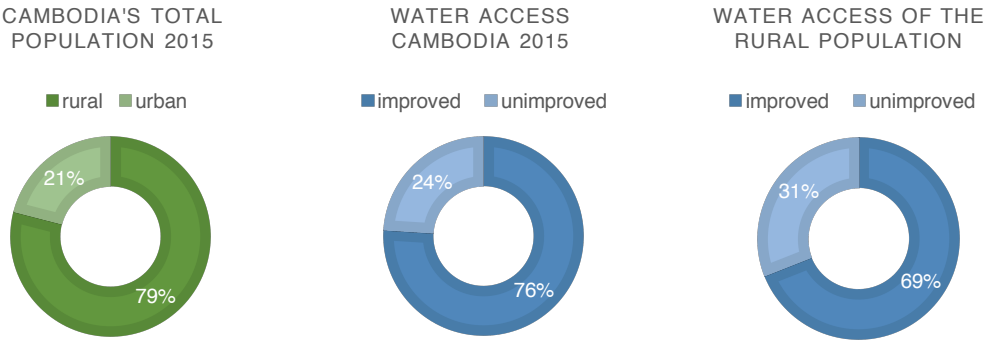

Figure 7 Overview: Cambodia's Access to Water. Source: WHO / UNICEF, 2015 & World Bank 2016a (own illustration).

5.3 Cambodia's Water Sector

Cambodia's base of the pyramid in the water market landscape is dominated mostly by small private water supply enterprises. The rapid expansion of improved water access has encouraged the creation of a decentralized water supply system and the growth of private operators (Shaheed et al., 2014, p.187).

While in other countries (e.g.: Bangladesh or Benin) water firms are wholly funded by governments or receive investments through donors, Cambodian water suppliers operate and invest mainly on a private basis: Hydrologic Social Enterprise finances, designs, constructs, operates, and manages everything autonomously, whereas in Benin, for example, only the management and operational part is operated privately. Cambodian private firms are well adjusted to market conditions, meaning companies display a strong orientation toward serving the rural poor (Sy et al., 2014, p.4).

Like Hydrologic, most of these enterprises are able to make a profit by yielding a positive return on investment and a revenue, which enables adequate provisioning for depreciation. Nevertheless, they are confronted with many challenges such as inadequate access to investment financing and the lack of security to operate (Sy et al., 2014, p.3). In Cambodia, for example, energy is a key issue for water firms, accounting for about 65% of the operating cost. This is mainly due to the diesel fuel used to generate electricity (Sy et al., 2014, p.11). Further, law and regulations set by the Cambodian Government has blocked processes (e.g.: the establishment of an in-house microfinance institution).

5.3.1 Obstacles to Growth

Commercial but also political factors are limiting the growth of private companies. Often, costs are unaffordable for the poor and more incentives need to be created to reach these markets. While the commercial factors are more or less similar across many different countries, the policy factors are more country specific (Sy et al., 2014, p.8).

5.3.1.1 Weak Demand

The presence of demand for paid-for water systems (e.g. piped water)[24] shows the poor are willing to pay for value and proves the large market potential for alternatives such as the Tunsai ceramic water filter. However, due to small and mostly seasonal income, the poor are constantly confronted with trade-offs between price and value when choosing the water source (Sy et al., 2014, p.2). Thus, poor households are only willing to allocate their limited money to a high quality product or service when alternative sources of water at much lower cost exist. The option for cheaper substitutes (e.g. access to rainwater, wells, springs) creates a difficulty for firms serving the subsistence market as demand is not strong enough (Sy et al., 2014, p.29).

In addition, tariffs and connection fees (if available water systems) are too high for many poor rural households as it would cost the Cambodians 4.1% of their income to reach the standard daily per capita consumption of 40 liters of water. Although this percentage does not crack the traditional maximum of 5% of the income, costs may surpass the budget limit for what poor households are able to pay. For many poor households, the cost of a private connection is an ever greater barrier averaging 34% of the income per month (Sy et al., 2014, p.8-9). As the pricing of Hydrologic's Tunsai water filter is adapted to the local environment and the income structure of the population, it can be defined a useful and affordable HSTW for the target group (see section 6.3.2). However, challenges related to stimulating correct, consistent and exclusive use of such technologies remain (Ahuja et al., 2010; Ahmed et al., 2011; Heierli, 2008b; Kremer et al., 2011; Roberts, 2003). Therefore, the product dissemination needs to be complemented with a suitable strategy informing the households about risks associated with unsafe water to change their behavior (Shaheed et al., 2014, p.192) (see section 7.2.1).

5.3.1.2 Unsupportive Investment Climate

In Cambodia, investments of private firms are mostly unsupported by the government. This is mainly due to "the incomplete nature of legal frameworks on urban and semi-urban water supply and lack of clarity and consistency about the rules governing private investment in water networks" (Sy et al., 2014, p.10).

[24] The presence of demand is shown through the combined high annual water sales estimated for Cambodia, Bangladesh and Benin, which are expected to increase to USD 90 mio. compared to USD 23 mio. in 2012 (Sy et al., 2014, p.2).

Other examples of policy and institutional obstacles in Cambodia include bureaucratic registration and complicated licensing procedures, the lack of effective dispute-resolution mechanisms and limited regulation and monitoring (Shaheed et al., 2014, p.187).
However, Cambodia's quasi absence of public supply of water and the rather liberal government approach to private firms creates commercial opportunities for autonomous private investment (Sy et al., 2014, p.8). Further, Cambodia's government profits actively from the Water and Sanitation Program (WSP)[25] that engages the domestic private sector (Sy et al.,2014, p.7). Nonetheless, the uncertain investment climate complicates the actions of firms in the water sector. For example, Hydrologic had to buy their own suitable land on which they were able to build the system infrastructure (e.g. factory), since the difficulty is that Cambodian loans are "collateralized by the real estate sector" (Sy et al., 2014, p.8).

5.4 Safe Water and Waterborne Disease

As the government lacks the financial and organizational capacity to install improved and safe water supplies from public resources, the households commonly mix water from various sources depending on the availability and preferences of sources. This makes them more exposed to potential waterborne diseases (Sy et al., 2014, p.15-16).
Children under the age of five are especially vulnerable to unsafe water consumption as it can lead to diarrhea, which is one of the three main causes of child mortality together with neonatal causes and pneumonia (Borapich & Warsh, 2010, p.6).
Worldwide, around 2'000 children die from diarrheal diseases each day. 90% of these casualties are directly related to contaminated water, lack of hygiene and sanitation (UNICEF, 2013). Cambodia's children make roughly one third of the total population (aged between 0-14 years). The country faces an estimated 10 mio. cases of diarrhea and 10'000 deaths every year, mostly among children under the age of five living in rural areas (Hydrologic Social Enterprise, 2013, p.1; UNICEF, 2013, p.1).
It is the poor rural households that pay the direct costs of inadequate access to safe water (Shaheed et al., 2014, p.186). Waterborne diseases can impose a heavy economic burden and endanger their well-being leading to healthcare problems, loss of productivity and income, and missed school days for children (Sy et al., 2014, p.16; p.31-32; World Bank, 2008, p.60).
In response to the persistent problems associated with waterborne diseases and also because Cambodian households live in hard-to-reach and less profitable locations for government actions, people rely on private initiatives that help to cover their need for safe water and storage (Sy et al., 2014, p.17). Consequently, new, context-specific and effective strategies for safe drinking water provision treatment at household level are gaining attention (Clasen, 2009, p.viii; Shaheed et al., 2014, p.192; Sobsey 2007, p.1).

[25] WSP is a multi-donor partnership administered by the World Bank to help poor people obtain affordable, safe, and sustainable access to water and sanitation services (Sy et al, 2014, p.7).

5.5 Most Prevalent HWTS in Cambodia: Boiling

In Cambodia, the most prevalent Household Water Treatment Solution (HWTS) to generate safe drinking water is boiling (Brown & Sobsey, 2012; Heierli, 2008b; Roberts, 2003; 2015; Sobsey, 2002). This ancient point-of-use method is effective in destroying different waterborne pathogens (e.g.: bacteria, bacterial spores, fungi, protozoans, helminth ova, and viruses) (Heierli, 2008b, p.26; Sobsey, 2002, p.13). According to Sobsey and Brown, the majority of Cambodian households (roughly 70%, of which 65% are rural and 75% urban) use this HWTS (Brown & Sobsey, 2012, p.397).

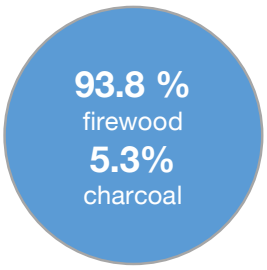

Figure 8 Fuels used for Boiling in %.

Although effective and widely used, the process also bears some disadvantages like high costs (compared to alternatives like ceramic water filters), poor indoor air quality and CO^2 emission (Clasen, 2009, p.ix). Further, more than 98% of rural households use firewood (93.8%) and charcoal (5.3%) as fuels for boiling water, which come from a predominantly non-renewable biomass (UNFCCC, 2014, p.4). This number confirms that practically everyone in Cambodia uses boiling as a HWTS (Mizou & Kai, 2004, p.118). Another drawback is the danger that boiling is practiced inconsistently, which means the water is not brought to a rolling boil for a long enough amount of time (minimum of ten minutes) (Sobsey, 2002, p.13). Thus, the water can still maintain some pathogens.

5.6 Ceramic Water Filters in Cambodia

After boiling, filtration methods to produce safe drinking water follow second with 10.7% in Cambodia (Brown & Sobsey, 2012, p.397). For lower-income rural households ceramic water filters (CWF) in particular have proven suitable as they have been tested widely in the laboratory and in the field and have demonstrated their capacity in effectively removing pathogens from contaminated water and contributing to long-term health benefits due to the users' adherence (Clasen, 2009, p.ix). Further, they have been actively promoted thanks to two important characteristics when targeting marginalized communities: they are low-cost and can be produced locally (Guerrero-Latorre et al., 2015, p.28). There are different versions of ceramic filters, but the pot-style filters originally created in Nicaragua in the 1990s is the most widespread in Cambodia since its introduction in 2001 (Brown, Sobsey & Proum, 2007, p.3).

6 Filling the Gap: Hydrologic Social Enterprise

The following section analyzes the essential elements of Hydrologic's social business model according to the Business Model Canvas described in section 4.2.3. Further, this chapter explains how Hydrologic Social Enterprise ensures safe water provision and generates benefits for the rural poor, while achieving commercial sustainability.

6.1 Company Vision and Mission

The for-profit company Hydrologic Social Enterprise[26] has been manufacturing, distributing, and selling their simple low-cost ceramic water filter called "Tunasi" to the BOP customers in rural Cambodia since 2001. The social enterprise follows two clear objectives: Positive social impact on society and financial sustainability. The company creates value for its customers and for the whole country through improved public health, environmental benefits, stimulation of rural economic activity, and their commitment to ethical business practice.

The impact of Hydrologic's activity is significant. To date, around 400'000 filters have been sold (Dec. 2014). As the pot has an average two-year lifetime, an estimated 200'000 are in use. With an average household size of 4.6 people, the water filters benefit nearly one million (945'000) people (Roberts, 2015, p.1). Considering the country's population, this is correspondent to approximately 6% of Cambodia's population. The firm's clear mission is crucial to further transform, sustain and scale its societal value. The ability of scaling the product in longer-term ensures firm sustainability. Therefore, Hydrologic's vision not only appeals to consumers, but to a variety of key stakeholders (see Annex), which is crucial as it articulates why the social enterprise exists (Kearney 2015, p.6).

Hydrologic Social Enterprise		
Objective	**Value Creation**	**Impact**
Financial achievement Positive impact on society and environment	Improved public health Environmental benefits Stimulation of economic activity Commitment to ethical business practice	200'000 Tunsai filters in use 400'000 filters sold (2002-2014) Benefits for almost 1 mio. people (6% of the population)

Figure 9 Overview: Vision and Mission of Hydrologic Social Enterprise. Source: Roberts, 2015 (own illustration).

6.2 Hydrologic Milestones

The company's roots lie in the 1990s, when the expert of the CWF technology, Ron Rivera, started the production of water filters in Nicaragua together with Potters for Peace (PfP), an NPO based in Colorado (USA) working in Latin America to support local potters to improve and market their product. The same technology was imported to Cambodia in 2001 (Heierli, 2008b, p.48). The founder of the Cambodian CWF project, Mike Roberts from International Development Enterprises (IDE) Cambodia (see Annex), started a small grant-funded production near Phnom Penh, together with two other partners (RDI and Red Cross). PfP provided workshops and technical support during the initiation process in 2000, 2001 and 2003 (Ashden, 2012, p.2).

[26] In this thesis Hydrologic Social Enterprise (formerly International Development Enterprises, Cambodia) is also referred to as Hydrologic.

During the following years, from 2001 to 2009, Hydrologic remained grant funded. The filter program operated on a partial cost-recovery basis, using revenue generated from water filter sales to cover production and distribution costs and using grants[27] to cover marketing and back-office costs.

From 2010 to 2012, Hydrologic received technical and financial support consisting of grants and loans[28] to enlarge the production plant, expand operations and facilitate the transition from a grant-funded program to a for-profit enterprise (UNFCCC, 2014, p.5). The switch from being grant-funded to profit-oriented led to the creation of Hydrologic Social Enterprise, a spin-off of IDE Cambodia (Ashden, 2012, p.1). Until 2012, grants and loans played a crucial role for the company to expand nationally and establish its value chain (e.g.: product development process, manufacturing and distribution channels). Since 2012, Hydrologic has remained profitable (Roberts, 2015, p.15; UNFCCC, 2014, p.11).

In 2011, with technical and financial help (provided by PATH), the company decided to differentiate its product range to shift from a push-centered to a more pull-oriented water treatment solution. The products were thus adapted to cover the specific needs of their target group. The company modified the Tunsai CWF and transformed its appearance into a more aspirational design. Parallel to that, PATH conducted an in-depth market segmentation research for point-of-use (POU) water treatments in Cambodia (UNFCCC, 2014, p.6). The focus was specifically put on the first stages of the company's value chain (research and product development), which proved to be key for further sustainability and impact. As a result, the Super Tunsai was launched as an upgrade version of the basic filter model in 2011.

This additional product allowed Hydrologic to pursue its differentiation strategy: They started piloting a multitude of strategies for direct and retail sales and distribution channels. The professional assistance for sales trainings especially strengthened the direct sales distribution channel (UNFCCC,2014, p.6). The company complemented the direct sales strategy with the additional possibility of issuing micro-finance loans to customers through a partnership with an international organization (World Vision). This considerably increased the impact of the product in society, since it increased the willingness to pay for the product at village-level. Microfinance is considered a principal reason for the increase of direct sales. This is why Hydrologic received the Impact Business Award 2011.

In 2012, after due diligence investigation, Hydrologic obtained a loan (debt financing repayable over 42 months) from a private impact investor (Geneva-based Impact Finance) (Go Green, 2015). This supported the costly certification approval process for the carbon finance project, which had been initiated one year earlier. Since then, Hydrologic is able to generate and sell carbon credits. The sale of emission reduction credits serves as an additional revenue stream

[27] Donors included AusAID, CIDA, UNICEF, Flan International, NZAID, CANADA Fund, Manitoba Council for International Cooperation, IDE Canada and IDE US.

[28] Donors included WaterSHED, USaid, PATH, Bill & Melinda Gates Foundation, IDE, Antenna, Nexus.

for the company (R. Pringle, personal communication, June-July, 2015). Nexus Carbon for Development, the carbon service platform, provided technical inputs during the application process to the Gold Standard Foundation, under which the carbon project is registered. Further, Nexus did capacity building for Hydrologic's staff through mentoring and training on how to manage the project through the different carbon finance project cycles. For this step, towards a sustainable company development, Hydrologic received the "Ashden Award for Avoided Deforestation" (UNFCCC, 2014, p.11-16).

Direct sales of the new, differentiated product "Super Tunsai" peaked in 2013 and Hydrologic won another prize: The Energy Globe Award (Hydrologic Social Enterprise, 2013, p.1). As the company continued focusing on direct sales, its strongest distribution channel, it launched (with support from the organizations IDE and KIVA[29]) an in-house microfinance mechanism to accelerate the approval processes for loans and ensure sales and distribution (R. Pringle, personal communication). Further technological advances were introduced in 2015. The digital data collection system called Sales Force that can be accessed via smart phone and tablet through the App "Taroworks" was developed with a partner based in Singapore and is currently being tested in two provinces (Annex II, removed). Furthermore, the activity on social media channels has considerably increased. Ongoing, professional partnership with Whitten & Roy, the sales consultancy since 2011, is strengthening the direct sales distribution system.

6.3 Product

Hydrologic's CWF is a promising HWTS. The fact that they are producing around 300 pots per day (and between 5'000 to 7'000 pots per month) (Mr. Sarath, personal communication, June 12, 2015; Roberts, 2015, p.4) proves the firm has overcome quality and design challenges and that it has created some demand at full cost-recovery pricing. Today, the company is able to supply a large amount of customers efficiently and effectively. Hydrologic's unique value proposition fills a societal gap, which is a distinct advantage, especially when it comes to sustainability and gaining support (Kearney, 2015, p.5).

6.3.1 From Push to Pull: Product-Mix Strategy

The ceramic water filter is not like a pull-product that the customers typically desire and wish for. On the contrary, the Tunsai CWF has strong push characteristics, meaning the target group is not aware that the product can solve their need for safe water (Koh et al., 2014; Roberts 2003; Sobsey et al, 2008). Thus, the most challenging part still remains in creating demand for the product. Customers do not necessarily understand the positive effects of the CWF, such as the creation of significant health benefits for households, reducing diarrheal disease, and the zero smoke emission that prevents indoor air pollution (when boiling). Further, although they often

[29] The organizations are described in the Annex I.

use water directly from sources which do not smell, taste or look bad, they might be contaminated (e.g. rainwater tanks) (Koh et al., 2024, p.8).
Especially at the beginning of Hydrologic's activity the push product was "not exactly what the clientele wanted" (Koh 2014, p.39). Thus, the firm shifted towards a pull-oriented product development approach by including the customers into the product development process (through extensive research on their preferences and needs), which resulted in change of the design, color and price of the product (Roberts, 2015, p.3).
Based on the Human Centered Design Approach, the color of the new product changed from red to translucent plastic and the new shape and increased functionality reminded less of a "rubbish bin" (according to consumer feedbacks). This means the product is tailored according to the needs and aspirations of the end-users. These small changes had an immense impact on how the product was perceived by the target group. In 2011, the new, much more appealing product "Super Tunsai" was introduced to the market. The inclusion of the customer in the product development process combined with the establishment of the microfinance-partnership increased the demand drastically: The unit sales of the Super Tunsai, which are sold through the direct sales channel, rose to 49% by 2014, compared to the year of its introduction in 2011, where the product accounted only for 17%. Currently, a bigger version of the Super Tunsai is in development. It will have a larger plastic tank to provide more filtered water to households (16 liters instead of 14 liters) and is expected to be launched at the beginning of 2016 (R. Pringle, personal communication, June-July, 2015).

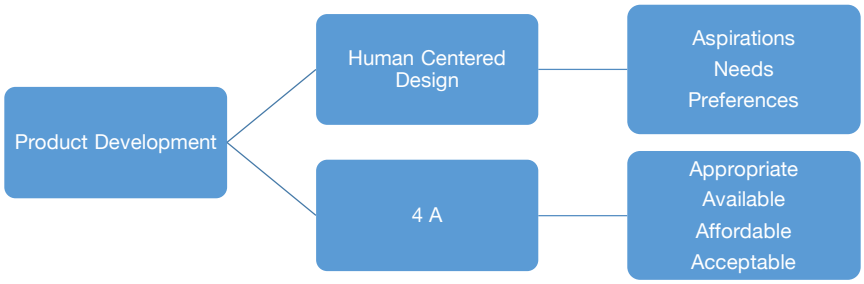

Figure 10 The Two Pillars of the Firm's Product Development Process (own illustration).

The advantage of the product diversification not only consists of increased sales numbers, but also in the creation of different channels that benefit specific target groups within Cambodia's BOP. The company's pull focus is based on two pillars: (1) The Human Centered Approach, which focuses on the end-user and its aspirations, needs, preferences and values, and (2) the four A's framework, which was developed by two marketing professors (Jagdish Sheth and Dr. Rajendra Sisodia, 2012) to create value for the firm's BOP customers by making the product accessible to them (Figure 10).
To this end, the product needs to be appropriate, available, affordable, acceptable. These four features are called the four As (Sheth & Sisodia, 2012).

6.3.2 4 As at Hydrologic Social Enterprise

Following sequence explains how Hydrologic incorporated the four As in their products.

To be appropriate, the product needs to account for the specific needs and constraints of low-income communities. Therefore, Hydrologic's human-centered approach is useful for the product design, testing, and adaption (PATH, 2012, p.13). The development of the Cambodian filter technology has constantly evolved since its introduction to the country in 2001. The product refinement after customer surveys ensures an appealing, easy to use technology, which is effective in eradicating bacterial contaminants. Thus, the Tunsai technology contributes to increased well-being of the target population as it reduces diarrheal disease and covers first and foremost the need of improved health. Other positive side-effects are less expenses for households and less CO^2 emission. Besides covering the needs, the HWTS must also provide high quality "to withstand the challenging conditions in which most developing-world households live while maintaining a simplicity that accommodates easy transport, assembly, repair, replacement, or upgrade" (PATH, 2016b). The production takes place in a factory, centrally located within reach of the target provinces. Due to this strategic decision, the product can easily and efficiently be transported and temporarily stocked in district offices near the provinces in which the marketing and sales teams (called Clean Water Exerts) work. However, once the teams change regions, the temporary district office closes. This means that the stock for remote areas is also only temporarily ensured. Logistical difficulties arise when customers need replacement parts and filter elements. The delivery can be time-consuming due to long transportation distances.

Every three months Hydrologic tests a sample of ten pots from the factory on bacterial contaminants in an external laboratory to ensure the high quality of the Tunsai filter. Every six months, the natural arsenic components in the clay are tested as well to ensure further health safety. As the consumers have been complaining about the slow filter flow rate, since summer 2015, a faster flow rate of 4.5l/h (instead of 3.5 l/h) was approved by the laboratory still ensuring product effectiveness, which ensures more water availability to households (Mr. Sarath, personal communication, June 12, 2015).

The second aspect of the four As that make a low-income product accessible is its immediate availability. This means production capacity must be high enough to cover the volumes demanded and to ideally create a stock, which can be useful when broken filter parts need to be replaced or for emergency relief actions (e.g.: International demand by NGO's for Tunsai ceramic filters peaked in 2005-2006 following the 2004 tsunami and Hydrologic responded with a shipping of 8'150 filters to Sri Lanka and Indonesia) (Roberts, 2015, p.6).

Further, having to cover long distances to obtain the product is a disadvantage and thus the end-product must be closely available to the end-users (PATH, 2012, p.13). Hydrologic ensures product availability in remote areas via their temporary district offices. As the filter breakage is one of the main problems of the end-users, the mobile offices serve as hubs for replacement

pieces and parts. As soon as villages need a service, the strategically well-positioned mobile office is a suitable alternative to the head office or the factory in Phnom Penh. The district office reduces the long distances between product and end-user and CWEs make use of time more efficiently in the field. Local personnel, like the CQC (CWF Quality Controller), whose task it is to deliver the replacement parts to the households, can assist the end-user on the spot (Annex II, removed) Strategically selected offices for stocks are crucial, especially since the company is operating in dispersed, rural areas far from the head office located in the urban center of Phnom Penh. The factory site lies 50 km outside of the city, and is accessible from different provinces. Its location allows sourcing the raw materials easily. From the production center, the CWPs can be dispersed to different provinces. The Clean Water Experts (CWE working in the field) are specifically trained and have acquired know-how about the technology to ensure products are being understood and used correctly by the consumer. The set up of a larger factory in 2010 increased the production capacity to an average of 300 pots per day to ensure the availability aspect (Mr. Sarath, personal communication, June 12, 2015).

A reasonable manufacturing scale not only ensures the necessary volumes to cover customer demand, but also guarantees the company's sufficient profitability. This can be a resource-intensive task for a social enterprise to undertake if a product does not generate enough sales (PATH, 2016b). The key to prevent this lies in demand-creation and the parallel shift from a push towards a pull product. Product diversification helps to reduce the risk. Hydrologic has elaborated a marketing model fostering direct sales for the upgrade product Super Tunsai, which has been designed based on customer preferences. This links the product more closely o what customers demand (which is a shift from push to pull).

The third aspect are the costs. Especially, high upfront costs can be an insurmountable obstacle in low-resource settings. To minimize the costs of the filter production, a collaboration between the company and local or international institutions can be helpful to develop or improve capabilities for purchasing, by reducing costs in manufacturing, testing, distributing, and financing effective health products.

Hydrologic collaborates with different partners for different tasks (see Annex I, Partners) e.g. to reach financial and environmental sustainability, research on efficiency, increase in health impact and for streamlining the value chain. These partnerships contribute to the product affordability. Also, the use of local resources for production and sourcing of raw materials and local staff ensure efficient low-cost manufacturing. For their direct sales channel, the company partners with a local microfinance institution (Vision Fund from World Vision) located near the consumers of the different rural villages. This mechanism considerably reduces the high upfront costs on the consumer side.

Since 2015, Hydrologic has operated with an in-house crediting facility. This centralized option reduces the approval time for credits and minimizes the delays in pot delivery. Further, it decreases the potential of conflicts and the dependency of the different parties involved in micro

financing, such as the company, the finance institution, the local employees and the end-user (Annex II, removed).

The fourth A, acceptability, is the key to achieve impact. It is critical to include the target consumers in the initial step of the value chain during product development and research process to ensure the product's effectiveness and uptake by the consumer. Hydrologic's premium product "Super Tunsai" was designed in response to user feedback and to the growing demand in rural areas for more aspirational products, which was well received (Roberts, 2015, p.3). The product must fit into their daily surroundings and take into account consumer preferences, practices, and beliefs. In many developing-world environments, design should thus be sourced through local means in order to ensure low-cost delivery and market sustainability (PATH, 2012, p.13).

In addition, the end-user must understand the health benefits and see the necessity of the product in order to use and maintain it well. Hydrologic's educational meetings during direct sales events at village level foster, on the one hand, the multiple socio-economic advantages for the BOP clients. On the other hand, these village meetings help to include the product into their daily routine. Further, the personal contact through the company's phone hotline contributes to a deeper understanding of the product by the consumers as one of the main reasons for calling appears to be product information required by consumers (see section quality control).

Achieving these four objectives generates access to the product for the target group at the BOP. Health-promoting and educative initiatives like the village-level meetings need to be combined with commercial goals of the company. This combination additionally fosters access to the product, which can be improved with a sustainable return on investment for the company (PATH, 2012, p.13).

6.3.3 Models: Super Tunsai and Original Tunsai

Hydrologic Social Enterprise is one of the estimated 47 CWF factories worldwide, which are spread over 24 countries (Google Map, 2016). With its Tunsai the firm has created an alternative HWTS to boiling that enables families to effectively disinfect and safely store drinking water in their homes. Currently, the company produces two models containing the same filter element. They are sold under the brand name "Tunsai", which means "rabbit" in Khmer. Cambodian tradition has it that this animal helps humans to solve problems.

Figure 11 Original Tunsai and Super Tunsai.
Source: PATH, 2016d.

The retail price of the basic model "Original Tunsai" (OT) is USD 18 and USD 36 for the aspirational premium design "Super Tunsai" (ST). While the OT captures 12 liters of storage volume, the ST provides

households with a 14-liter water tank. The two models further differ in the target group they aim at. While the simple model aims at people earning less than one US Dollar per day, the upgrade filter targets those earning between one to five US Dollars per day. The focus on the four As helps to tailor market-based HWTS to the corresponding customer segment. This proactive, horizontal consumer approach further underlines that Hydrologic sees their target groups as engaged economic actors and decision-makers and encourages their access to the product.

6.3.4 Pricing

Contrary to classical manufacturing businesses, where the price is set to cover the production costs and yield profits for the company, the price setting at Hydrologic serves as a basic regulator which takes not only into account factors of production and serves the enterprise but also offers a reasonable price range for the target group (see 4 As section 6.3.2). Although BOP customers are highly price sensitive, for ongoing sustainability and viability of water filtration programs, it is essential to sell water filters at a reasonable price covering the costs (at least of the operations, which is the core business) of the company but is still affordable for the customers. The initial assessment of the BOP market size as well as the different Cambodia specific income segments are important for the price setting. Further, the provision of financing mechanisms like microloans additionally supports the end-users as it lowers the upfront costs.

Another aspect prospective of a sustainable pricing structure is to keep up the willingness to pay for the product and the consumer commitment to the product (Brown et al., 2007, p.13-14). Research by a local Cambodia NGO found that the acceptance of the ceramic filters at village level might take longer if the solutions are heavily subsidized or even given for free. Free products decrease the BOP customers' willingness to pay for replacement parts, because they just wait for a new free product (Hagan, Harley, Pointing, Sampson & Soam, 2009, p.59). Filters provided under a sound cost structure are important for the future customers' use and the company's financial viability in the long run. Depending on the volumes purchased, prices for the products and spare parts are adapted (see tables 2-4 in the Annex). For an overview of Hydrologic's price setting see Table 2-4 below (Removed).

Hydrology focuses on one specific target group per distribution channel. Depending on their purchased units, they are handed a reduction in the price (see table). The sales agents sell the Super Tunsai directly to the end-users for the unit price of USD 36. This price is set according to the income segment of households living at the Cambodian BOP.

Since the customers are highly price sensitive, they are only ready to spend their limited cash on an item that is appealing, increases the status and creates value (Sy et al., 2014, p.29). Some might consider spending of approximately 1/4th of their monthly income on a new water technology as an obstacle. However, the Super Tunsai is a high quality and appealing product. Thus, the BOP communities are generally willing to pay for it. Further, if the lifespan of two to five years is considered and the price broken down to a monthly rate of USD 3 (36/12), payable

via microfinance, the monthly spending on safe water can be considered as appropriate. The credit offering is usually explained immediately after a village sales meeting. The microloan covers the full cost of a Super Tunsai (USD 36 at 2.8% per month interest over six to twelve months) (Roberts, 2015, p.7). In addition, when switching from boiling to a Tunsai filter technology, the customer saves expenses. Health-related expenses per year per household are estimated to be reduced by around USD 25.00 (Table 2) and overall savings by USD 73 per year (Roberts, 2015, p.2).

Table 2 Health Cost Savings per Year CWF vs. Boiling. Source: Hydrologic Headquarters, 2015

Costs/Time	Super Tunsai CWF	Boiling (with wood fire, fuel, electricity)
Costs/1 day	$ 0.0395	$ 0.12
Costs/1 month	$ 1.1875	$ 3.225
Costs/1 year	$ 14.25	$ 38.7
Costs/ 2 years	$ 28.5	$ 77.4
$ Saved/1 year	$ 24.45	
$ Saved/2 years	$ 48.9	

6.3.5 Technology

The Tunsai filter technology is based on the model developed in 1981 by Dr. Fernando Mazariegos of the Central American Industrial Research Institute (ICAITI) in Guatemala (PATH, 2012, p.42). The product contains a filter element, which is a 10-litre porous ceramic pot made of kiln-fired clay and impregnated with silver nitrate ($AgNO_3$). The clay pores act as a physical barrier to sediments and micro-organisms whereas the silver prevents bacterial growth (UNFCCC, 2014, p.9). The filter component fits into a plastic receptacle tank with a lid and spigot that protects filtered water from recontamination (Mr. Bora, personal communication, June 25, 2015). In this way, safe drinking water can be stored and dispensed at the point-of-use.

Raw water seeps through the ceramic pot by gravity, filtering its 10-liter volume in three to five hours (Mr. Sarath, personal communication, June 12, 2015). With about three to four fillings per day, the filter produces 30 to 40 liters of water a day. Since June, the acceptable range of the flow rate has been between 1.5 to 4 liters per hour (Mr. Bora, personal communication, June 25, 2015). Regular maintenance is required as soon as the flow rate slows down (usually once a moth) (Roberts, 2003, p.5). The inside of the ceramic pot is scrubbed with a plastic brush and rinsed with non-soapy water to unclog the pores, while the plastic tank and spigot are washed with soapy water to prevent bacterial growth (UNFCCC, 2014, p.11).

6.3.6 Filter Lifespan and Usage Rate

The lifespan of a Tunsai ceramic filter depends on many factors such as the water quality, the frequency of cleaning, and the thickness, as repeated cleaning will eventually wear away the

filter surface (UNFCCC, 2014, p.9). The plastic receptacle and spigot are expected to last five years if there is no breakage. According to surveys, the potential lifespan of the filter elements is indefinite (Brown et al., 2007, p.5; Lantagne, 2001, p.58; Roberts, 2015, p.3). Accoding to Brown et al. (2007) making households pay for the product leads to a "continued filter use versus receiving the filter free of charge" (p.17).

However, the sediments may clog the filter pores over time. To ensure a steady water flow rate, the filter can be cleaned with a brush (Roberts, 2015, p.3). Figure 12 shows that after four to five years, the average usage rate is still 72% if proper maintenance and care are assumed. The average lifespan, however, is one to two years (Lantagne, 2001, p.58; Campbell, 2005, p.v), where usage rate is highest with 91 and 87% respectively (Pringle & Joshi, 2015, p.7; Roberts, 2015, p.2). The most important reasons for non-continuation are broken parts (ceramic filters and other parts). Thus, the product comes with a two-year warranty during which end-users have the possibility to contact Hydrologic via phone hotline and replace broken parts or the entire unit at no cost. This ensures a minimum filter lifespan of two years and explains the high usage rate during this time (Mr. Bora, personal communication, June 25, 2015).

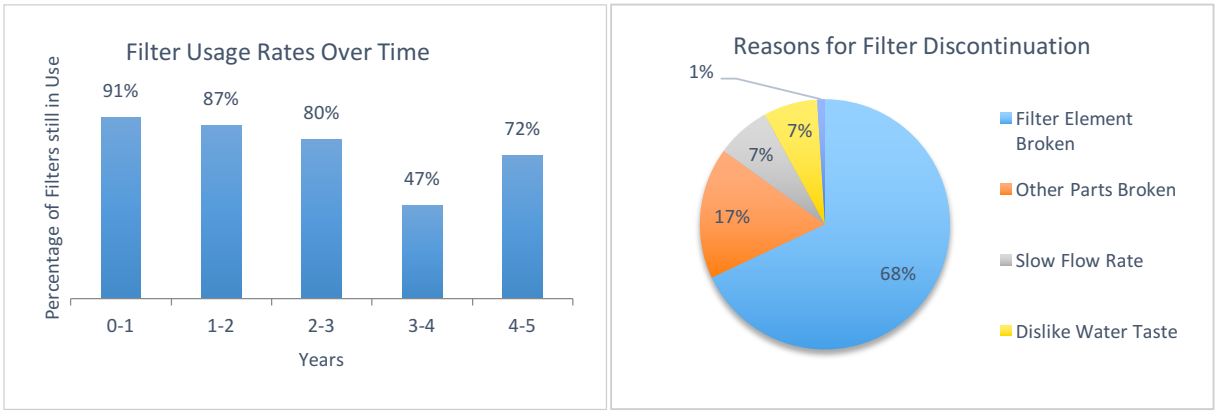

Figure 12 Filter Usage Rate and Reasons for Discontinuation. Source: Hydrologic Headquarters, 2015 (own illustration).

6.3.7 Pathogens Removal Effectiveness

Since diarrhea is a predominant problem for Cambodians, the main goal is to drastically reduce the occurrence of this waterborne disease, which is caused by the ingestion of different pathogens. Various field studies have tested households using the locally produced ceramic filter and have reported significant reduction in diarrheal disease (a reduction by 46 to 49%) (Brown & Sobsey, 2006; 2010; Brown et al., 2007, 2008; Roberts, 2003, 2015).

The sizes of the three main microbes (protozoan, bacterial and viral organisms) responsible for waterborne disease vary. Typically, protozoa are largest in size (8 -10 µm) (Lantagne, 2001, p.19), followed by bacteria, which are between 0.5 x 1.0-3.0 µm (Van Halem, 2006, p.35; Lantagne, 2001, p.19). Viruses are usually smaller (0.02-0.2 µm) in diameter than the average filter pore size (around 1 µm), which makes them very difficult to be retained through ceramic water filtration

(Lantagne, 2001, p.19). Their average filter pore size is around 1 µm but differs depending on the raw materials and methods used to locally produce the filters (Lantagne, 2001, p.19). Due to their large size, protozoa can most effectively be removed with a percentage of bigger than 99.99% (4 LRV)[30] (Lantagne, 2001, p.69). The bacteria's removal efficiency ranges from 2-4 LRV (99-99.99%) (Oyanedel-Craver & Smith, 2008, p.931). According to other field tests, the Tunsai CWP has proven effective in removing E.coli bacteria with 99% (Roberts, 2003, p.5) and up to 99.99% (2 LRV) (Brown et al., 2007, p.4; Roberts, 2003, p.5; 2015, p.10). The fact that silver impregnated Tunsai filters can retail between 99 and 99.99%(1-2 LRV) of bacteria has further been confirmed by Brown and Sobsey (2010, p.9). According to Van Halem, the log removal range of viruses is between LRV 0.5 and 3.0 (2006, p.75). Lantagne's test results in virus removal consisted of a less than one log removal rate (<1 log reduction) (Lantagne, 2001, p.70). This statement was further underlined in another study, which showed that a 0.21-0.45 log reduction range for viruses was achieved (Salsali, McBean & Brunsting, 2011, p.306). A more promising score resulted in 2014 in Haiti, where a new filter technology test showed effectiveness greater than 99.9% (3 LRV) (Guerrero-Latorre et al., 2014, p.3). In conclusion, the larger the pathogens, the higher the retention rate and the more effective the Tunsai ceramic filter. Although the values vary, the most important fact is that the protozoan and E.coli bacteria causing diarrhea can efficiently be removed with a certainty up to 99.99%. Viruses are more difficult to retain but a promising result was shown in 2014.

The antibacterial effect of silver is not new. Prior to the development of antibiotics, colloidal silver was used extensively until the 1940s and 1950s as an anti-bactericide (Gibbs, 1999). As the amount of silver absorbed from the filtered water is far below WHO guideline for drinking water of 0.1 mg/L., the silver application on the Tunsai filters is negligible and not harmful to the users' health (Lantagne, 2001; Roberts, 2003). The silver application on the filter has shown varied effects in relation to the pathogens removal rate. While some have observed that microbial removal can be enhanced significantly with silver treatment (Bloem, Van Halem, Sampson, Huoy, Heijman, 2009; Lantagne, 2001; Roberts, 2003; Van Halem, 2006), others have not seen any difference between silver coated and uncoated ceramic filters (Brown & Sobsey, 2010; Guerrero-Latorre et al., 2014; Oyanedel-Craver & Smith, 2008). Therefore, further research is needed, especially on the resistance of the colloidal silver application to scrubbing and usage in longer term (Lantagne, 2001). Finally, research on colloidal silver impregnated ceramic filters in Cambodia has proven the capability of the filters to significantly reduce the surrogates for waterborne pathogens that cause diarrheal disease to produce low risk potable water conform with the WHO guidelines (1-10 E. coli per 100 mL water sample) (WHO, 1997, p.78)[31].

[30] The reduction in contaminants reported as log reduction value (LRV) and percent reduction is described in Table 3.
[31] See Table 7 for the risk classification system defined by the WHO in 1997.

Table 3 WHO Log Reduction Value (WHO, 1997, p.78)

LRV	Reduction
0.5	68%
1	90%
2	99%
3	99.9%

Table 4 WHO Water Quality Guidelines (WHO, 1997, p.78)

Number of thermo tolerant (fecal) coliforms or *E.coli* per 100 mL water sample	
<1	Conforms to WHO Guidelines
1-10	Low Risk
10-100	Intermediate Risk
100-1000	High Risk
1000 +	Very High Risk

6.3.8 Manufacturing

Tunsai ceramic filters are manufactured and assembled 40 km outside Phnom Penh in Kampong Chhnang Province, where Hydrologic currently employs 35 local workers who earn salaries at least equal to the national minimum wage.

Figure 13 Kampong Chhnang Province, Cambodia. Source: Wikipedia, 2015.

The plastic parts (basic receptacle, spigot, scrub brush, lids) are produced by external manufacturers in Phnom Penh. The plastic receptacle of the upgrade model (ST) is imported from a factory in Ho Chi Minh City (Vietnam), which is certified for food-grade quality (Roberts, 2015, p.4).

Ten years ago, the original factory had an average monthly production capacity of only 300 pots. Today, the factory is able to produce almost the same amount per day (Mr. Sarath, personal communication, June 31, 2015; Roberts, 2015, p.4).

The production of one clay pot takes three days until it can leave the factory. Local clay is mixed with powdered rice husks, pressed into a pot shape, smoothed by hand (rounding the edges to minimize chipping), and baked in a kiln at 830°C for 12 hours. After the soaking in water and the flow rate testing, the pots need to dry again. Finally, the ceramic filter elements are coated with silver nitrate (Mr. Sarath, personal communication, June 12, 2015)[32]. The following crucial

[32] For a simplified filter production process see Annex I (adapted from PfP, 2001, p.44 and Mr. Sarath, personal communication, June 12, 2015).

material is needed to produce the Tunsai ceramic water filter: Raw materials (clay, burn-out material like rice, coffee or maize husk, water, wood, colloidal silver), labor (factory workers) for the molding of forms for plastic tanks and spigots (produced in Vietnam), sources of energy (electricity, generator and diesel fuel), transportation vehicles, infrastructure (land, buildings, interior fittings), equipment (machines like pug mill, mixer, press) (PfP, 2001, p.33-44).

6.3.9 Quality Control and After Sales Service

To ensure a high quality product, the company follows certain control mechanisms. The flow rate is tested on a regular basis at the factory site, which lies between 1 to 4.5 liters per hour (Mr. Bora, personal communication, June 25, 2015; Mr. Sarath, personal communication, June 12, 2015). Pots are discarded at different stages during the production process (see Annex I, Production Process) and especially at the end, if they are defected or if the flow rate is outside the acceptable range (PfP, 2001, p.44; Mr. Sarath, personal communication, June 12, 2015). In addition, an external laboratory carries out water sample tests. Every three months the water quality is examined to control the filter effectiveness on bacterial removal. Furthermore, every six months, the water is tested on its arsenic content. So far, the laboratory tests have been very satisfying: under laboratory condition, a 100% bacterial removal rate is ensured[33] and arsenic contaminant results are far below the limit of 10 µg/l set by the WHO (WHO, 2011, p.11).

Another important area to consider besides production capacity and quality is the workflow in general, which goes beyond the factory. Especially when working in rural areas, distances can lead to complicated logistical processes. Hydrologic has introduced the principle of gathering a group of interested customers in rural villages and organize one sales meeting everyone can attend, instead of offering single service through time-consuming door-to-door visits. This increases efficiency, reduces costs and contributes to the firms' overall sustainability (PATH, 2016a). In addition, the strategic routes for the drivers and the rotations from village to village and district to districts guarantee a smooth workflow. Moreover, Hydrologic rents temporary district offices near densely populated villages, which makes the sales tours more efficient for the sales team (Annex II, removed).

Further, it is crucial to follow and establish safety guidelines for workers at the factory, as done by Hydrologic. As there is dust emission during processing and mixing (e.g. burn-out material lie rice husk and clay), the firm provides workers with dust and smoke suppression equipment (e.g. masks, gloves, helmet) (Annex II, removed). Further, especially during firing and when applying the liquid silver mix, the company highly recommends working with (heat) gloves and face masks. The factory workers are also regularly checked up for their health (Mr. Sarath, personal communication, June 12, 2015; PfP, 2001, p.42).

[33] Laboratory test results from July 2015 are in Annex I.

The aftersales service is fostered through a 24-hour phone hotline to assist the customers directly. Further, the Tunsai water filter comes with a two-year warranty, which allows the client to replace broken parts and pots. In 2014, the 24h-hotline generated assistance to 3'733 households, who needed a new pot. Figure 13 shows the hotline tracking report from January to June 2015[34]. The three principal customer complaints are because of broken pots from usage (28.7 %), followed by slow filters (19 %) and dripping taps (17.4 %) (Annex II, removed). This tracking data allows the company to optimize the product accordingly. Further customer assistance includes support in installation, instruction, care and disposal of a product (PATH, 2016c). For the direct sales, Hydrologic's CWEs are educating and training the target population on product usage, benefits and maintenance during sales meetings and thus establish the first contact with the clients. Afterwards, the CWF Quality Controller's task is to support post-sale by visiting the clients and deliver replacement parts to the villages, after the needs have been reported via the 24h-hotline.

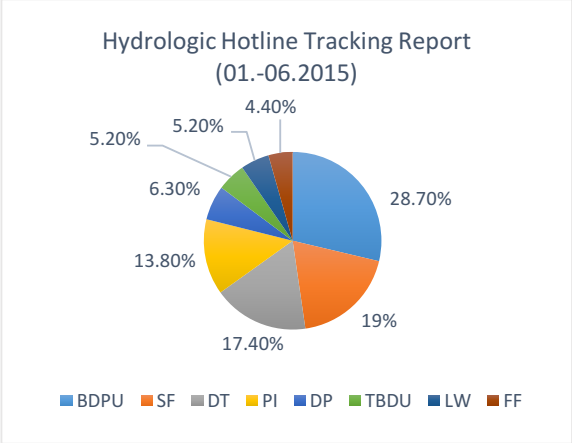

Figure 14 Hotline Tracking Report.
Source: Hydrologic Headquarters, 2015 (own illustration).

6.3.10 Triple Benefits

The following section will explain the triple benefits (social, economic and environmental) for the BOP population and the company when households switch from the traditional water treatment method, mainly boiling, to Tunsai water filters.

Hydrologic estimates that around 200'000 filters are still in use (Roberts, 2015, p.10). Assuming that each filter serves one household with an average size of 4.6 (National Institute of Statistics, 2013, p.2), more than 900'000 individuals (6% of Cambodia's population) are currently receiving direct benefits from Hydrologic's business activity (Roberts, 2015, p.1). The resulting main social benefit is the provision and storage of clean drinking water for individual households. The filter effectiveness contributes to a 46% lower incidence of diarrhea (Roberts, 2003, p.27). Further, UNICEF, the Red Cross and other organizations have used filters extensively during floods for emergency relief, providing families with a HWTS. Another positive social effect is increased health, not only due to significantly less waterborne disease (Brown, Sobsey & Loomis, 2008, p.394) but also due to less air pollution in the households (Clasen, 2009, p.ix). The air quality in cooking areas improved by 78% as a result of a considerable reduction in exposure to toxic smoke (Roberts, 2015, p.10). Further, the filters relieve households from having to collect

[34] Legend Figure 13: BPDU = Broken Pot from Usage; SF = Slow Filter; DT = Dripping Tap; PI =Purchase Information; DP = Decayed Pot from Usage; TBDU = Tap Broken from Usage; LW = Water Leakage; FF = Fast Filter (Source: Hydrologic Headquarters, 2015).

firewood by 22 hours per month (Roberts, 2015, p.10).
Moreover, using Tunsai filters as alternative to boiling reduces the use of wood and charcoal. An average household saves about 730 kg of wood each year (Roberts, 2015, p.10), around 73% of which come from non-renewable sources (Pringle & Blackburn, 2014, p.24). The total reduction in deforestation amounts to about 49'000 tons of non-renewable wood per year (Roberts, 2015, p.10). The 2015 monitoring report shows that the total emission reductions reach approximately 140'000 tons per year (Pringle & Joshi, 2015, p.25), which is roughly equal to the carbon emitted by almost 30'000[35] cars in the same period (Roberts, 2010, p.10).
Hydrologic's activity contributes to the sustainability and profitability to Cambodia's BOP and the company itself. Economic benefits are gained through saved cost and time (e.g. 22 hours spent collecting wood per month), reduced health care costs and increased productivity. The overall savings with water filters is estimated at around USD 73 per household per year.
The production and distribution of water filters in Cambodia has generated employment (factory employees, sales agents, office workers) mostly in rural areas where it is urgently needed. In total, Hydrologic employs 104 employees, 35 of whom work at the factory site, and who earn similar amounts to the salaries in the Cambodian garment industries but without the expense and social disruption of migration to cities. Sales agents are provided with additional amounts for fuel and phone cards and work on commission (see incentives on section 7.2.2). Further, a household using a filter has an annual financial benefit of USD 73 compared to families that are not using one (e.g.: through decreased health costs and fuel expenses) (T. Hory, personal communication, June 30, 2015; Roberts, 2015, p.10).

6.3.11 Advantages and Disadvantages

Finally, the ceramic pot-style filters have the advantages of being produced locally, lightweight, portable, relatively inexpensive (through the microfinance option), chemical free, low-maintenance, effective, and easy to use (Brown et al., 2007, p.6). Further, they are accepted among users because of their attractive, affordable design (human cantered and aspirational approach) and due to their social, economic and environmental benefits (section 6.3.10) (Roberts, 2015, p.3). The filter life span might be long if well maintained and the high quality is ensured through control mechanisms during production and the firm's after-sales service.
The downside, however, are the high up-front costs for a social enterprise to establish the filter production (Clasen, 2009, p.x). Further, it is difficult to capture evidence about the product uptake and longer-term use. A survey is carried out on the warranty registration process, to maintain contact between the company and the clients, but it is difficult to register the customer data consistently as the product is sold via different channels by different parties. Other challenges reported from the household-side are the limited amount of water captured by the

[35] 95'000 tons of CO2 emission reduction per year = 20'000 cars (Roberts, 2010, p.10). 140'000 tons of CO2 emission reduction per year = 29'473 cars.

respectable tank, their dissatisfaction about the low flow-rate and the need for regular cleaning, which increases the susceptibility to water recontamination and the need for ceramic filter elements and spare parts due to breakage. This fact might hinder the firm from scaling up (Clasen, 2009, p.x). The Tunsai water filter removes principally bacteria, parasites and to a certain degree dirt and other suspended solids. However, it does not remove dissolved metals and cannot remove arsenic from water. Further, the Tunsai CWP cannot treat salty water and the filter is least effective against viruses.

7 Facts and Financial Figures

After the presentation of the firm's value proposition, this chapter will describe the company's financial and economic data[36]. Furthermore, it will explain how demand is created.

7.1 Hydrologic Sales Figures and Channels (2002-2014)

In order to gain a picture of how the company's sales and marketing activities as well as the financial figures are linked, this section will introduce the main distribution channels and the most important sales developments from 2002 until 2014.

The total number of Tunsai CWF sold between 2002 and 2014 is approximately 400'000[37] (Roberts, 2015, p.1). Hydrologic's filter sales numbers did not grow on a constant scale but were influenced by internal and external factors. In 2002, the company had only one distribution channel (NGO) through which only 897 filters were sold (Figure 15). One year later, in 2003, the company expanded with two distribution channels (NGO and Retail), which led to a total sales increase times ten (from 897 to 9'028 filters). The succeeding sales peak happened during Hydrologic's emergency relief actions, when they shipped 8'150 Tunsai filters to Sri Lanka and Indonesia during 2005/06.

The establishment of the new factory in 2010 increased the production capacity from 300 to 3'000 filters per month, while the sales average consisted of 4'000 filters per month. 2011 marked an important year for the company's sales since the distribution channels were enlarged to three (Direct Sales, NGO, Retail). This almost doubled the sales from a total of 21'735 in 2009 to 45'847 in 2011. In 2013 the sales number of the Super Tunsai peaked, mainly through direct sales. The direct sales grew from 9'684 filters in 2012 to 24'427 in 2013 and has remained on a high level since (Figure 16)[38]. The total sales even tripled from 2009 with 21'735 to 65'392 sales per year in 2013. The main reason for the massive sales peak in the year of 2013 were the massive floods in Cambodia, which increased orders from NGOs drastically. The following year, in 2014, the sales numbers shrank and reached similar levels as in the years of 2011 and 2012 with around

[36] Note: A summary of Hydrologic's latest raw data can be found in Annex II (removed).
[37] The exact number of the total sales is 381'976 for the period of 2002 to 2014.
[38] Note: The product "Crystal" in Figure 16 was a test product, which was only used for one specific period in 2010, prior to the development oft he standardized Super Tunsai and Original Tunsai in 2011.

45'000. The demand from NGOs for the Original Tunsai dropped in 2014 because of the unpredictability of this distribution channel: The main reason was the availability of a smaller amount of aid money for NGOs in that year (R. Pringle, personal communication, June-July, 2015).

Currently, the NGOs support these two programs heavily, which leads to a drop in Hydrologic's NGO sale. However, the year 2014 shows a continuing, successful, high level of direct sales generated by the Super Tunsai (20'966 per year) and direct sales distribution becomes more important. Today, the company is able to produce between 5'000 to 7'000 pots per month and sells around 3'500 to 4'000 per month (Roberts, 2015, p.4).

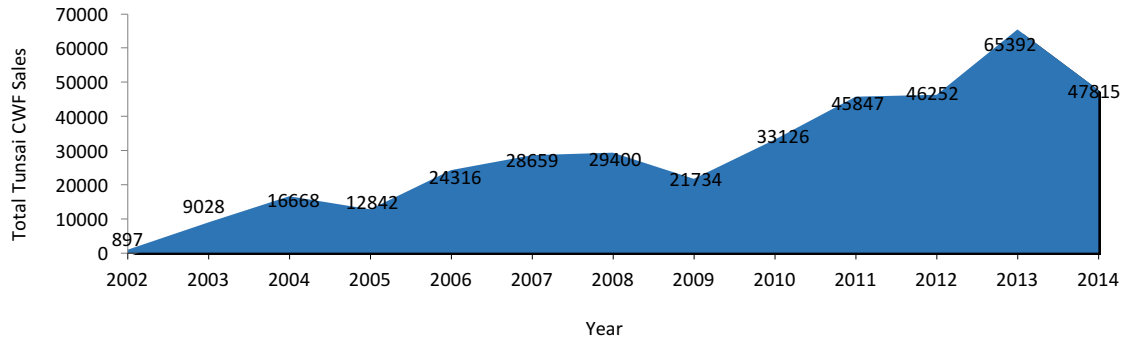

Figure 15 Total Tunsai Ceramic Filter Sales per Year (2002-2014). Source: Hydrologic Headquarters, 2015 (own illustration).

The most important information that can be read from Figure 16 is the more or less constant small share of sales numbers from retailers. Filter sales through retailers have not increased during Hydrologic's development. Retail sales are typically very passive in Cambodia (T. Hory personal communication, June 30, 2015; Roberts, 2015, p.6; R. Pringle, personal communication, June-July, 2015). Hydrologic has set up a retail network consisting of three provincial distributors that are supplying an unknown number of shops. Hydrologic itself supplies around 40 additional shops directly, most of which are pharmacies or sell household-goods (Roberts, 2015, p.6). Since the retailers do not actively promote them, Hydrologic has turned its focus toward the direct sales channel, which has become the main sales branch since 2011.

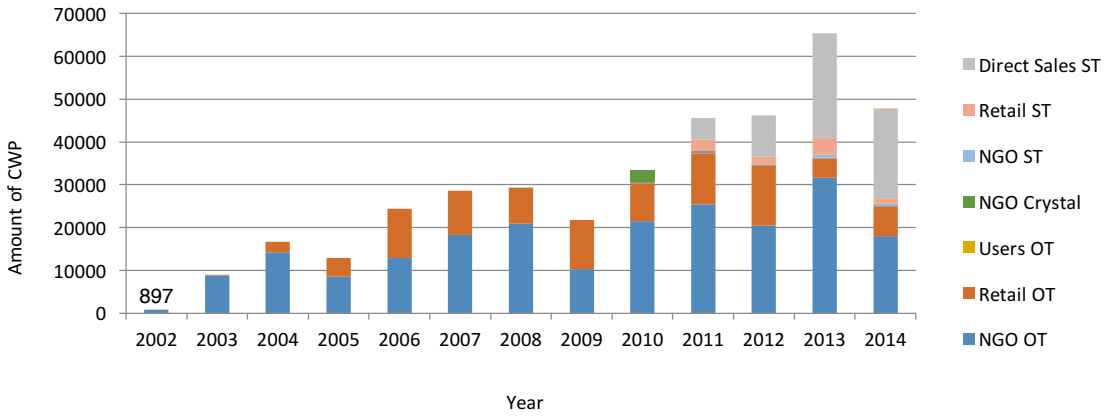

Figure 16 Sales Development per Channel (2002-2014). Source: Hydrologic Headquarters, 2015 (own illustration).

7.2 Distribution Channels and Revenue

As already highlighted in section 7.1, Hydrologic sells its CWP products through three distribution channels (Retail; Direct Sale; NGO) to make them accessible to their corresponding target segment.

The NGO channel sells the basic model, Original Tunsai filters, to NGOs, which provide the poorest households of the BOP with the HWTS who otherwise would not be able to afford one. They are either highly subsidized or distributed for free. Hydrologic, however, recommends to make the beneficiaries pay at least for a minimal amount to ensure their take up in longer term and make the BOP customers value the Tunsai filter more (Brown et al., 2007, p.14). The company does not actively seek to expand international sales to NGOs but only responds to specific requests (see Annex I, Nine Lessons Learned, No.5). For example, in 2005/06, after the 2004 tsunami in the Indian Ocean, Hydrologic experienced the most concentrated period of international demand and shipped 8'150 Tunsai filters to disaster relief agencies active in Indonesia and Sri Lanka. The nature of the company's Retail channel works differently, as described in the previous section. Because retailers in Cambodia are not very proactive, the social enterprise is fostering their third channel: The Direct Sales channel, where sales agents known as Clean Water Experts (CWEs) sell water filters directly to end users. CWEs coordinate a group sales meeting with the chief of the target village one or two days beforehand. 10 to 40 people will attend a typical meeting and 20% to 40% will opt to purchase a filter (Mr. Puthe, personal communication, July 6, 2015). CWEs also sell filters door-to-door in the village, meeting one or two families at a time. A provincial sales team consists of three to four CWEs, each of whom can cover about 20 villagers a month (J. Kondelka, personal communication, June 27, 2015). Since most of the time spending money for a filter is an obstacle, a micro-loan is offered to allow families to spread the cost over time. The revenues from direct sales have grown enormously since their introduction in 2011. From 2012 to 2014, the direct sales have grown from 42% to 67% of the company's total revenue (Figure 17).

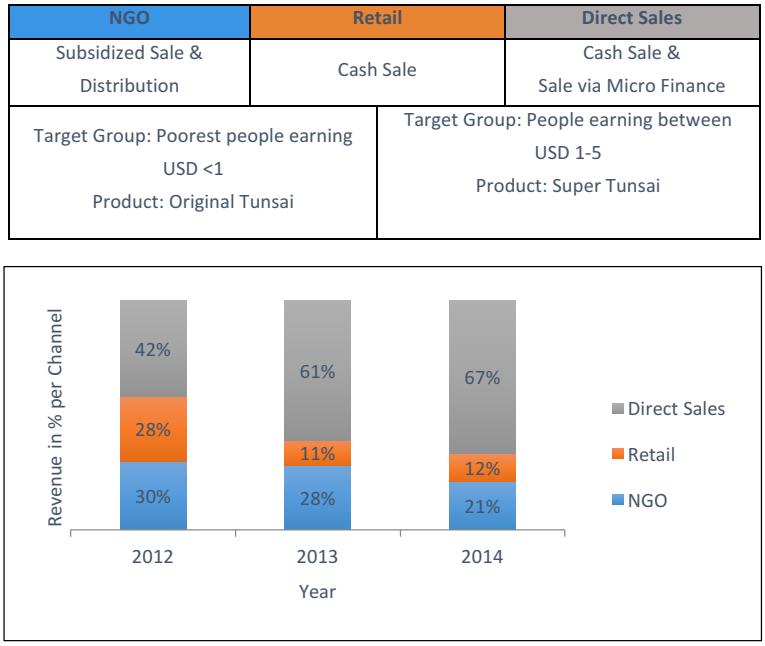

Figure 17 Distribution Channels and Revenue. Source: Hydrologic, 2015 (own illustration).

The average operational revenue (2012-2014) is approximately USD 1 million. The revenue per distribution channel can be observed in the graph (Figure 17). Direct sales are the strongest revenue stream and are responsible for two thirds of total revenue on average. This is why Hydrologic focuses on the development of consumer demand for the Super Tunsai CWP via direct sales as explained earlier. Positioning the Super Tunsai in the market does not only increase sales but also the company's profit margins.

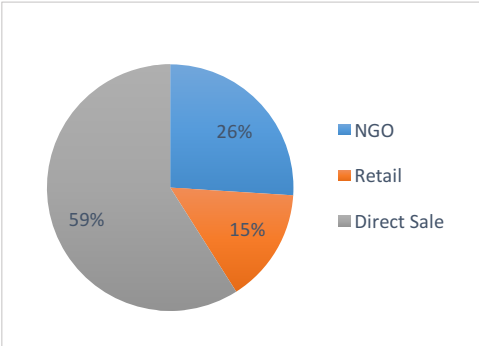

Figure 18 Average Operational Revenue per Distribution Channel (2012-2014). Source: Hydrologic Headquarters (own illustration).

7.2.1 Direct Sales Model

The company's direct sales strategy is supported by an external consulting firm. The basic logic is to first aim at the larger, densely populated provinces of the country, where the distribution route for the filters can be laid out to combine as many villages as possible (T. Hory, personal communication, June 30, 2015; J. Kondelka, personal communication, June 27, 2015). Table 16 shows which provinces do well in sales, mainly due to the number of direct sales that the Clean Water Experts manage to achieve. Reasons for success are manifold.

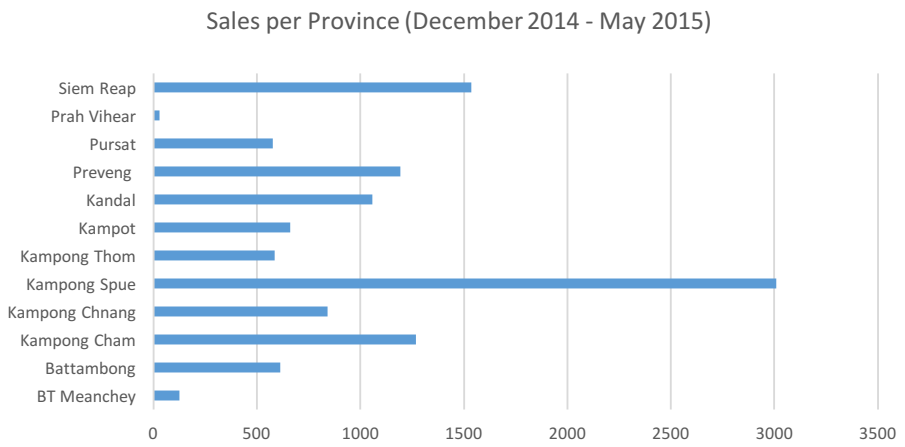

Figure 19 Sales per Province (December 2014-May 2015). Source: Hydrologic Headquarters, 2015 (own illustration).

The provinces closest to Phnom Penh, and which are also close to the factory site, make it very simple for the National Sales Manager (NSM) to travel and control the whole area in which Hydrologic is active with sales. Many provinces around Phnom Penh, in which Hydrologic operates, have many factories (especially garment but also brick factories). The advantage is that the factory provides work for the inhabitants of these provinces, meaning they have a monthly salary. Further, these people are at home in the evenings and at weekends, when most sales take place. The best selling provinces generate the highest sales rate at weekends (J. Kondelka, June 27, 2015).

Another aspect is the density of population, which plays a crucial role in choosing the province which to start direct sales events in. To prevent long travel distances from village to village, Hydrologic mainly operates in provinces where population density is high. This is a huge advantage for the strategic placement of the temporary district offices, which serve as hubs for stock and are thus centrally located, as close to as many districts as possible. The specific choice of highly populated provinces increases effectiveness because the sales experts visit more villages and stage sales events in a shorter period of time. Out of a total of 23 Cambodian provinces, only around 12 of them qualify. Siem Reap or Battambang, for example, which is very rich, and has a lake. It is also known from tourism and has a high agricultural activity too. The Kampung Thom province located between Siem Reap and Phnom Penh, is another large province with high population density. Then, there is Kampung Cham province, where many garment factories are located. These are all examples of provinces that are ideal to work in and are similarly dense population-wise (J. Kondelka, personal communication, June 27, 2015).

Usually, Hydrologic anticipates when a province is not able to further continue its operations. It is a development over months. Usually, a CWE must sell a minimum of 40 Super Tunsais per month in order to reach the minimum turnover to be break-even. Considering the fact that usually three to four Clean Water Experts are responsible for one province, a minimum of 120 pots need

to be sold each month to maintain the operations in a province. If it is constantly below 100 pots per month, the region has to be closed down (J. Kondelka, personal communication, June 27, 2015). The whole idea of improving Hydrologic is to improve the sales and improve the people and increase their performance. Since it is not possible to do this with all provinces, the company's strategy is to first scale down from 19 down to 7 provinces, focusing on strengthening and sustaining them. Once the seven provinces do well and they occupy a strong team, more Provincial Sales Managers can be trained, to manage more sales closely, which will allow Hydrologic to scale up activities in more provinces nationally. Reasons for stopping operations in a specific province are manifold. Sales performance over the last five months, but also other factors like the micro-crediting facility influence the decision, for example, when micro-credit issuance was blocked for some months and microloans could not be issued to buyers. As a result, the employees (CWEs) had to move to a new province, which they did not want. The consequence was that all except one CWE resigned. Such incidents affect sales numbers as well (J. Kondelka, personal communication, June 27, 2015).

7.2.2 Super Tunsai: Last Mile Distribution and Incentives for the Sales Team

Generally, reaching the last mile is a challenge in Cambodia because there is little organized distribution in rural areas. Most distributors only operate on district level, where small retailers resell goods purchased in towns to villagers (PATH, 2009a, p.10). However, Hydrologic has found an innovative, demand driven push strategy to reach the BOP villagers by sending their sales force directly to rural households. Additional demand is created at the spot and in villages, which thus also includes the pull element. Although this strategy works well, direct sales distribution is also relatively time and cost intensive, as the sales team needs to develop sound communication skills, close monitoring, and intensive training on how to approach and gain customers who trust the offered Super Tunsai technology (PATH, 2009a, p.11; J. Kondelka, personal communication, June 27, 2015; Mr. Puthe, personal communication, July 6, 2015). Thus, Hydrologic invests a lot in the sales management process as it takes a lot of effort and organization to manage the Clean Water Experts (CWEs) responsible for direct sales, on a daily basis.

This is why Hydrologic has come up with a four-level hierarchic structure for its direct sales model: The general manager (CEO) is superior to the National Sales Manager (NSM), who coordinates the Area Sales Manager (ASM). The ASM is responsible for a number of provinces and collects the information for the NSM, who is located in the main office in Phnom Penh. Provincial Sales Managers (PSM) transfer their sales numbers to the ASM and supervise their teams consisting of three to four Clean Water Experts (CWE). The CWEs are visiting villages and actively selling and promoting the Super Tunsai to the target group by setting up village meetings. In order to sell the Super Tunsai to lower-income buyers via direct sales, the recruitment of motivated sales agents who are trusted by their community is essential.

Therefore, the contact with the most trusted and influential individual at the micro-level is essential. The village chief is in close contact with his villagers, disseminates information and helps facilitating the community meeting (PATH, 2009a, p.13). If this trusted village leader recommends and endorses the Super Tunsai, the product is automatically much more trustworthy than if an external sales agent comes independently with no connection to the key person in the community. For this reason, it is crucial to contact the village leader by phone and fix a date to visit him personally before the actual meeting takes place (Mr. Puthe, personal communication, July 6, 2015). The CWF Quality Controller (CQC) comes into play after the sales to instruct the villagers on proper filter maintenance, which may increase the lifespan of the filter. However, this does not fully prevent from filter breakage. When the end-users complain and ask for replacement parts via the 24-hours phone hotline, the CQC needs to deliver the spare parts and filters to the villagers by motorbike. Thus, the provision of replacement parts is crucial for the continuing use of the filters by the villagers. The delivery by the CQC can be a challenging task, since incentives for this job position are low compared to those of a CWE and travel distances are long. Thus, the system of temporary offices officially called District Mobile Offices (DMO) has been established by Hydrologic. These hubs are strategically selected, centrally located and temporarily rented out by the company. They are supplied with spare parts and filters from the factory, from which the CQC can pick up the spare parts and bring them to the customers (Annex II, removed).

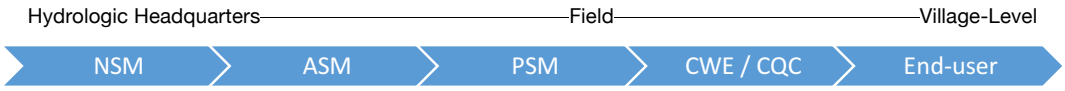

Figure 20 The Sales Position Hierarchy (from left to right) (own illustration)

The new incentive plan developed in June 2015 contributes to a great degree to the motivation of the sales team, which is key to succeed (PATH, 2012, p.24). Further, the incentives push the direct sales - especially in the four biggest provinces (Kampong Thom, Siem Reap, Kampong Cham, Kampong Speu) (J. Kondelka, personal communication, June 27, 2015; T. Hory, personal communication, June 30, 2015). On average, Hydrologic needs to sell a minimum of 250/month per province in order to be profitable. Ideally one province has four CWEs, who generate direct sales. The minimum amount a CWE needs to sell is set at 63 pots/month (250/4= 62.5) (J. Kondelka, personal communication, June 27, 2015).

Table 5 Hydrologic's New CWE Incentive Levels. Source: Hydrologic Headquarters, 2015.

Level	ST sold by CWE / month	Incentive in USD/filter
Level 0	0 - 59 filters per month	0
Level 1	60 - 99 filters per month	1.25
Level 2	100 - 149 filters per month	2.5
Level 3	150 - 199 filters per month	3
Level 4	200+	3.5

The salary base, which includes additional benefits such as gasoline, stays on the same level. The CWEs are paid around 1.25 x the official minimum wage (Roberts, 2015, p.7). The new incentive has much bigger room for growth and financial opportunity, but is in exchange for slightly higher sales targets (J. Kondelka, personal communication, June 27, 2015). Since the majority of ST consumers (66%) use micro loans, the incentive level is based on the total number of loans approved by the micro finance partner Vision Fund (VF) in the month cycle. The incentives for CWEs are displayed in the above graph (Table 8). The Provincial Sales Manager (PSM) and Clean Water Experts (CEWs) are paid based on four performance levels of monthly CWE sales. Thus, the pay of the PSM, who is the superior of the CWEs, depends on the CWEs average monthly performance. More specifically, the PSM incentives are paid on CWE average production versus the total number of filters sold. The advantage of the new incentive plan is not only sales generation, but also the increase in the quality of Hydrologic's sales people. This strategy motivates the PSM to supervise and push his CWE team as professionally as possible and leads to a rise in pay as the average CWE sales numbers go up. The incentives for the PSM are listed in Table 9 (removed).

7.3 Hydrologic's Marketing Strategy

Hydrologic follows a mixed marketing strategy, that is to say advertising, promotion, communication and sales processes are interwoven.

At the beginning the company's marketing activities were concentrated on Above-The-Line (ATL) methods to reach out to consumers on a national scale via conventional mass media like TV-, radio-ads and billboards. Having started off with only one (NGO) and later two distribution channels (NGO and Retail), the marketing activities were heavily focused on Above-The-Line (ATL) methods. As this approach reaches out to consumers on a national scale via conventional mass media, the ATL-strategy is useful for the market introduction phase as the product is new to the consumer (Morris, 2004, p.6). The power of mass media is especially helpful because it influences consumer purchase decisions (e.g.: total sales of Tunsai CWP doubled in retail

settings during a memorable television and radio commercial campaign) (PATH, 2012, p.23). Hydrologic's lack of direct competition at the start was a distinctive advantage and helped launching the Tunsai CWP on a large scale. The ATL method contributed to the fact that now many people consider the Tunsai CWF-model (or even more specifically the Super Tunsai CWF) as a synonym for the whole range of ceramic water purifiers in Cambodia (The Product Life Cycle Stages, 2016).

With the launch of the Super Tunsai (ST) in 2011, Hydrologic turned towards a people-to-people method, centered around the individual and involving active promotions at the point of sale in rural areas to push the direct sales channel (and thus the sale of the ST). This approach is also called Below-The-Line (BTL). Since the reach of mass media is very limited in rural areas, the BTL marketing offers a more suitable way to reach the specific target group for the Super Tunsai. In general, BTL-methods are characterized by less conventional communication channels like group sales meetings that target specific customer segments and deliver tailored messages in a more personal manner with increased impact (PATH, 2012, p.23). The BTL-strategy is appropriate for direct customer outreach programs (like acquisition through promotional sales events at village level as described in section 7.2.2). Hydrologic can directly influence its marketing and sales strategy and use its budget efficiently in order to impact the target audience. The applied BTL approach increases the value rather than volume and seeks to make the consumers pull the goods they demand for their needs. This is ideal for Hydrologic's demand driven value-chain (Industry Week, 2015).

For demand creation, Hydrologic applies a push- and pull-strategy mix that creates incentives for customers to buy the Super Tunsai via direct sales. Professionally trained sales agents (Clean Water Experts) set up educational village meetings and present the product. Not only health and economy related benefits are important, but also aspects that show social, environmental and aspirational benefits, signaling status and modernity. The educational aspect is crucial for people to understand the need for the filter. Further, the word-of-mouth is effective for validating products and reach behavioral change (PATH, 2012, p.25). The possibility to buy the product via micro-finance contributes to the company's efficiency, increasing volumes and minimizing the unit costs for the BOP customers. The switch from full-scale marketing to direct sales (person-to-person) marketing has proved efficient in increasing sales and building a strong market - especially for the premium product Super Tunsai.

Following a marketing mix strategy is very demanding (see section 7.2.2) (PATH, 2012, p.23). This is why Hydrologic receives professional support from an external consulting firm for its sales and marketing operations. While the amount for marketing had been budgeted separately in the past, Hydrologic nowadays combines sales and marketing activities in one budget. Marketing supports the direct sales at village level. The expenses have increased considerably during the last five years (2010-2014), which is highly due to the direct sales push by the company. Finally, 13% of the company's costs go to marketing purposes.

7.4 Hydrologic's Revenue Structure

Approximately two thirds of the company's total income are generated through operations of the core business (production and sales of the pots). Another important source of revenue are the carbon credits with 36%, while the grants and other financial sources are only a small part of the total revenue. The long-term goal of Hydrologic is to reduce the dependence on grants to zero. In fact, the dependence on grants has decreased considerably, which contributes to the company's autonomy and sustainability (section 7.7).

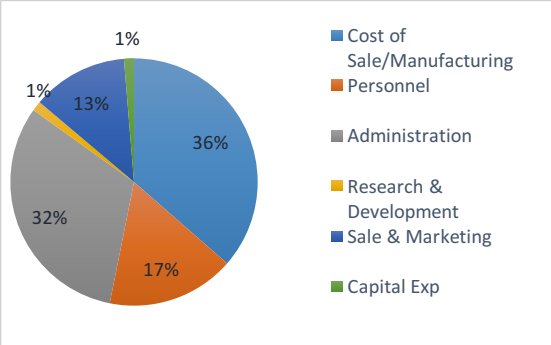

Figure 22 Hydrologic's Cost Structure 2012-2014 in %. Source: Hydrologic Headquarters, 2015 (own illustration).

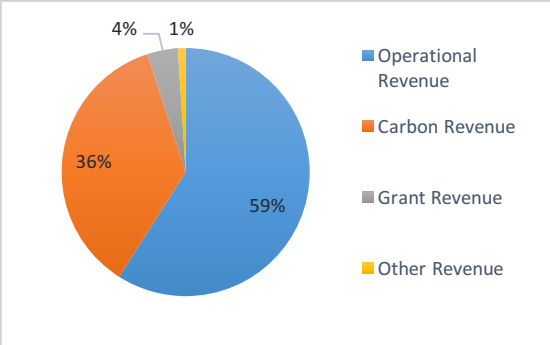

Figure 21 Hydrologic's Revenue Structure 2012-2014 in %. Source: Hydrologic Headquarters, 2015 (own illustration).

7.5 Hydrologic's Cost Structure (2012-2014)

The company's cost structure shows that the largest expenses are the costs of sale and manufacturing, but also administration. Both make more than one third of the company's total costs. Sales and marketing together with personnel make another third.

7.6 Break-Even and Profitability

Since 2010 Hydrologic has reached the break-even point and in 2012 it achieved profitability. The company's average annual turnover is USD 1.2 mio. (Annex II, removed). The profits were non-existent in 2014 due to the drop of carbon prices (see section 7.8). In order to find back to profitability Hydrologic has undergone a major restructuration process to keep the core business sustainable. This is why since January 2015 the social enterprise has scaled down activities in provinces to strengthen the direct sales team and is now reopening direct sales gradually (J. Kondelka, personal communication, June 27, 2015).

7.7 Capital Employed: Equity and Long-Term Liabilities

Hydrologic's capital employed consists of equity and long-term liabilities. The firm's equity has doubled from 2012 to 2013 and has since then remained on a similar level. The liabilities have been reduced by almost half from 2012 to 2014. This development fits well into Hydrologic's long-term goal of becoming financially independent from other investors (Figure 24, Figure 23).

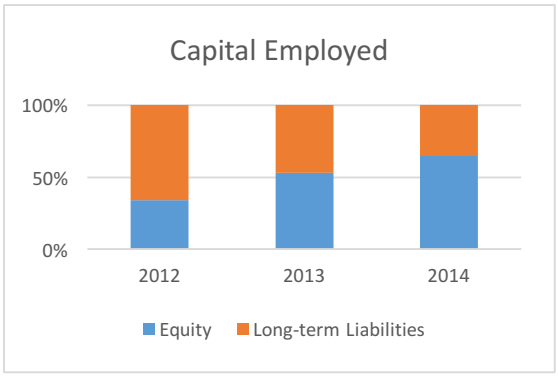

Figure 24 Capital Employed 2012-2014 in %.
Source: Hydrologic Headquarters, 2015 (own illustration).

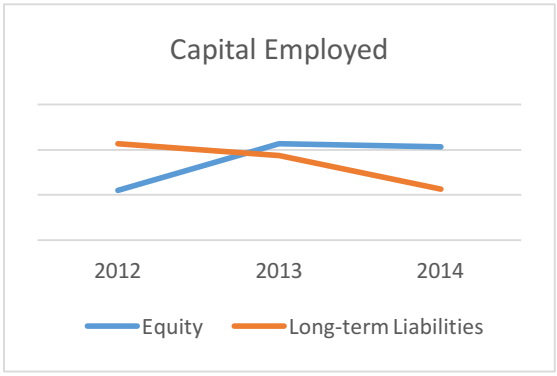

Figure 23 Trend: Long-Term Liabilities & Equity 2012-2014.
Source: Hydrologic Headquarters, 2015 (own illustration).

7.8 Carbon Finance

Hydrologic uses carbon finance as an additional revenue stream that adds to the company's profitability. Although the average prices in the voluntary carbon market have dropped considerably during the last two years, it still creates an alternative source of revenue for Hydrologic to gradually replace donor funding. Additionally, with increasing direct sales, the dependency on the carbon market decreases each year. Currently, the firm's revenue from carbon credits accounts for 36% (Figure 21).

In 2010, Hydrologic became a member of Nexus cooperative and initiated the carbon finance application. In 2012, the carbon finance project was approved. Hydrologic became the first Asian, market-based filtration business registered under the voluntary Gold Standard scheme. This certifies the company to generate and sell Voluntary Emission Reduction credits (VERs). The multinational company Deutsche Post DHL purchased the first carbon credits in 2012 (Go Green, 2015).

Hydrologic was accredited to sell carbon credits during a good phase of the carbon market where prices in the voluntary carbon emission market were much higher than today. Currently, it is unclear where the market is heading and how the prices will develop. On the voluntary market, 1 VER credit is equivalent to 1 ton of CO^2. Average prices dropped by 17% in 2013. The current average price is USD 4.90 per metric ton in the voluntary carbon market (Bloomberg, 2014).

It is crucial to keep in mind that initiating the carbon finance registration process is combined with high costs (more than USD 100'000, depending on the project). A business therefore needs to be quite established and earn stable revenue in order to benefit from the carbon credit mechanism. It is important to weight costs of the carbon application process versus the benefits for the company, when applying for carbon credits. Thus, a careful carbon market examination is recommended (R. Pringle, personal communication, June-July, 2015).

7.9 Assets and Capex

For Hydrologic, the fixed assets make 53% (acquisition costs 2010) of the total assets. The building and factory equipment are other big parts of the total assets, with 29 and 17% respectively. The capital expenditure (CAPEX) is a very variable number and depends on many factors such as country, and industry. The company's average CAPEX (maintenance and depreciation) per year is 13% of fixed assets.

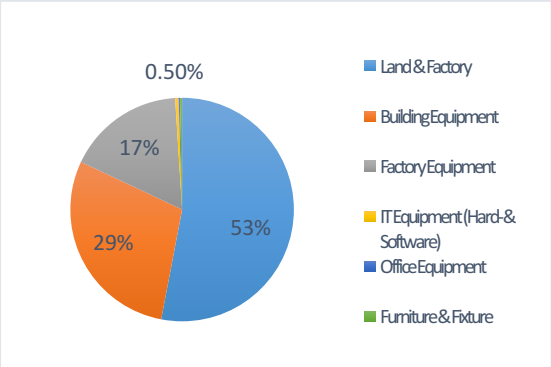

Figure 25 Acquisition Cost Hydrologic. Source: Hydrologic Headquarters, 2015 (own illustration).

7.10 Hydrologic's ROI

There are different ways of calculating a company's return on investment (ROI). Hydrologic's ROI is calculated as followed: ROI = Net Profit / Investment (Capital Employed). In 2012 the ROI was 21% and climbed up the following year to 26%. In 2014, it sank to -2%. The average is thus 16% between 2012 to 2014. Two main reason were responsible for the drop in the ROI: First, in December 2014, Hydrologic had huge expenses to create the molding forms for the new, larger version of the Super Tunsai filter. The return has not been realized yet. Thus, the company's profits were lower than the years before. Second, the drop in carbon market prices has led to a smaller additional income than in the years before 2014. The small profits registered in 2014 combined with the similar amount of capital employed to the years before led to the negative ROI in 2014 (-2%). However, the ROI is a complex variable, especially for social enterprises. Thus, its result depends on many factors (e.g. inclusion of the social return) (R. Pringle, personal communication, June-July, 2015).

Based on the company information, the next part will describe scaling strategies for Hydrologic Social Enterprise.

8 Scaling Strategies

The chapters 5-7 have provided a valuable insight on the business model of Hydrologic Social Enterprise covering the elements of the BMC. Based on that, the aim of this section is to describe potential international scaling strategies for Hydrologic Social Enterprises, as presented in chapter 4.2.2. First, the framework of the five Rs (Dees et al., 2004) will explain why Hydrologic is ready for going to scale in another country. Second, the most appropriate scaling possibilities will be outlined before each particular strategy for the firm will be proposed. Finally, preconditions and possible challenges will be looked at before a specific strategy will be recommended.

8.1 The Five Rs

According to the framework of the five Rs, which consist of readiness, receptivity, resources, risk, returns, the first step to identify if the social enterprise is ready to scale up consists of understanding the Tunsai filter well enough to successfully transfer it to other communities (Dees et al., 2004). "The initial exploration of scaling options begins and ends with considerations of readiness, which asks: Is the innovation ready to be spread?" (Dees et al., 2004, p.30). This can be answered positively, because Hydrologic mainly employs four key pillars to transfer the Tunsai filter to the BOP successfully. These are the Human Centered Design Approach and the four As framework (section 6.3.2), the triple benefits effect (section 6.3.10), and the distribution to villagers via the direct sales method (section 7.2.2). As a prerequisite to reach the BOP customers, the Tunsai ceramic filter was tested, refined and promoted in pilot provinces to increase acceptability.

The second "R" standing for a company's receptivity "is reflected in the demonstrated willingness to locally invest in time, money, and energy to achieve the impact the innovation aims to create", especially when demand is low and the need for the product is high (Dees et al., 2004, p.30). Hydrologic attains receptivity at the target community mainly through the company's investments in the establishment and refinement of the direct sales network, where the CWEs work closely with the trusted village leaders and communicate directly with the end-users during village meetings. The clean water experts hold educational meetings at the village level using the sight seller presentation, which is interactive and simple enough to understand the essential features of the Tunsai filter (see Annex I, Sight Seller Presentation). The possibility of buying the product via microfinance - for USD 36 at 2.8% interest rate per month over six or twelve months (Roberts, 2015, p.7) - additionally pushes the direct sales (Annex II, removed). This strategy is being implemented with the help of professional, external consultants who closely supervise and train the sales team (J. Kondelka, personal communication, June 27, 2015). This direct sales method considerably contributes to the customers' willingness to invest in a Super Tunsai filter as an alternative HWTS, resulting in increased demand. The establishment of this last mile distribution system reaches a wider community and thus substantially increases Hydrologic's social impact at the BOP.

However, spreading the innovation with minimal costs while maintaining effectiveness requires additional resources (Bloom, 2012, p.16). Thus, the social enterprise must have a credible "resource plan" in mind (Dees et al., 2004, p.30). Apart from the possibility to scale up with the help of partners and existing organizations, Hydrologic has so far established alternative, renewable revenue streams, like carbon finance and direct sales. The carbon finance makes 36% of the total revenue, yet the prices have fallen considerably and further development of this income channel must be observed (section 7.8). Another important income is generated via operations, which consist of production and dissemination of Tunsai ceramic filters, which are at the center of Hydrologic's business model. Almost two thirds of the total revenue is generated

by this stream, of which 59% alone is from direct sales. Further, direct sales are particularly important, as they are responsible for 67% of the total revenue (section 7.2). In addition, the firm's CAPEX is developing in a promising direction showing a stable evolution of equity and a reduction in long-term liabilities (section 7.7). This trend decreases dependency from investors and sustains operations in the long run. Furthermore, Hydrologic's focus on professional training and monitoring of the direct sales team makes value creation effective, which in turn can attract additional funds. The local demand, however, has to be high enough, in order for hydrologic social enterprises to work. If this is not the case, the company must also have a buffer (e.g.: additional grants) to cover potential temporary shortfalls. In the long run, the firm needs reliable sources, consisting of a large individual donor base, impact investors and new revenue streams (Dees et al., 2004, p.30).

The fourth "R" considers the risks in failing to achieve the intended impact. Working on the local level is connected to risks like negative reputation, sparse credibility, or loss of resources (Dees et al., 2004, p.30). The main difficulty is to reach the BOP customers at the village level. Thus, it is crucial to show that the company stays dedicated to the social mission and to impact co-creation, which might take time (see Annex I, Nine Lessons Learned, No. 2, 8). If financial dependency from resources for scaling up is too high, the firm may drift away from its social mission in the struggle for financial performance (André & Pache 2014, p.7-8, 13; Bloom & Skloot 2010, p.56).

As Dees et al. (2004) claim: "Impact is not just about serving more people and communities but about serving them well." (p.30). This last R is dedicated to the company's "bottom-line", the strategy that will reach most locations (Dees et al., 2004, p.31). Hydrologic's concentration on scaling up in different provinces on national level solidifies their direct sales mechanism. This lies at the core of the company's social but also economic impact. Focusing on national dissemination allows the company valuable returns, as the innovation (Super Tunsai) is of higher quality than already available options (Dees et al., 2004, p.31).

8.2 International Scaling Up

The five Rs have shown that Hydrologic Social Enterprise is ready for going to scale. This chapter examines the potential international scaling strategies for the company.

8.2.1 Formalized Strategies: Social Franchise, Joint Venture and Quality Standards

Besides nationwide dissemination, other strategies like formalized affiliation and branching possibilities can also generate returns, since they improve organizational effectiveness and efficiency, create additional economies of scale and transfer firm knowledge on an international level (Dees et al., 2004, p.31). More specifically, international partnerships allow to multiply Hydrologic's social business model (structures and relationships) (Thindwa, 2015) and enable other social ventures to work in a specific way that makes the innovation successful in the new

country (Gabriel, 2014, p.17). This form reunites parties with the same purpose and facilitates connections and tools for implementation of the original business model (Gabriel, 2014, p.23).
The first, most inclusive possibility for going to scale in an international level is through the establishment of formalized relationships, which allow the transfer of knowledge to foreign providers (Lyon & Fernandez, 2010, p.71). Hydrologic could sign a social franchise agreement with (a) new hub(s) and ask for a start-up fee to cover costs for the use of shared branding (e.g.: name and trademark) and operating systems (such as IT programs and apps, social media platforms and expensive molding systems for the production of plastic parts and components of the product) (Lyon & Fernandez, 2010, p.71). In addition, this revenue could be used for activities like monitoring and evaluation, introduction trainings for the new providers and managing the relationship with the new hub(s), assistance with fundraising and access to documents, manuals and material (Gabriel, 2014, p. 24-25). However, a formal relationship between the franchisor and the franchisee is the precondition (Bradach, 2003; Lyon & Fernandez, 2012). This is due to the independent work a franchisee follows, while maintaining strong links to the Cambodian enterprise. The spin-off firm needs to meet Hydrologic's high quality standards for products and the services to BOP customers. Thus, the option of penalization or ending the relationship is required, in case agreements are not being kept (Lyon & Fernandez, 2010, p. 71).
Another form of branching is the creation of a strategic partnership in the form of a social joint venture. This can generate a "step change in the scale" for Hydrologic, by giving the new firm access to new technologies, skills, capabilities and competencies that would otherwise be difficult to develop (Gabriel, 2014, p.26). This approach can combine both firms' expertise in specific areas: know-how on product manufacturing and the distribution network can be provided by Hydrologic, while the local partner can assess how to best reach the local BOP community (Gabriel, 2014, p.26).
Hydrologic could also scale up through purely developing and supporting quality standards, that ensure the "Tunsai" filters have the same level of effectiveness abroad. This would intensify social outcomes of the party signing up for these. Hydrologic's role would be to inspect the standards according to the information provided by the new partner. While the filter element will most probably be produced locally in the new country using local resources and material, the plastic parts, which can be cheaply produced in South-East Asia, could be imported from Hydrologic (section 6.3.8). The molding forms for the plastic parts are a huge financial investment for a social venture. As Hydrologic has produced them already, the two firms could share them. However, taxes, import regulations and logistics need to be taken into account. But, the quality standard could then be specifically applied on the effectiveness of the ceramic filter element. Further, the controller-function is time-consuming and needs to be done consequently to be effective. Extra coordination due to time zone differences needs to be counted in. Hydrologic would need to have enough capacity for monitoring the process, in return for a fee paid by the new firm (Lyon & Fernandez, 2010, p.71). On the other hand, the advantage of such quality

standards is that a whole network of similar firms working in the same sector could apply them. Governments and international organizations could be integrated to ensure responsible action on quality standards, performance and certifications of the private sector. They could for example reduce barriers on importation, boost production and distribution of Tunsai filters and encourage Hydrologic's partners to reach marginalized populations (Clasen, 2009, p.xi).

8.2.2 Non-Formalized Strategies: Training, Consultancy, and Good Practice

Besides formalized organizational links, Hydrologic could opt for less binding, and more flexible ways for going to scale. This would consist of providing training, consultancy and spreading good practice on a regular basis.

Training on particular topics like the direct sales, raises the quality of the product provision in the new setting (Lyon & Fernandez, 2010, p.71). Educational training could cover topics related to health, saving costs, effective distribution mechanisms and could increase the awareness about the necessity for safe water. Since Hydrologic is already implementing training for its staff in Cambodia, this offer could be expanded to the staff in the new country. To ensure a clear understanding, Hydrologic could apply the approach of "train the trainer". This could take the form of everyone implementing the direct sales technique, has been trained by someone trained by Hydrologic (Gabriel, 2014, p.24). This way, the quality in the direct sales network delivery can be ensured. In case of poor performance, monitoring and evaluations would need to be added (Gabriel, 2014, p.19).

Training can be complemented with other scaling methods like advising and mentoring the staff (Lyon & Fernandez, 2010, p.72). The requirement however, is that Hydrologic is ready to share its ideas. At the same time, this can be risky as intellectual property serves as a competitive advantage in increasingly competitive markets (Khota & Stern, 2005). This scaling method offers only a low level of control over how the idea is taken up. On the other hand, it gives the potential to reach a wide audience. Thus, Hydrologic could influence the direction in which the new partner could develop. It might be particularly appropriate for sharing the vision or parts of the business model as guidelines for the new partner working in a different context (Gabriel, 2014, p.22).

Alternatively, Hydrologic could scale on a more conceptual level by sharing good practice with the respective partners in the new country through meetings or at conferences, which can happen virtually (e.g.: via Skype call) or face-to-face on a regular basis, depending on the financial capacity and the time available. The outcome of this form of knowledge transfer depends on how the good practices are translated into impacts on beneficiaries at the new site. However, if it is well done, the number of individuals and organizations benefiting from these kinds of network can be substantial due to the specificity of the know-how received (Lyon & Fernandez, 2010, p.72).

Intensified linkages among similar stakeholders can strengthen the international use of the product and spread the meaningfulness and importance of Hydrologic's Tunsai filters among the

population (UNICEF, 2010, p.13). Therefore, advocacy is especially suitable when the action goes beyond different countries' borders. Further, this method is particularly apposite as Internet and social media can serve as an organizational tool for communication and mobilization to a specific end (UNICEF, 2010, p.52). Hydrologic in the position of an advocate can play a leading role in providing information for different partners. This might additionally attract and foster support from investors and governments and strengthen the international consensus on the need for ceramic filters to the BOP. This can foster inclusive industries and mobilize the water sector for safe water provision to the BOP. Thus, especially in transnational contexts, advocacy is a promising way to scale up the Hydrologic's business model (UNICEF, 2010, p.16).

If Hydrologic decides to scale with the least amount of control on how the business model and the processes are implemented, the firm can also provide open source material, as Hydrologic already does to a certain degree on their website and social media. This valuable experience makes Hydrologic a credible and central player in the field of social business model scaling. Thus, the firm can reach potential replicators and provide them with material, advice and good practice guidelines. However, it might be difficult to know if and how replicating social ventures are carrying out good practices in a complex environment as they might not have been verified (Lyon & Fernandez, 2010, p.72). On the other hand, it allows Hydrologic to scale internationally, allowing others to take ideas and adapt them without losing the focus on their current national priorities (Lyon & Fernandez, 2010, p.73).

Finally, cooperation networks and partnerships "can accelerate the flow of resources needed into the global BOP water sector, including funds, capacity building, mentorship and networking opportunities" in the ecosystem of Hydrologic (Kearney, 2015, p.11). However, to understand the business model, active participation and deep knowledge sharing is needed. Further, transparency is crucial for shared knowledge as it generates trust in Hydrologic, which in turn can contribute to secure additional funding for the company's organizational growth (Kearny, 2015, p.10-11).

8.3 Preconditions and Similarities of the Suggested Scaling Strategies

Before transferring Hydrologic's knowledge, some preconditions are indispensable for a successful scaling process.

First, Hydrologic must identify the country and potential partner company to collaborate with. Ideally, it should be a social enterprise working in the water sector with the similar goal as Hydrologic. Second, country specific data needs to be gathered (e.g.: on the local BOP market size, the culture, needs, habits, and preferences of the population, the target groups' willingness to pay, their income structure, national regulations and laws, and taxes). A feasibility study combined with a small-scale pilot-project in the new country is thus required to found a solid base for further collaboration between the potential partner and Hydrologic. Piloting the use of Hydrologic's value proposition in a densely populated, strategically selected BOP region is

crucial to start with. Therefore, a proposal for financial investors must be planned to allow establishing the first components of a sustainable value chain (e.g.: extensive field research and product development based on the two pillars of Hydrologic (section 6.3.1)).

Although the suggested scaling strategies follow different types of activities, they are all demanding as they require transparency, additional resources, skills and capacities from both sides; Hydrologic as well as the new firm (e.g.: for investments in market research, central coordination and management, additional accountability, training and business support and planning, the provision of information and open source material) (Lyon & Fernandez, 2010, p.75). Further, "The greater the number of standardized elements, the more resources are optimized and the more likely replication will succeed." (Bradach, 2003, p.21). Thus, to increase operational efficiency and growth, formalized processes like coordination, rationalization or homogenization help to optimize the use of scarce resources (André & Pache, 2014, p.8). The use of modern technology and tools to organize, communicate, cooperate and facilitate collaborations is essential (Gabriel, 2014, p.26). However, at the same time, this increases the risk of turning the social business into a bureaucracy (André & Pache, 2014, p.8).

Social ventures typically operate in complex contexts where margins are low and volatile and supply of money is usually scarce. The demanding business environment challenges the mobilization of resources and requires social enterprises to stay agile, creative and determined to find new solutions to issues (Bornstein & Davis, 2010, p.30). The unknown commercial viability of a firm's pioneering business model may lead to heavy losses for investors, as such inclusive businesses are highly risk-averse and have low financial returns (Koh et al., 2014, p.10). This situation might hinder them from receiving the required capital investments (Koh et al., 2012, p.7). Hence, the mobilization of additional financial resources is a necessary condition for scaling up (Bradach, 2003, p.25). Depending on the degree of scaling, Hydrologic, together with the partner firm might open new sites, recruit new staff, rent new offices, and set up the systems or will be required to oversee operations in different countries (Bradach 2003; Dees et al. 2004). With the increasing need for resources, the dependency on new revenue streams will automatically increase (André & Page, 2014, p.7). As Hydrologic's revenues cannot be covered from sales alone (because these do not have the capacity to pay the full price), the firm, but also the new partner, will rely on other stakeholders to ensure consistent funding during the international scaling phase. To prevent high transaction costs, it is recommended to focus on a small number of long-term grants for financial support. This enables stable growth because a start-stop nature of the funding is prevented (see Annex I, Nine Lessons Learned, No.4).

Impact investors can catalyze scaling processes for social enterprises as they seek to create positive impact beyond financial return (Nicholls, 2010, p.612; Koh et al., 2012, p.58). They are thus considered crucial players for unleashing the full potential for scaling of inclusive businesses. To know how best to support a pioneer firm requires an understanding of a company's needs, which change as it evolves over the course of its journey from start-up to

eventual scale (Koh et al., 2014, p.10). When operating with social enterprises, they face three challenges in particular. One of the most relevant challenges on an industry level for impact investors, is the lack of sufficient absorptive capacity for capital. This means there is an imminent lack of impact investing opportunities into which large amounts of capital could be placed at investors' required rates of return (Saltuk & El Idrissi, 2015, p.19). This is followed by the lack of efficient intermediation and high search and transaction costs caused by fragmented demand and supply, small and complex deals, and a lack of understanding of risk. The third challenge is in connecting different parties and finding a balance between philanthropy and investment. Lastly, the impact investors' lack of track record of successful investments as the field is emerging and still relatively new (Koh et al., 2012, p.4). Even though the field of impact investment is increasing, it is important not only to focus on impact investors, but to seek support from different key players like philanthropists and (public) aid donors to ensure commercial viability during Hydrologic's scaling process (Koh et al., 2012, p.9).
Public and non-profit institutions like NGOs or governments still remain key. Specifically, as economic and financial crises have confirmed that markets cannot function properly in isolation from other actors, since institutions still occupy a vital role in coordinating market activities (Bornstein & Davis, 2010, p.101). They enhance trust, information, certainty, shared cognitive frameworks, and to improve rules, competition and the balance of power (McKague, 2012, p.21). Further, institutions can reduce transaction costs through the creation of better infrastructure, organization, development of skill and training of the beneficiaries (Heierli, 2008a, p.36). Moreover, the public sector is crucial for providing key public goods or subsidies for private actors (Mendoza & Thelen, 2008, p.427). Governments have the exceptional capacity to promote the sector of social entrepreneurship through tax incentives for donors, attract investments, lower costs for social enterprises, and stimulate training (Kearney, 2015, p.12). Temporary subsidies in the form of grants, soft loans and guarantees can be helpful to cover the high up-front costs connected to scaling during the initial phase. Once the scaling is achieved, Hydrologic automatically becomes even more attractive to investors and might have the chance to receive return-seeking impact capital[39].

The proposed scaling strategies are not exclusive and can be combined. However, it depends first and foremost on Hydrologic's willingness to engage in such an international scaling process. Increasing scale is connected to loss of control over how the firm's knowledge is used. This also means abandoning ownership of intellectual property to a certain degree (Lyon & Fernandez, 2010, p.72-73). Hydrologic can choose a scaling route with tighter control, if "fidelity to the original innovation is important" (Gabriel, 2014, p.27). This gives the social enterprise a greater ability to oversee and regulate quality and reputation, which might increase effectiveness and

[39] Impact investors actively place capital in businesses and funds that generate social and/or environmental profits but also expect financial returns (O'Donohoe, Leijonhufvud, Saltuk, 2010, p.7).

sustainability in the long-run (Gabriel, 2014, p.27). However, more control is also connected to a longer scaling process (Gabriel, 2014, p.27). Otherwise, the firm can select a faster scaling route, targeting a wider audience through greater reach. In this case, effectiveness can be achieved through allowing more adaptations to country specific environments and creating greater local ownership, nonetheless, at the expense of control (Gabriel, 2014, p.28).
Finally, the proposed scaling strategies are flexible and non-exclusive. Formalized relationships like social franchising, social joint ventures or the establishment of standards can be combined with less formalized methods like advising, training and the provision of information and open source material.

8.4 Recommendation

Hydrologic has established a stable business model over the past years of its existence and the five Rs show that the social firm is technically ready for international quantitative scaling up. Nevertheless, as stated above, the choice of scaling strategy is influenced by many factors.
Hydrologic is currently successfully creating growth on a national scale, for example through the expansion of operations, direct sales in particular, employees and sales numbers. Other national scaling measures are achieved through the diversification of products and distribution channels, the set-up of the last mile distribution system and the establishment of the in-house microfinance mechanism. This has increased the socio-economic impact of the company at the Cambodian BOP. This growth on national level is presently the firm's focal point.
Further, although the direct sales channel contributes a great amount to the company's profitability (section 7.6), the company is also heavily investing in that channel. This is shown through the hiring of external consultants to monitor direct sales. In combination with the uncertain situation of the carbon markets, the reliance on further investors might increase. It is recommended to wait a few more years to see how Hydrologic's restructuring process is evolving (J. Kondelka, personal communication, June 27, 2015) and to what extent this branch can ensure long-term sustainability (section 7.2).
Thus, the primary recommendation is to start with a less binding international scaling path. Having a loosely controlled scaling method to begin with, fits Hydrologic's current state and can add benefits in terms of synergies and network enlargement. Hydrologic's position as a role model can serve as an important driving force to mobilize the water sector in the dissemination of safe drinking water to the BOP. While being a pioneer firm in breaking new ground with its social business model, the firm has the ability to create new markets, which allow other firms to follow in their footsteps and reach more people. Thus, diversity of firms in an industry and healthy competition among them drives greater value for customers and contributes to company growth in the long run (Koh et al., 2014, p.10).
As the company already provides a high degree in transparency by putting a lot of documents online and providing open source information, the social enterprise could intensify this scaling

method by offering specific manuals and material about certain pillars of the business model (e.g. on the establishment of the micro-finance or direct sales mechanism). Further Hydrologic could extend its local training courses (e.g.: on the last mile distribution) to carefully selected firms and international partners. Especially, if a partner is found, Hydrologic could closely follow and mentor the foreign firm on how to accurately implement different pillars of Hydrologic's business model.

Although the company's current state shows that international scaling is not its first priority, the willingness to spread the business model to a more specific level might emerge at some point. Then, Hydrologic Social Enterprise could gradually opt for a more intense, controlled international scaling strategy to improve quality and build a deeper, more binding, formalized relationship with the new partner. Hydrologic could envisage starting a social joint venture or a franchise, depending on the partner chosen and the capacities available.

Finally, among the several forms proposed, two routes can be identified for Hydrologic: First, the less controlled, less formal and less binding option. Second, a gradual intensification of the relationship, turning the international scaling strategy into a formalized scaling route.

9 Conclusion

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has." (Margaret Mead)[40]

The trend in using market approaches in development aid has considerably contributed to poverty reduction. Including the BOP communities into the market economy can lead to increased standards of living through economic growth (Elkington & Hartigan, 2008). This development has given rise to hybrid organizational forms like social enterprises which have the ability to combine economic with social goals. Social businesses usually start with small initiatives that have global relevance, such as for example access to safe water. The innovative solutions, which a social venture validates in its local context, can be replicated in other geographies and even be expanded to global industries (Zahra et al., 2008, p.118). This is only possible if enterprises manage to grow and have a disproportionate impact on the wider community (Blundel & Lyon, 2015, p.81), as is the case for Hydrologic Social Enterprise. The firm has "profound implications in Cambodia's economic system as it strengthens the water sector, adapts and validates new business models, and invests resources in neglected societal problems" (Santos, 2012, p.335).

The purpose of this case study was to analyze the business model of Hydrologic Social Enterprise in order to identify potential scaling strategies to expand the company's socio-

[40] Margaret Mead is a cultural anthropologist, political activist and writer (BookBrowse, 2016).

economic impact of the BOP by enlarging its production and dissemination of Tunsai ceramic water filters to an international level.

The first part of this paper provided information about the BOP approach, which includes the world's poorest into the formal market economy by addressing them not only as consumers but also as producers and entrepreneurs. Whereas the initial view consisted purely in "fortune-finding" at the BOP, the paradigm has shifted towards a "fortune-creating" attitude. Values like co-creation, shared capabilities, and building synergies emerged and gave way to specific business models that emphasize innovation in product and process technologies (Simanis & Hart, 2008).

The subsequent investigation of Hydrologic's social business model with the help of the BMC has shown that the last mile distribution is the core of the model which connects the firm's value proposition with the target group. Especially in a BOP context, the biggest challenge for social ventures remains in demand creation. Hydrologic Social Enterprise has been able to overcome this barrier after almost a decade by modifying its business model and establishing a professional direct sales system in order to reach the Cambodian BOP households, which are mostly located in remote rural areas. As Cambodia still faces challenges to ensure safe drinking water for households, Hydrologic effectively covers their need through a sound last mile distribution system.

The direct sales network is key for sustainable firm activity and poverty alleviation as described in chapter 5-7. On a national scale, the company has reached considerable growth and currently invests in consultants who help expand its direct sales activities to cover more provinces. This further shows that the success of the product depends on its usage, which in turn depends on the affordability and its accessibility for BOP individuals.

The five Rs have demonstrated that Hydrologic Social Enterprise has reached a stage where it is technically ready to set the scale internationally. The author's claim on the high potential for Hydrologic Social Enterprise for setting the scale and making use of strategies tailored to its business model can thus be confirmed. Among the different options for Hydrologic to spread its innovation (Bloom & Skloot, 2010), the analysis has shown that there are two scaling routes in particular which best fit in the firm's business model. The first is less binding, less formal, and also less controlled. The firm can provide open source material and training sessions or offer consultancy for similar social enterprises in the field. The second option consists in a gradual intensification of the relationship between the potential pattern and Hydrologic turning the international scaling strategy into a formalized scaling route. It considers the establishment of international standards for Tunsai filters or the creation of social franchises or joint ventures. Furthermore, advocacy is particularly suitable for transnational contexts.

Although the current focus of Hydrologic is on national scaling up, international scaling would be a chance to expand the firm's socioeconomic impact. However, in order to do so, the company has to identify a partner and assess the local BOP market conditions of the country.

Moreover, a pilot project should first be implemented to see how the BOP customers can best be reached. Further, some adaptions in the business model will definitely need to be taken into account. Besides this, Hydrologic would need to focus on cooperation and on consumers, who are at the center for demand creation.

The author firstly recommends to continue to scale on national level for a few years until financial stability is ensured, especially in regard to the insecure situation of the world carbon prices. Also, if the company further increases its activity in provinces, it becomes more attractive to impact investors. The multi-stakeholder approach that the company follows will additionally increase commercial viability during the firm's scaling process, which will also be appealing to investors (Koh et al., 2012).

The emerging field of impact investing is an attractive possibility for Hydrologic to find support for its scaling process. If Hydrologic chooses to engage in a binding scaling strategy like starting a social franchise or a joint venture, it can be interesting for impact investors to support this process. The investors could overcome one of their main challenges, namely the lack of opportunities into which large amounts of capital could be placed at investors' required rates of return (Koh et al., 2012). Further, as Hydrologic Social Enterprise found a way to ensure steady demand through direct sales, transaction costs for investors would be lower and intermediation more efficient. The continuous positive results of Hydrologic additionally show that financial investments can be successfully implemented by a social enterprise.

Finally, scaling first depends on the firm's willingness to invest in the scaling process, as some preconditions for scaling need to be taken into account. The firm has to be aware that scaling up internationally will demand for additional (financial) capacity. Although scaling is a demanding task, it is recommended for further reducing global poverty by enlarging impact. Therefore, this present case study can be considered as a baseline for further follow ups concerning the scaling process of Hydrologic Social Enterprise in another country.

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Annex I

BMC: Summary of the Main Components of Hydrologic's Business Model

<table>
<tr><th>Internal View</th><th>Value Proposition</th><th>External View</th></tr>
<tr>
<td>- Use of local resources to produce and disseminate ceramic water filters
- Professional support from consultants to strengthen direct sales
- Strengthening direct sales network
- Provide customer support to ensure positive long-term impact at the BOP
- Partnership with a microfinance institution
- Assistance and guidance form a network for carbon finance
- International partners and close collaboration with IDE
- Multi-stakeholder approach: cooperation with private, public and civil society organizations</td>
<td>Product diversification of the Tunsai Ceramic Water Filter
Original Tunsai (OT) USD 18
Super Tunsai (ST) USD 36
- Price is set according to the income levels of the BOP customer segments
- High quality and the aspirational design of the ST increase users' willingness to pay for the product and make customers feel distinguished
-Tunsai filter covers need of users (access to safe water)
- gives access to safe drinking water – USD 73 annual financial benefit per household using a filter
- triple benefits: economic, health and environment</td>
<td>Diversification of channels:
Direct sale, Retail, NGO

Customers: Cambodian BOP households
2 Target Groups:
OT: those earning below USD 1/day
ST: those earning between USD 1-5/day

Customer Relationship:
- Co-creation: Inclusion in the product development process
- Focus on direct sales: last mile distribution at village level combined with the possibility to receive micro-loans
BOP Customers:
-are highly discriminating customers due to limited cash availability
-are ready to pay for better quality
- face price-value trade-offs</td>
</tr>
<tr>
<td colspan="3">Financial Aspects
Total Investments (2002-2012): USD 2.5 mio.
Profitable since 2012
Yearly turnover: USD 1.5 mio.</td>
</tr>
<tr>
<td colspan="2">Cost
- High up-front costs to start operations (Land and Building)
- Carbon finance application process is time and money consuming
- Investments into the establishment of the last mile distribution system (with the help from external consultants)
- Operations: Molding form for plastic tank production
-</td>
<td>Revenue
- Main operational revenue comes from direct sales
- Traditional revenue streams are complemented with alternative options (carbon finance)</td>
</tr>
</table>

Quality Control: Results from the Laboratory Test, July 2015 (Tunsai Filter Element)

Food and Chemical Services
N. 52, St. Berk Thmey, Sangkat Tumnubtek,
Khan Chamkarmorn, Phnom Penh, Cambodia
Tel: 012 531000 / 088 5531000
E-mail: Davinuy@gmail.com

Ref.: AS2014-270

RESULT OF ANALYSIS

Organization / company	**HYDROLOGIC** **Tel:** 088 7373970
Type of sample	Influent and effluent water from Ceramic Filter
Sample submitted date	6 July, 2015

N	Code on Ceramic	Date of Manufacture	Total coliform cfu / 100 mL	E. coli cfu / 100 mL
1	N. 16905(4-5)	20 – 11 – 2014	0	0
2	N. 29525(4-5)	16 – 6 – 2015	0	0
3	N. 29864(4-5)	17 – 6 – 2015	0	0
4	N. 26147(4-5)	2 – 6 – 2015	0	0
5	N. 28964(4-5)	12 – 6 – 2015	0	0
6	N. 30181(4-5)	17 – 6 – 2015	0	0
7	N. 30220(4-5)	17 – 6 – 2015	0	0
8	N. 29481(4-5)	16 – 6 – 2015	0	0
9	N. 29520(4-5)	16 – 6 – 2015	0	0
10	N. 29947(4-5)	17 – 6 – 2015	0	0
11	***N. 16905(4-5)***	***20 – 11 – 2014***	0	0
12	***N. 29947(4-5)***	***17 – 6 – 2015***	0	0
13	Influent water	-	***1704000***	***87200***
14	Standard for drinking water	-	0	0

Phnom Penh, 11 July, 2015
Head of Laboratory

DR. DAVIN UY

Sight Seller Presentation Hydrologic Social Enterprise for the Village Sales Meetings

ទំព័របន្ទាប់គឺជាទំព័របន្ថែម
ហើយវាត្រូវបានប្រើប្រាស់
ប្រសិនមានសំណួរបន្ថែមពី
អតិថិជន

1	3,300 រៀល	12,800 រៀល
2	3,200 រៀល	12,400 រៀល
3	3,200 រៀល	12,200 រៀល
4	3,100 រៀល	11,800 រៀល
5	3,300 រៀល	11,700 រៀល
6	3,200 រៀល	11,400 រៀល
7	3,300 រៀល	11,100 រៀល
8	3,200 រៀល	10,800 រៀល
9	3,100 រៀល	10,500 រៀល
10	3,300 រៀល	10,300 រៀល
11	3,100 រៀល	10,000 រៀល
12	117,100 រៀល	9,800 រៀល

Partners and Awards

Hydrologic's principal partners from 2001-2014 were the following:

Antenna: Antenna Technologies is a Geneva-based non-profit that works to reduce extreme poverty and health problems in developing countries by bringing innovation in science and technology to bear at the Base of the Pyramid.

Bill & Melinda Gates Foundation: Is one of the largest private foundations worldwide aiming to globally enhance healthcare, reduce extreme poverty and expand educational opportunities and access to information technology.

IDE: Is a non-profit International NGO with a unique market-based approach to poverty reduction. IDE helps to build profitable enterprises and value chains that deliver sustainable social and economic benefits to the rural poor, enabling them to increase their income and improve their quality of life. IDE works primarily in rural areas, where the majority of Cambodia poor live, and in two sectors: agriculture and water & sanitation. IDE is the current owner of Hydrologic.

Impact Finance Geneva: Impact Finance is an investment manager that supports the growth of companies that have a positive impact on the base of the socio-economic pyramid. In March 2012, after due diligence investigation, the Geneva-based Impact Finance provided debt financing to Hydrologic, repayable over 42 months.

Microfinance Institutions: Vision Fund Cambodia: Hydrologic's microfinance partner, which provides twelve-month loans for village-based direct sales.
iDE in-house credit: In-House credit mechanism provides six-month micro loans to villagers.

Nexus: A cooperative of development organizations that supports vulnerable communities by scaling up successful climate-friendly projects like Hydrologic's Tunsai CWP Project. It supports Hydrologic in the access of technical assistance and funding opportunities via carbon finance. Nexus shares expertise and services: it builds the capacity of Hydrologic staff through mentoring and training to manage the project through the carbon finance project cycle.

PATH: Is an international non-profit organization that creates sustainable, culturally relevant solutions, enabling communities worldwide to break longstanding cycles of poor health. Path helps Hydrologic to provide appropriate health technologies and vital strategies that change the way people think and act.

SDC: The Swiss Agency for Development and Co-operation is the Swiss Government agency for development cooperation and is supporting Hydrologic through Antenna Technologies in Geneva.

The Gold Standard Certification: Is one of the major voluntary carbon offset certifiers that offer nearly universally accepted credits with high level of flexibility levels between registries.

WaterSHED: Water Sanitation and Hygiene Enterprise Development project is a public private partnership funded by USAID and implemented by the University of North Carolina. It aims at bringing effective, affordable water and sanitation products to market in Cambodia, Laos and Vietnam.

Awards

2011: Impact Business Award from GIZ for business models that present innovative products, services and technologies for climate mitigation or adaptation to climate change

2012: Ashden Award for protecting health and reducing deforestation in Cambodia: Award for avoided deforestation supported by Waterloo foundation

2013: National Energy Globe Cambodia for providing clean drinking water to rural households, reducing firewood consumption and supporting economic development

Nine Lessons Learned

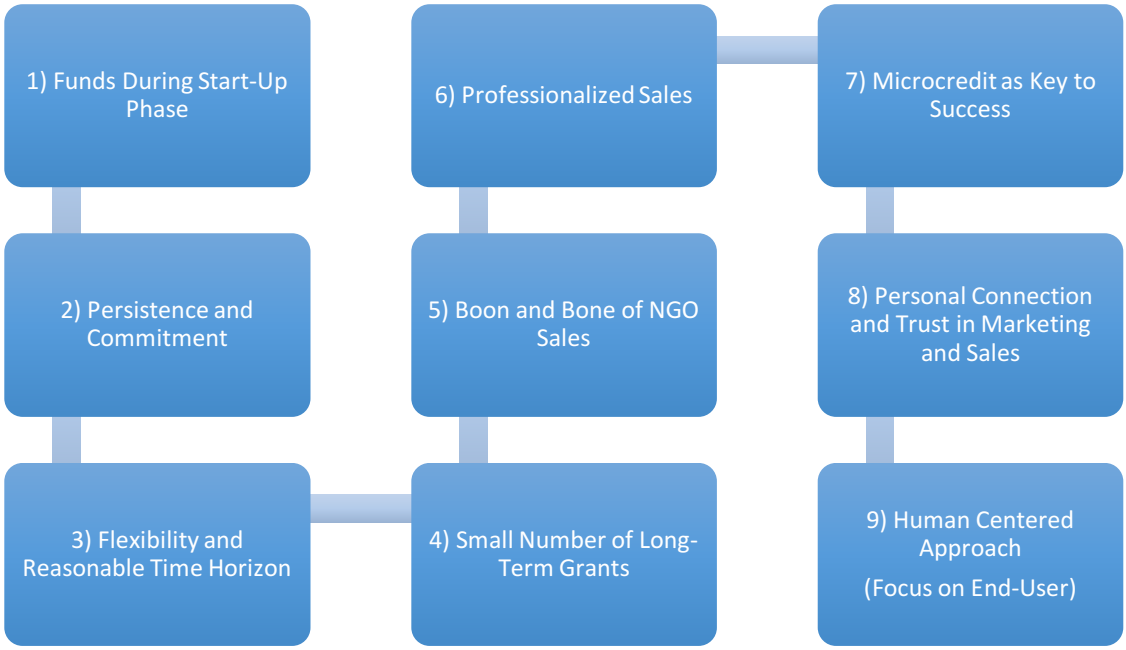

Figure 26 Nine Lessons Learned. Source: Roberts, 2015, p.8-9 (own illustration).

1) Funds During Start-Up Phase

Donor funds are crucial for incubation of social enterprise models in challenging markets, because the social return on investment can be very high for such investments. From 2000-2014 USD $2.5 million in grants were invested in Hydrologic while the financial return to rural Cambodians was approximately USD $89 million.

2) Persistence and Commitment

Nurturing a social enterprise from start-up to maturity requires persistence and commitment. Hydrologic stood on the verge of failure numerous times. Crisis events included cash flow pinches, a grant cancellation due to slow progress, an asset ownership dispute, personnel conflicts, and a yearlong delay in the carbon finance application.

3) Flexibility and Reasonable Time Horizon

Social business incubation requires a reasonable time horizon and a learning orientation. In the beginning, iDE aimed for eventual commercial sustainability for the filter program but did not know the exact pathway to get there. Time and flexibility were needed to allow for mistakes to be made and corrected along the way.

4) Small Number of Long-Term Grants

It was difficult to secure consistent funding during start up. From 2001-2008, 12 small, short-term grants funded the filter program. This led to high transaction costs. The start-stop nature of the funding kept the staff in survival mode and made it difficult to grow. The incubation period might have been shorter and more efficient with a smaller number of longer-term grants.

5) Boon and Bane of NGO Sales

Bulk sales cost less to make than individual sales, NGOs can supply filters to those who could not otherwise afford one. Further, bulk sales increase production scale and profitability. However, giveaways can undermine markets and cannibalize future sales. In addition, NGO sales are irregular and hard to plan for. Finally, the end-user receiving a free filter is less likely to use it properly or complain if they face problems.

6) Professionalized Sales

Selling is a hard job, since sales agents need to keep a positive attitude in the face of frequent rejection. Thus, Hydrologic works with external consultants to craft tools, methods and solutions for the establishment of a sound direct sales network, which are able to identify problems early, generate more sales, and monitor progress.

7) Micro-Credit as Key to Success

The possibility of micro-credits proved to be key to the success of direct sales. In one region where cash sales were practiced, the access to micro-credit resulted in four times more sales (Kampong Cham Province). The downside of this process: Once sales agents start selling on credit it is hard to motivate them to go back to selling on cash.

8) Personal Connection and Trust in Marketing and Sales

In 2011 Hydrologic shifted its marketing strategy from mass media campaigns (including billboards, radio and TV spots) toward village meetings and door-to-door sales. This resulted in a stringer correlation between marketing effort and sales results. Personal connection helps building customer trust and generate more direct sales.

9) Human Centered Approach: Focus on the End-User

People with low incomes like attractive goods too. Prestige and convenience are central to them, since they connect at an emotional level. The health benefits alone are not enough for them to step into action. The apsirational, aesthetic aspect of the product responds to the deep motivations and daily needs of the end-user. This applies not only to products but the whole customer experience like promotional messages, finance, models, and after-sale services.

Hydrologic's Production Process of the Tunsai Ceramic Filter Elements

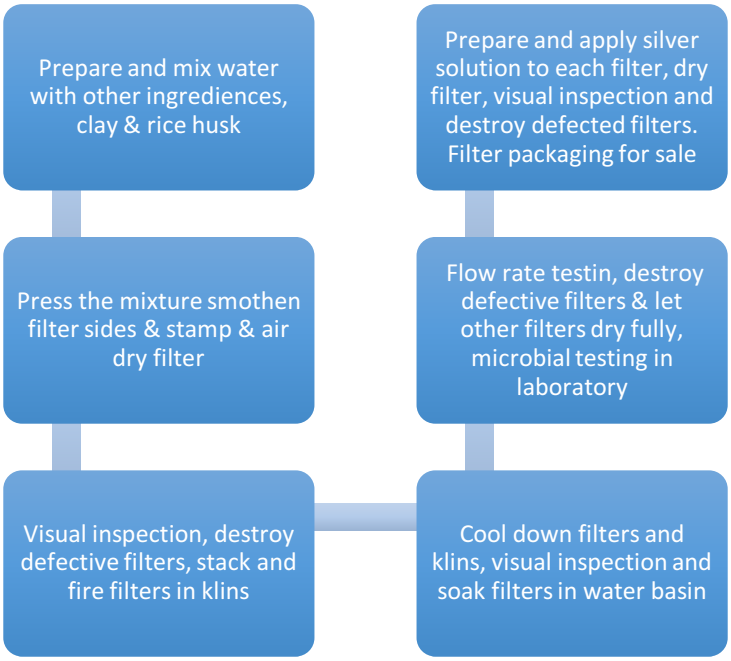

Figure 27 Filter Production Overview (own illustration).

Annex II: Removed for public circulation.

Declaration of Authorship

"I hereby declare

- that I have written this writing sample (thesis) without any help from others and without the use of documents and aids other than those stated in the references,

- that I have mentioned all the sources used and that I have cited them correctly according to established academic citation rules,

- that the topic or parts of it are not already the object of any work or examination of another course unless this explicitly stated,

- that I am aware that my work can be electronically checked for plagiarism and
- that I hereby grant the University of St.Gallen copyright as far as this is required for this administrative action."

Küssnacht am Rigi, February 22nd, 2016

Soraya Kohler

Declaration of Discretion

Soraya Kohler hereby undertakes and warrants to treat any information obtained by Hydrologic Social Enterprise in strict confidence. In particular, she shall only permit people other than the referees to inspect her written work with the express consent of all the parties that have provided the information.

Küssnacht am Rigi, February 22nd, 2016

Soraya Kohler