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Global Thirst for Governing Water

Technologies, innovations and drinking water governance in India and Ethiopia

LINDA ANNALA TESFAYE

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PREFACE

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CONTENTS

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1 INTRODUCTION

1.1 In search of solutions to water governance

Water has attracted remarkable popular and scholarly interest through topics such as water scarcity, water privatization and corporate neglect of water pollution. For people living in so called water abundant societies, social constructions of water problems are rarely visible. Distant news on depleting ground water levels, pollution and looming threats on water wars become contrasted with more relatable consumerist purchasing decisions on bottled water. In this thesis, water governance is studied in two contexts where access to clean drinking water is not self evident. In the city of Ahmedabad, India, uncertainties are linked to the quality of the drinking water: is the water clean enough to drink? Is the technology used to filter water beneficial for personal health in the long term? In rural Ethiopia, the functionality and reliability of communal water points, as well as the time and energy women and girls spend for travelling and queuing for water are issues that sharply portray the inequalities pertaining to drinking water on a global scale.

According to antropologist David Mosse, "the relationship between water and society is as complex a historical, sociological, and regional problem as any that can be imagined" (Mosse, 2003: 1). With regard to the focus of this thesis, I would add two more adjectives to this problem formulation: technological and economic. Framing the relationship between water and society through discourses of 'problems', however, comes with its consequences – as a 'problem' usually calls for a solution. Problems of technological character may become constructed solvable with new technologies, or innovations as many would address them. Problems that are framed as economic, on the other hand, render themselves solvable by scarce use of resources and affordability. This thesis examines the links between recent reforms in water governance, notably extended participation of communities and individuals in processes of water governance, and technological innovations. Special interest is placed on the recent emergence of frugal innovations – resource scarce innovations - as a contested concept resonating with the exclusionary traits of economic affordability.

1.2 From community managed rural water governance to frugal innovations: constructing and connecting the dots

In this article-based thesis, water governance, technology and innovations are studied in two separate contexts: in the urban city of Ahmedabad, the largest city of the Indian state of Gujarat as represented in Article 1 (Annex 1), and in rural districts of Amhara region in Ethiopia as in Article 2 (Annex 2). In the more conceptual Article 3 (Annex 3), the broader context of India as a nation state is discussed to illustrate the discourses surrounding frugal and grassroots innovations. The city of Ahmedabad was chosen because I participated in an external research project evaluating drinking water technologies in the urban context of Ahmedabad. Amhara region, on the other hand, was chosen due to my personal work experience within a rural water governance project in Ethiopia. As a geographical area, Amhara region has the longest history of involving

communities as co-producers of drinking water in Ethiopia though community management programs. The methodological choices and their implications are discussed as part of the research process in chapter 3.5.

In the context of Ahmedabad, the households and housing societies actively co-produce drinking water by drilling private wells to improve access to water and by treating tap water to make the municipal water provisioning cleaner to drink (Article 1). A central material artefact in the study, a problem solver for uncertainties pertaining to water quality in middle and high income households, is the private water filter. The technological specifications of the water filter are co-created among end users and local water filter entrepreneurs to better address health-related concerns and price expectations of the households. In this thesis, these resulting innovations carry the label of frugal innovations, i.e. resource scarce innovations, due to the simplicity of the filter's design – which also makes them cheaper as their branded, mass-produced counterparts.

Moving from the analysis of how individual households in the city of Ahmedabad cater for their drinking water needs, the focus of this thesis traverses into examining how power relations unfold within rural water governance in Ethiopia. Drinking water governance in Amhara region of Ethiopia entailed practices of involving end users in the construction, use and maintenance of water wells located in rural districts (Article 2). Such an approach bears the name of 'community management' due to the increased sets of responsibilities and autonomies placed upon communities. Community management as a discourse and practice has attracted a lot of polarized attention globally, with many opponents and proponents. What often remains hidden in community management programs is the critical examination of the political processes taking place within the communities and the extended network of actors involved in co-producing drinking water. Instead, the eyes of governmental officials and development practitioners are fixed on the numbers indicating trajectories of water points being constructed, the binary functionality of water points, as well as the sums of finances end users contribute to the construction and maintenance of water points. In governmental discourses, this sort of technocratic approach to water governance reproduces a romanticized portrayal of homogenous 'communities' as units void of power dynamics and contested politics (Agarwal, 2001; Agrawal and Gibson, 1999; Cooke and Kothari, 2001; Mosse, 2001; Sultana, 2009). A technocratic approach to community management may focus on celebrating ideals of efficiency and sustainability, and in the process leave the sustained efforts, struggles and workings of power unnoticed - both within and beyond the communities. Co-production as a policy and practice – as represented through Article 1 on urban water provisioning in India, and Article 2 on community managed rural water programs in Ethiopia – in this thesis is viewed as a disputed governance discourse with implications for end users, governmental and private sector actors.

The research undertaken with the concept of frugal innovation and co-creation processes in Article 1 continued with an in-depth examination of the phenomenon. How the concept of frugal innovations came to be, and what discourses it draws upon, is also researched as part of this thesis (Article 3, Annex 3). The governance-driven discourse

on co-creating innovations with the 'poor', and particularly frugal innovations, as a solution framed to sustainability challenges is questioned for the spaces it legitimizes for private sector actors and corporations.

1.3 Co-production and co-creation as evolving meaning systems in water governance

Contextual practices related to water keep on changing as water flows, stops flowing or changes its forms. Global and national level water policies strive to keep up their governance frameworks to control the changing uses of water. These policies are the official side of knowledge on water governance, setting the discursive ground for governmental officers and development practitioners to plan and implement water provisioning at various levels. Local actors, however, often transmute and transform water governance discourses towards new directions. Water governance is not only about clear top-down policies, solid infrastructure and technological expertise, but a political field where values and power play pivotal roles (Linton and Budds, 2014). What happens outside the guidelines, manuals and statistics often goes unnoticed. The informal networks of citizens, communities and private sector actors co-producing water do not get documented in the official reports.

Practices of water governance in India and Ethiopia are influenced by broad, contested discourses of global water governance: Co-production and community management largely driven by proponents of participatory governance, and co-creation of (frugal) innovations influenced by corporate interests. These governance discourses are to be discussed in this thesis, shedding light on the new meanings constructed within water governance. Through the discourses and practices of co-production and co-creation, individuals and communities are becoming more involved in producing water as a public service, and in designing technological innovations. This shapes and is shaped by neoliberal processes where water governance is increasingly problematized in relation to the conduct of communities and individuals rather than as a political problem to be addressed collectively on a societal and global levels (Birkenholtz, 2009; Dewan et al., 2014).

1.4 Aim and research questions

The overall aim of this research is to understand the processes of drinking water governance and the ways in which the use and practices related to drinking water technologies and innovations are socially constructed in the studied contexts. In order to address the overarching objective, I ask the following research questions:

R1. How are governmental and private sector actors and representatives, as well as end users, socially constructing practices of drinking water governance in the studied contexts?

R2. How do the governance discourses of a) co-production and b) co-creation influence the governmental actors, private sector and end users in constructing meaning systems to drinking water technologies and innovations?

R3. Which discourses do the articulations of frugal innovations draw on, and what are the implications of the current meanings attached to the term?

As mentioned earlier, I seek answers to these questions through two empirical cases - from the city of Ahmedabad in India (Article 1) and the Amhara region in Ethiopia (Article 2) – and addingly one conceptual article (Article 3). By utilizing multiple methodologies, this thesis contributes to the interdisciplinary literature on water governance, as well as the emerging scholarship on frugal innovations.

1.5 Key concepts

1.5.1 Social constructionism

As a methodological approach, social constructionism rejects the idea of an objective truth. Rather, the ways in which we understand the world carry historical and cultural specificities. Knowledges form in social interaction between people. Perceptions of the world are entangled in power relationships that have consequences for our actions and practices. (Burr 1995; Gergen 1985) From a social constructionist position, technologies and innovations are constructed in interaction with the broader environment. These technologies and innovations, as well as meanings and materialities of waters, are socially produced, rather than existing as independent objects. This production of waters, technologies and innovations takes place in social contexts, where discourses shape the way people behave, form practices and talk about water, technologies and innovations. Social constructionism if discussed in more detail in Chapter 3.

1.5.2 Discourse

Discourses can be seen as sets of historically and socially created rules entitling "what is" and "what is not" (Carabine, 2001) and frameworks for what can be said and done (Torfing, 1999). The functioning of a discourse is a social practice that constructs the world in meaning (Jørgensen and Phillips, 2002). A discourse excludes alternative interpretations of the reality and therefore can be viewed as a reduction of possibilities (Jørgensen and Phillips, 2002). Deployed as a methodological concept, this thesis builds on discourses as frames that define the world and subjects in particular ways (Schram 1993). Viewing the social world in a certain way carries a message that there are no right or wrong, more or less truthful, objective ways to make sense of reality. The understanding and role of discourse has evolved throughout the thesis process and will be discussed more thoroughly later in chapter 3.

1.5.3 Drinking water governance

Drinking water governance, in this thesis, is viewed as a web of relationships, structures and practices through which societies organize access to drinking water. It comprises a

series of political, social and economic discourses and practices that exist and change to develop and administer sources of water, and the distribution of water at different levels of society. These processes are entangled with the use and maintenance of technologies and infrastructures to extract, move and purify water. Water governance includes global and national water policy processes that shape and are shaped by discourses on the complex historical, social, regional, institutional, economic and technological relationship between water and society.

1.5.4 Co-production

This thesis views co-production as a discourse and practice[1] in water governance. Co-production is seen as a discourse that incorporates the subject-making processes that construct citizens, governmental and other actors as producers of access to drinking water. These actors interact through a bundle of practices to gain access, provide, and monitor drinking water; their interaction constitutes new meanings, thereby producing new social practices (Ahlers et al., 2014).

1.5.5 Co-creation

Co-creation is approached as another discourse on water governance in this thesis. It is a discourse which contributes to the subject-making process of end users who are actively involved in various phases of product or service development processes (Prahalad and Ramaswamy 2000; Vargo and Lusch 2004; Voorberg et al., 2014). Zwick et al. (2008: 163) argued that the co-creation discourse constitutes a corporate power that does not function through the intentional shaping of consumers' actions as per a desired norm, but through working "with and through the freedom of the consumer". As a result, the consumer-innovator aspires of becoming a co-creating subject.

1.5.6 Frugal innovation

In its literal sense, the word frugal means "simple", "plain", or "using money or supplies in a very careful way" (Merriam Webster, 2017). Frugal innovations are typically framed as innovations driven by scarce resources and regional circumstances of poverty and exigency (Pansera and Martinez, 2017). Commonly credited for creatively enhancing efficiency of resource utilization (Zeschky et al., 2014)), the diverse discourses on frugal innovation as a concept generally refer to products, technologies and services developed for, by and with 'the poor' (Article 3).

[1] In Article 1, co-production is seen as a practice rather than a discourse. However, the methodological approach towards practices and discourses has changed during the thesis, as explained later in section 3.3. At the time of writing this thesis, I see co-production as a discourse that incorporates practices as explained in section 3.2. According to the current methodology, practices are embedded in discourses.

1.6 Structure

This dissertation comprises of seven chapters and seven annexes. In Chapter 1, I have introduced the work, the research problem and related research questions, as well as the concepts that I have considered most important in making sense of the following texts. Chapter 2 briefly summarizes the articles that form a substantial part of this thesis. Chapter 3 is dedicated to methodology. Chapters 4 and 5 construct the overall narrative of this thesis with reference to earlier scholarly literature on the topics of 'water governance' and 'technologies and innovations'. Chapter 6 integrates the theoretical discussions this thesis engages with: Michel Foucault's governmentality approach and Laclau and Mouffe's discourse theoretical conceptualizations. In all chapters, linkages are simultaneously built to the articles of this thesis in order to tie together the articles and literatures. In Chapter 7, the contribution of this thesis is presented in relation to the literatures this thesis builds upon. The limitations and future research directions are finally discussed.

2 PRESENTATION OF THE ARTICLES

2.1 Article 1: Co-production of frugal innovation: Case of low cost reverse osmosis water filters in India

This article illustrates how practices of public water supply and the use of household water filter technologies unfold between water filter entrepreneurs, government officials and end users in the city of Ahmedabad. The paper focuses on the material practices of households in co-producing quantity and quality of drinking water, and how these practices further construct individualized processes of drinking water governance. At the centre of this co-production process is the household water filter; more specifically, a more affordable technology carrying the label of frugal innovation. The paper furthermore elaborates on the processes of co-creating frugal innovations and the ways in which perceived value is created between end users and water filter entrepreneurs designing the technologies. The paper posits that co-creation of frugal innovations is facilitated by individualized processes of co-producing drinking water. The focus on private, affordable technological solutions further constructs exclusion to those who cannot afford and gradually assimilates the environmental and social dimensions of drinking water into the economic focus.

2.2 Article 2: Co-producing drinking water in rural Ethiopia: governmentality in the name of community management

Article 2 of this thesis seeks to understand how different groups of actors interact while co-producing drinking water in the Amhara region of Ethiopia. The analysis zooms into governmental actors, communities' water, sanitation and hygiene committees (WASHCOs), end users, non-governmental organizations (NGOs), private sector suppliers, micro-finance institutions, and local artisans in a context where community management of rural water points is pursued as a policy and practice. Utilizing Foucault's governmentality approach, the study analyses what kinds of power relations are being (re)produced among co-producing actors through the discourse of community management. The attempts to render private sector actors and communities governable through 'conduct of conduct' (Foucault, 1975), and the processes of objectivation and subjectivation, depict a reproduction of power relations through development interventions. With a focus on governmentality, the paper makes power visible in the otherwise depoliticized literature of co-production.

2.3 Article 3: Frugal innovations hijacked: The co-optive power of co-creation discourse

Article 3 presents a discourse theoretical analysis on how frugal innovations have gained meaning as sustainable innovations. The paper traces the historical developments of various discourses on frugal innovations, drawing on the Base of the Pyramid, Approriate Technology and grassroots innovation discourses which join together through a 'chain of difference' – a concept used in Laclau and Mouffe's discourse theory. In the paper we illustrate how frugal innovation is shifting from business and community-driven

articulations towards a governance-driven approach, where the notion of co-creating frugal innovations between corporations and 'the poor' stands out as a powerfully positive discourse and practice. The paper raises questions on the co-creation discourse for potentially enabling corporate exploitation and novel ways to govern the poor and their creative sustainability value.

3 METHODOLOGY

3.1 The research process

The methodology of this thesis is best described as a process shaped by theoretical concepts, interactions within the empirical world, and reflexivity towards my research practices. As I started my PhD studies, I was very much embedded in a positivist, realist research methodology. Positioning myself in one of Burrel and Morgan's (1979) paradigms of social science, I would have described myself as a functionalist. Throughout the thesis process I have gradually moved towards what Burrel and Morgan would call the radical humanist: from an objectivist approach and the sociology of regulation towards the subjectivist approach and the sociology of radical change (see Burrell and Morgan, 1979). More specifically, and aligning myself with some of the more recent categorisations of research paradigms, I would currently place myself in the fluid and broad category of social constructionism. Yet again within social constructionism I have been most inspired by the strand labelled poststructuralism. I will return to these categories in the next section.

The changes in the methodological perspective occurred during a long and non-linear process. Due to my interest towards post-colonial studies – which emerged already before the start of the thesis work – it became clear to me quite soon, that I was no longer able to accomodate my research within positivist traditions. Although this thesis does not directly employ post-colonial theories, I want to acknowledge the transformational power provided by the literature. By engaging with post-colonial writings (e.g. Bhabha, 1994; Said, 1978; Spivak, 1983) I was able to seriously embrace the claim of research not being a neutral activity: it is "undertaken by one party in order to extract information from and construct knowledge in relation to another" (Westwood, 2004: 60). The ways in which knowledge and 'truth' are told about the 'other' influence how the reality is acted upon, thus legitimising action and inaction.

At the time of starting the thesis, I was employed as an international development consultant in Ethiopia, working on rural water governance at the Ministry of Water. While planning and doing the first interviews in April 2013 prior to the actual start of my PhD studies, my professional identity and my role as a development practitioner of public policy strongly influenced the ways I took upon the research. As a field of practice, international development is typically envisioned to produce authoritative knowledge – a 'true' interpretation of the problems affecting water governance in my case - and to develop solutions to better the world through this knowledge. Switching my professional identity from a development practitioner to a researcher has been a complex and partial process which affected the ways the empirical material was generated, analyzed and represented. More broadly speaking, a researcher is always part of the discourses that are formed historically, institutionally and ideologically – discourses that participate in knowledge-power nexus and that claim to speak definitively, authoritatively and exclusively. Acknowledging these discourses is important, since any claim to knowledge is always an exercise of power (Foucault, 1973; 1980). The quest for finding the 'best

solution', the 'definitive answer' to rural water governance through my research, however, soon became an impossible task to accomplish. Unresolvable complexities, incomplete knowledges and contradictory perspectives emerged from the empirical material, for which an objectivist methodology did not do justice. With the support of post-colonial philosophies and the practice of reflexivity - which I took up through writing field journals and a research diary from year 2014 onwards – my engagement with the empirical material was enriched with an increased sensitivity towards my own multiple positionalities, and a more informed understanding of how history and place are linked to knowledge production.

The repeated experiential instances of acknowledging my own positionalities and the ways through which I as a researcher reproduce discourses, led to a realization of my responsibility to (more or less) continuously reflect on the position from which I undertook research. In this thesis, this felt responsibility transpired in a practice of reflexivity, as mentioned earlier. I would describe reflexivity as a process of on-going internal dialogue that involves self-evaluation of the researcher's situated positionalities (e.g. Berger, 2015; Bradbury-Jones, 2007). Methodologically, reflexivity and introspection into the motives of the researcher's assumptions have important implications for the questions that result from these assumptions (Lynch, 2008). Whether acknowledged or not, the questions we ask and the methods we follow, all reflect the researchers' ideological presuppositions (Lynch, 2008). These presuppositions can stem from various positionalities, such as geopolitical (e.g. nationality, language, geographical place), social (e.g. class, racialisation, gender, age and their intersections) or research (e.g. doctoral student, employee, consultant) related positionings. The processes of emphasizing reflexivity and positionings of the researcher throughout the research process are typical of feminist researchers (Mason, 1996; May 1997, Maynard, 1994 in Fawcett and Hearn, 2004) – a label I would identify myself with at this point in time.

As I have now shed light on the changes in my understanding on knowledge as socially constructed, situated and influenced by my own positionalities, I will turn to another change that I consider an important part of the research process. Throughout the thesis process, the need to think of societies consisting of multiple, often conflicting realities became increasingly urgent. My initial willingness to find a consensual understanding of the phenomenon I was studying was gradually replaced with an acceptance and appreciation of fragmented, different perspectives out of which none was more 'true' than the other. Deetz (1996) has described this methodological categorization through the concepts of consensus and dissensus. What is meant with consensus is the belief in a hegemonic order as natural state, where harmony and trust are possible and desired. Such research would typically view science as neutral, and the researcher as an unidentified instrument describing reality through representations. Dissensus, on the contrary, is characterized with suspicious mindset, and focuses on conflicts over order as a natural state of things. A distrust towards order stems from an understanding where order is only possible through domination and suppressed conflicts. The researcher here is named and positioned and science is considered political. (Deetz, 1996)

3.2 The current methodological approach

Instead of describing all the different methodological positions the articles of this thesis have traversed, I will focus on the current research paradigm, which has also been most influential during the research process: social contructionism, and more specifically poststructuralism. All the articles of this thesis do have traces of a social constructionist approach, although Article 1 does not talk about discourses and meanings, but about social practices constructing reality. Articles 2 and 3 are in line with the current methodology of social constructionism.

Both social constructionism and poststructuralism are controversial markers, and in fact there are no unified versions of neither one of them, nor is there a consensus about the relationship between these two (Jørgensen and Phillips, 2002). What does it mean then to label oneself as a social constructionist? While there are several similarities between the various constructionist approaches, there are also distinguishing characteristics which differentiate poststructuralism from other approaches. Starting with the similarilities, Burr (1995:2-5) lists four grounding ideas common for social constructionist approaches, referring to Gergen's (1985) earlier work:

A critical approach to taken-for-granted knowledge: We should be critical towards the notion that our perceptions and knowledge of the world would lead to an objective truth. Rather our representations of reality are manifestations of our ways of labelling the world. (Burr 1995: 3; Gergen 1985: 266-7)

Historical and cultural specificity (Burr 1995: 3): The ways in which we understand the world are historically and culturally relative: our worldviews and identities depend on the particular social and economic arrangements we occupy, and they can change over time.

Link between knowledge and social processes: Our ways of perceiving and making sense of the world are formed and reproduced by social processes (Burr 1995: 4; Gergen 1985: 268). Knowledge forms in the processes of social interaction between people in which we create truths and enter into competitions about what is true or false (Jørgensen and Phillips, 2002).

Link between knowledge and social action: With a specific perspective of the world, some types of action become normal and accepted, while others become differentialized and excluded. Different perceptions of the world lead to differing social actions and practices, and therefore the ways in which knowledge is socially constructed leads to specific consequences (Burr 1995: 5, Gergen 1985: 268-269). Our constructions of the world are moreover filled with power relationships that have consequences for what is allowed for different people to do, and for how people may treat others.

What then distinguishes poststructuralism from other social constructionist approaches? Questions pertaining to the understanding of discourse, and the relationship between discourse and reality create some of the most notifiable differences

between poststructuralist and other social constructionist approaches. In the poststructuralist approach, "discourse contstructs the social world in meaning" (Jørgensen and Phillips, 2002; p.6). Not only speech or text are 'discursive', but also social practices can be discursive (Hall, 2001). Social actions are actual, individual and contextual, but they are also institutionalised and influenced by broader discourses. Because of this duality, social actions tend towards patterns of regularity, a social practice. (Jørgensen and Phillips, 2002) In a poststructuralist approach, neither the material nor the discursive becomes privileged: they fold into one another, get tangled up in one another, since the material object can only gain meaning through discourse. (Denzin and Giardina, 2015; pp: 199-200) In this ontology, physical materials and actions become real when a discourse attaches meaning to it and become objects of knowledge – a material in itself cannot generate meaning (Burr, 1995). In relation to the materiality of water, this means that governance discourses are not separate from water, or imposed on water; they exist *because* of water as bio-physical material and *through* engagements with water. The material properties of water are productive of social relations, but only through meanings gained through discourses. Laclau and Mouffe (1985) have suggested that the disctinction between discursive and non-discursive is in fact unnecessary, since all social complexes such as organizations or governance techniques are given meaning through discursive structures. This statement represents my current understanding of discourses, where discourses are fully constitutive of the social.

With language, we formulate representations of reality that can be never simply neutral reflections of reality, but actively construct reality (Jørgensen and Phillips, 2002). Due to the instability of language, it becomes impossible to permanently fix the meanings of language. The various discourses do not exist independently, but they form an assemblage of competing and interacting discourses that give meaning to a certain phenomenon (Weedon, 1987). In this assemblage, they get constantly transformed through contact with other discourses. For example, the depleting ground water level in several parts of the world is a material condition. As we assign meaning to the bio-physical, material phenomenon, it becomes part of a discourse and affects social relations. Many people would place it in the meaning category of excessive use of natural resources. Others would draw on a liberalist discourse and see it as a result of government failure to regulate the usage of water through laws and norms. Some would see it as a result of rural communities wasting water and not having the proper technologies to make the best use of water for agricultural productivity. Some would draw on religious discourses on the disappearance of holy water. Diverse discourses dominate depending on the geographical, historical and political contexts. Contingent on the contextual setting, different discourses also direct towards different paths of legitimate action.

The above examples on ground water level demonstrate how social phenomena comprise of competing discourses, all of them giving different meaning to the phenomenon, but also interconnected to each other. Discourses can be thought of being involved in a continuous discursive struggle with one another, trying to determine the meanings of

language in the way they would dictate. Hegemony, thus, can be desribed as a temporary dominance of one specific perspective. (Jørgensen and Phillips, 2002) This dominance is a character of discourses having power effects, leading to particular practices to become envisioned as self-evident, normalized and legitimate. Power is therefore inbuilt in knowledge construction, resulting in a version of truth at a given time and geographical location.

3.3 The changing understandings of discourse in the thesis

The methodological journey of this thesis is reflected in the research questions the three articles of this thesis posit, as well as in their articulations on discourses and social practices. The papers can be placed on a continuum where the understanding of discourse as well as the key concepts of this thesis have come under change. Co-production has changed from an empirical social practice (Article 1) to a discourse reproduced by governments, private sector actors, and end users (Article 2). Similarly, co-creation transformed from an empirical social practice (Article 1) to a powerful discursive concept (Article 3); frugal innovation from a material artefact (Article 1) to a discourse with various meanings (Article 3). Putting the articles on a timeline, Article 1 was written and finalized first. This article does not involve discourses in its methodology. Rather, concrete, material practices of co-production as a form of water governance and co-creating frugal innovations are described – with little reference to the role of language, meaning or social constructionism. The focus is on the 'what' and 'why' questions, i.e. what kind of material practices exist in relation to co-creating frugal innovations and co-producing drinking water, and why frugal innovations emerge in the studied context. Physical objects and social practices are viewed as real and truthful, without questioning the knowledge regimes that produce them as 'true'. Despite asking critical questions towards the end, Article 1 reproduces the status quo and does little to interrogate the taken-for-granted knowledge on frugal innovations, co-production and co-creation. A focus on power and social change as reflected in the two other articles are also not present in Article 1.

After finalizing Article 1, the ontological and epistemological assumptions of social constructionism became more persistent in my thinking, and thus more visible in my writing. The commonly shared interest among researchers to change the world for the better motivated me also to *re*-search the meanings within the empirical material. This process was inspired by the need to demonstrate the negative consequences of particular fixations of meanings (Jørgensen and Phillips, 2002); in this case the discourses resulting in inequalities within drinking water governance[2]. Moreover, the struggles between the various knowledge claims in the empirical materials called for methodologies that would allow for studying them as struggles between discourses. At this point the social constructionist premise of the unattainability of truth convinced me

[2] The focus on inequalities and uneven power relations characterizes critical discourse-analytical approaches. The aim of these approaches is to analyse power relations in societies in order to formulate normative perspectives from which such relations can be critiqued and possibly opened for change (Jørgensen and Phillips, 2002).

that it is useless to ask whether some thing is true or false. The attention ought to be on *how* effects of truth are created and maintained in discourses (Jørgensen and Phillips, 2002).

The objective for unmasking the taken-for-granted knowledges with discourse-analytical tools was to open up and destabilise the prevailing meanings of community management (Article 2) and co-creation of frugal innovations (Article 3) in order to transform them collectively into "potential objects for discussion and criticism" (Jørgensen and Phillips, 2002: 178). In order to destabilise the meanings of community management and co-creation of frugal innovations, I searched – with the support of the work of several scholars, colleagues and reviewers – for new conceptual frameworks and theories to make sense of the phenomena. This search ended in applying Foucault's governmentality approach in Article 2, and Laclau and Mouffe's discourse theory in Article 3 (more about these theoretical approaches in Chapter 4).

What is then the methodological difference between Foucault's and Laclau and Mouffe's approaches, and why was the move to Laclau and Mouffe's discourse theory necessary in Article 3? Both of these theorizations can be considered as social constructionist, critical discourse analytical approaches (Jørgensen and Phillips, 2002). The reason for moving from Foucault's governmentality to Laclau and Mouffe's discourse theory is twofold: Firstly, I wanted to move to a more abstractionist stance on discourses, where the subject is even more decentered than in Foucault's conceptualizations. I had become interested in how broad, abstract discourses limit our possibilities for action (although the premise that discourses are changed and maintained in everyday micro-level practices is also contained in Laclau and Mouffe's discourse theory). This abstracting was enabled through a historical study of the various discourses on sustainable innovations as presented in Article 3. Secondly, Laclau and Mouffe's discourse theory differs from Foucault's monolithic view to identify one single knowledge regime – in this case (neoliberal) governmentality – that dominates (Jørgensen and Phillips, 2002). Such a view needed to be replaced with a more plural framework in which various discourses exist side by side or struggle for the right to define truth (Jørgensen and Phillips, 2002). Moreover, the argument on a dominant ideology underestimates people's agency in creatively resisting ideologies and limiting possibilities for change (Jørgensen and Phillips, 2002).

3.4 Engaging with research ethics: positionalities and power of the researcher

Similar to methodologies, researchers' ethical ideals may change considerably over time. One way for this to happen is through the researcher acknowledging her/his worldviews and assumptions, and becoming inclusive to new discourses and ideas surfacing during interaction with research participants (Lynch, 2008). My own understanding on research ethics has became more nuanced and plural also through encounters with other researchers and practitioners drawing on different research paradigms and meanings towards the topic. These types of differences generated serious questioning towards my own ethical principles and the assumptions behind them. For example, I have gradually

moved from a rather structured interviewing style I deployed in my first interviews towards more open interviews that create space for conversations to be dialogical.

Research ethics is naturally present in any type of research in the form of prior consent and confidentiality. However, choosing to conduct research in India and Ethiopia did make me increasingly sensitive regarding power differences between the researcher and the researched. What does the concept of power have to do with research ethics? Acknowledging one's personal power and the power of representing research results is important and it brings along certain responsibilities towards one's research subjects. It can be argued that there is always a power relation between the researcher and the researched – in the form of the subject and object positions. Most researchers also have power over choosing whom they want to interview, what they want to ask, and when and how they want to ask the questions (Louvrier, 2013). Power is discernible in three interrelated dimensions: (1) power differences stemming from different positionalities of the researcher and the researched (class, racialized identity, nationality, life chances, urban/rural backgrounds); (2) power exerted during the research process, such as defining the research relationship, unequal exchange, and exploitation; and (3) power exerted during the post empirical work period – writing and representing. (Wolf, 1996, p.2) It is important that the contradictory issues related to power and social distance of subjectivities are considered and documented, even if it was for their political importance (Walkerdine et al., 2002).

Adding to the powerful positionalities granted through class, language and ethinicity, the surveillant and authoritative position of researchers in general keeps making many researchers uncomfortable with power very anxious (Walkerdine et al., 2002). Power is, however, by no means only granted to the researcher. The research subjects also have various powerful positionalities that may unfold during interview situations. For example, during two separate discussions with water filter entrepreneurs in Ahmedabad I was questioned for the intentions of my research. In these situations I needed to convince the interviewee of my genuine interest not to copy their business ideas. I suspect that my organizational affiliation with a business school caused distrust between myself and the interviewees.

When conducting research into areas of "otherness" without the researcher having personal experience on the particular structural and social oppressions, persisting attention should be paid to historical and geographical context and to a critical relation towards the research topic (Fawcett and Hearn, 2004). As discussed by Fawcett and Hearn (2004), maintaining a focus on self-reflexivity, and "the continual interrogation of the social bases of knowledge, together with a detailed understanding of political agendas, are also important" (Fawcett and Hearn, 2004: 201). Concerns have been raised whether an 'outsider' researcher can ever truly understand the research phenomenon even if reflexivity is used throughout the research process (Pillow, 2003). Studying the unfamiliar, from which the researcher does not have direct experience on, has also been viewed as offering many advantages – as long as the researcher does not try to speak on behalf of the group she has studied. The researcher being new to the situation and the

interviewee holding the expert position has been claimed of creating potentially empowering experience for the respondent (Berger and Malkinson, 2000). An 'outsider' researcher may approach the phenomenon from new and different viewpoints leading to fresh directions (Berger, 2015). In this research I have been influenced by the work on scholars such as Pease (2010) on the plurality of positionalities, or standpoints, by contemplating how the labels of 'outsider', 'insider', 'priviledge' or 'otherness' are far from straightforward. During the research process, I have come to align my thinking with several feminist researchers on the notion that researcher and researched cannot be rationally, objectively separated (e.g. Mason, 1996). Rather, currently I would see myself as a research participant instead of an expert in the research process.

As a practical outcome of reflection on research ethics, my understanding on informed consent and consent forms has gone through a transformation. Utilizing informed consent forms may be the procedurally correct way of integrating research ethics into the research design. In this thesis, consent forms were utilized in the interviews, questionnaires and focus group discussions conducted in Ahmedabad, India. When searching for research participants, the research assistant Devina Sarwatay would first explain the topic and ask for an appointment. Some water filter retailers would cancel the appointment or reject the request. During the interview, I let the interviewees know that the interview can be stopped any time, taking care of not taking too much of their time. During the first data collection in Ethiopia, I had not yet commenced my doctoral studies, and was unfortunately ignorant of the practice of consent forms. During the second time of interviewing in Ethiopia, I was strongly advised by my translator not to utilize signed consent forms – a guidance which I followed and later on regretted. I was explained about the unfamiliarity of such a practice for rural farmers, and that this would make them very suspicious towards the interview situation. In the context of rural Ethiopia, signing documents is a practice strongly related to the governmental procedures and authorities, and for this reason was not recommended for me to use. Several studies have reported problems arising from informed consent forms (see e.g. Corrigan, 2003). The critique is often focused on the use of language and the process of communicating ethical information about the research and its outcomes (Tesch, 1990) tending to leave many researchers and research subjects puzzled. In some qualitative research traditions, consent has been framed as a continuous negotiation and renegotiation of trust (Field and Morse, 1992; Kvale, 1996; Munhall, 1988). While I would currently think of informed consent as a continuous negotiation, I also think that an official consent form is a good practice to follow during interviews, as it also generates a mechanism of accountability towards the researcher.

Another change pertaining to research ethics was my willingness to share the research findings with the participants. In the context of Ethiopia, the logistical challenges of meeting my research participants again proved to be out of my economic and temporal resources at that time. I wrote a summary report on the findings and shared it with the project working on community managed rural water governance. In Ahmedabad, a summary report on the findings was translated into Gujarati and given to the respondents in person (in most cases I was present in the meeting, but due to falling ill

some were visited by the research assistants Ashish Ranjan and Devina Sarwatay). Moreover, the interview transcripts in Gujarati, as well as the project report were shared and briefly discussed with the research participants. I also shared the published article with the water filter entrepreneurs and showed the quotes that had been anonymized and utilized in the paper. However, the process of sharing was a rather one-way procedure, with limited room created for in-depth discussions.

Power within empirical work is an abstract, complex concept that can be conceptualized and understood at various levels, depending on the research methodology. The realizations on my positionality based on economic priviledge, language (especially English in the context of India), racialized identity, gender and organisational position have been largely informed by post-colonial and feminist readings. The above described changes in research ethical practices can be conceptualized through post-colonial critique on white, Nordic researchers conducting empirical studies in the global South. Although Finland has never possessed overseas colonies, the country has benefited from the global colonial order. There is a continuum of (post)colonial relations (e.g. Ahmed, 2000) in the Nordic countries (Vuorela, 2009), and my own subjectivity as a researcher shapes and is shaped by these racialized relations. Within the continuums of colonial relations, I refer to the processes of categorizing and differentiating people according to the colonial logics that permeate Europeanness and non-Europeanness (e.g. Hesse, 2007; Seikkula, 2020). As my own epistemological perspective was changing, I was no longer able to view the accounts of my 'non-European' research participants as signs of ignorance or passivity (e.g. Hobart, 1993) or victimhood (e.g. Kapur, 2002) – typical discoursive constructions of white researchers concerning post-colonial, racialized subjectivities (which I am reproducing through this sentence). As I became more aware of the discourses I was projecting on my research participants, I started to take each account seriously. The first step in this process was to slow down my own interpretations, questioning each interpretation and finding alternative understandings without making quick abstractions of the empirical material. This was followed by a critical questioning of some of my research practices, towards which I was blind at the time of generating empirical material: the easy access to conduct interviews with research participants (even without a prior notice in the case of Ethiopia), the limited possibilities granted for my research participants in influencing research questions, and the lack of access to the results of my research. From a post-colonial perspective, these are instances of reproducing a racialization of thought - a product of the hierarchization of epistemological systems (Hesse, 2007). The process of becoming (partially) sensitive to the various knowledge claims put forward by research participants as representations of discursive, racialized struggles was an important realization. Without the analytical frames provided by post-colonial theory through which I started to question the tendencies to hold knowledge claims of racialized people inferior, those knowledges would look different in this thesis.

3.5 Researching drinking water governance: methods and empirical material

This section describes the research processes in the empirical contexts and outlines the methods that were used for the empirical work; justifying why those methods were chosen, specifying what empirical material was generated by the chosen methods and how that material was assembled to address the research questions. Qualitative interview as the main method for this thesis was chosen because interviews enable an opportunity to generate detailed and nuanced rapports. Interviews typically generate a more open space of trust, therefore allowing for expressions of non-conformity (Webb, 1995). Focus group discussions (FGDs), on the other hand, were chosen in order to accentuate differences between the participants and to contribute to an understanding of a wider range of practices (Morgan, 1998). While the detailed tables of interviews and FGDs are included as Annex 1.A, and Annexes 2.A and 2.B in this thesis, a summary of the research methods is provided below.

Empirical context and year	Type of empirical material	Number of empirical material	Connection to research question
India, 2014	Semi-structured interviews	10	Research questions 1, 2 and 3
India, 2014	Focus group discussions	2	Research questions 1, 2 and 3
India, 2014	Household survey	100	Research question 1
Ethiopia, 2013 and 2016	Semi-structured interviews	56	Research questions 1 and 2
Ethiopia, 2016	Policy documents	6	Research question 1
Ethiopia, 2013	Photographs of water points	84	Background material
Ethiopia, 2013	Field notes	35 (pages)	Background material

Table 1 Summary of research methods

The aim of the interviews, FGDs and household surveys in the context of India was to understand how governmental actors, private water filter entrepreneurs, as well as end users are socially constructing practices of drinking water governance; contributing to research question 1 of this thesis. Interviews with water filter entrepreneurs and FGDs with end users moreover generated understanding on the influence of co-creation as a governance discourse. The meanings attached to the co-creation of water filters as an example of frugal innovation thus contributed to research question 2 and 3 of this thesis. The aim of the interviews in the context of Ethiopia, similarly, was to understand how governmental actors, private spare part suppliers and artisans, as well as community members and WASCHOs are socially constructing practices of drinking water governance, thus contributing to research question 1 of this thesis. More specifically, as

described in Article 2, the aim was to understand what kinds of power relations are being (re)produced among co-producing actors through the discourse of community management. In this process, new meaning systems were constructed in relation to hand-pump technologies – thus contributing to research question 2 of this thesis.

3.5.1 Researching frugal innovations and drinking water governance in urban India: methods and description of the research process

Drinking water governance in the city of Ahmedabad was the other empirical context of this thesis (chronologically speaking the second empirical context after Amhara region). Soon after starting my PhD studies, I was asked to join a project led by Comprehensive Initiative on Technology Evaluation (CITE) at Massachusetts Institute of Technology. The project was undertaken in collaboration with Indian Institute of Management, Ahmedabad (IIM) and financed by the United States Agency for International Development (USAID). The aim of CITE's large-scale field research was to evaluate household water filters and their sustainability implications in the city of Ahmedabad. Personal justification for taking part in the project was largely based on a continuing interest in the use and practices surrounding drinking water technologies. Furthermore, Ahmedabad is a city where approximately 88% of people treat their drinking water 'by any method' before drinking (MSPI, 2012), making it an interesting context for studying the processes of co-producing drinking water. In addition, the commercial market for water filters is high within the city, making it the second largest hub in India for importers of water filter technologies (Article 1).

I first joined the supply chain team of the project, conducting open ended surveys with water filters retailers in Ahmedabad for two weeks in June, 2014. I then continued with household surveys in the sustainability team of the project for the next three weeks. For this thesis, the results from the 100 household surveys of the sustainability part are included in Article 1 as background information, and this empirical material is not given a lot of emphasis in the analysis. This is because the survey did not answer the research questions set out for this thesis and for Article 1. Instead, the focus of Article 1 is on the semi-structured interviews with water filter entrepreneurs, government representatives and FGDs with end users (see Annex 1.A for the list of respondents), which were conducted independently in July, 2014 after my participation in the CITE research project.

After the first period I spent at the Indian Institute of Management from June to July 2014, I returned in January 2015 to join CITE's evaluation project on water quality test kits. I later spent two longer research visits at IIM, 5 months in 2016 and 4 months in 2018. The participation in CITE's research projects and the time spent in Ahmedabad during research visits – altogether 12 months - allowed me to gain a more nuanced understanding of the social and historical context of water governance in Ahmedabad. Although the household survey as an empirical material did not receive much attention in my thesis work, it was beneficial in terms of sensitizing me to issues pertaining research ethics and challenges of quantitative, positivist survey research. Moreover, the

media articles I was investigating during that time as well as the findings of the CITE project provided useful background material on water governance, water filters and water quality in the city of Ahmedabad.

As I conducted interviews for Article 1 during the first year of my PhD studies, my approach to research was only leaning towards social constructionism. Rather, I still relied on relatively structured interviews that focused on realist questions on how social practices take place instead of focusing on meaning construction. The empirical material consists of ten semi-structured interviews and two focus group discussions (FGDs) with end users, as outlined in Annex 1.A. I conducted semi-structured interviews with five water filter entrepreneurs, one water filter distributor, one representative of water filtration business association, three representatives of the Ahmedabad Municipal Corporation and a quasi-governmental organization. The interview guides were developed around water filter entrepreneurs' business models and customer relationships, end users' perceived water quality and health risks, and public water supply in Ahmedabad city (see Annex 4). Many of the water filter entrepreneurs were identified through the survey of the CITE project. Participants for FGDs consisted of women responsible for household water, and they were selected by the research assistant through her contacts from relatively similar socio-economic backgrounds.

3.5.2 Researching community management and drinking water governance in rural Ethiopia: methods and description of the research process

At the time of starting my research on rural drinking water governance in Ethiopia (Article 2) I had been working in a bi-lateral development project "Community-led accelerated water, sanitation and hygiene in Ethiopia (COWASH)" almost for two years. Adding to the personal circumstances, the choice of Ethiopia as a context for conducting research on water governance can be attributed to several reasons. Ethiopia has an abundance of water, but experiences an inequitable and uneven geographical distribution of water (FDRE MoWR, 2002). Adding to this paradoxical situation, the rainfalls have been increasingly unpredictable in the last decade, leading to an increased water stress in several locations. On a global scale, the country remains among those with the least access to safe drinking water for the population (JMP, 2017). Moreover, Ethiopia has a history of significant political changes that continue to shape water governance processes in the country.

For generating the empirical material, I had chosen the northern region of Amhara as a geographical focus. This was due to the long-term presence of the Community Managed Project (CMP) approach to rural drinking water governance in that region – the approach I wanted to include in my study due to the practice of including communities in drinking water co-production. In some qualitative research traditions, the selection of Amhara region would represent a theoretical sampling strategy (Glaser, 1978) so that each interview with *woreda* and WASHCO represenatives, private suppliers and artisans illuminated the phenomenon of co-producing drinking water.

Prior to starting my research, I had been interested in the technocratic question on how to improve the long-term functionality of rural water points – or sustainability as I would have defined it back then. This interest was invoked by the relatively poor long-term functionality statistics of rural water points, and as I was strongly influenced by proponents of community management in the aid sector, I was looking for reasons to justify the positive sustainability effects of community involvement.

The first 52 interviews took place in the Amhara region, as well as in the city of Addis Abeba in April and May 2013, and later 4 interviews in the Amhara region in February 2016. With the help of the COWASH project providing an official government support letter in gaining access to the *woreda* (Amharic term for a governmental district) water offices (WWOs), and a field vehicle with professional drivers Alemayehu Tilahun and Gezahen Hailu employed by the project, I visited 9 different rural *woredas*. The interviews were organized together with a water sector consultant Yewondwossen Tesfaye, who acted as a translator when needed. We had altogether 56 interviews with individuals or groups of people: 27 community organizations, i.e. Water, Sanitation and Hygiene Committees (WASHCOs), 9 government officials from *woreda* Water Offices (WWOs), 10 spare part suppliers, 1 artisan association, 1 micro-finance representative and 5 NGO representatives. The rest of the interviews were conducted at the regional and federal levels (see Annex 2.A for the list of respondents). The interviews took place either in Amharic or English languages, supported by consecutive translation by the translator. I was able to follow many of the Amharic interviews due to language skills obtained during my work experience. The lack of fluency in common language, however, did make the interviews less personal and intimate, and the flow of discussion became fragmented.

As described earlier, my approach to interviewing was initially more positivistic and structured that what has become my current approach. The semi-structured interview guides which I used for the first 52 interviews in 2013 were designed around questions pertaining to community management, sustainability of water points, and maintenance of water points (see Appendices 5.1-5.4 for the interview guides). I had separate interview guides for the WASHCO members, WWOs, private suppliers, NGOs and regional and national government representatives, and I tried to keep the interviews as similar as possible for each organizational group of interviewees. I also took field notes and documented the appearance of water points by photographing them in order to gain contextual understanding on the research process. I used a stratified purposeful sampling strategy (Patton, 2002) in which geographical districts and the spread of different water governance approaches were represented. For the 4 interviews conducted in 2016 with WASHCO members, an open ended interview guide was used (see Annex 5.5). These interviews focused on participatory governance, and challenges experienced during the construction and continued use of water points. These interviews were more open and allowed for a more discussive approach. Adding to the interviews, I analyzed several policy documents (see Annex 2.B), guidelines and web sites on rural water governance in Ethiopia in order to gain understanding on the administrative and organizational water policy processes of Ethiopia.

Perceived a foreign, upper middle-class woman related to the COWASH project influenced my positionality and thus the interview situations in several ways. Moreover, the presence of the translator and often times the accompanying WWO technician did have consequences for how the interviews unfolded. Using translators as well as having other persons present in the interview situations influences the formation of a certain kind of connection between the persons (e.g. Edwards, 1998). In a positivist research, these kinds of "consequences" would be considered as hindrances to the objectivity of the research. For social constructionist researchers, such dynamics only add to the interesting complexities of the research. For WWO officials, I was often regarded as an evaluator, or a channel through which improvement ideas related to the project, or claims for better financial employment compensations could be addressed. This was due to my affiliation with the bi-lateral project that paid for the individual per-diems of WWO staff members, some part of their salaries, and provided vehicles and other material benefits to the water offices. However, due to my younger age, status as a student, gender and ability to have simplistic conversations in Amharic (which, based on my interpretation, were sometimes considered naïve expressions and clumsy language), frank discussions took place with many government officials – this clearly did not happen always, though. In the villages, I was generally welcomed with tense curiosity. These tensions were partially caused by the arrival to the villages by a federal car, and the companionship of *woreda* level water technicians. Despite these tensions, interestingly, several critical discussions took place with the WASHCO representatives. The interview situations became spaces where WASHCO members were able to express their independence with regard to the WWO, raise issues of government neglect, or negotiate for benefits. Interestingly though, the WASHCO members did not address their complaints on the COWASH project directly to me, but rather held the *woreda* officials accountable. Sometimes, however, the interviews became sites of WWO officials asserting their "expert knowledge" and explaining situations on behalf of the WASHCO members.

3.6 From empirical to conceptual

The growing uncomfortable relation to the empirical material in response to my changing methodological position urged me to opt for a conceptual article as a third paper for the thesis. The writing process of Article 3 started during the write-up of Article 1, while I was engaging with the literature on frugal innovations. The motivation for the paper arose from the overly positive portrayal of frugal innovations in academic and practitioner discourses, and perceived lack of more diverse perspectives on the topic. Laclau and Mouffe's discourse theoretical approach became a suitable lens through which the abstract critique towards co-creating frugal innovations as a hegemonic project could be analyzed. Article 3 provides thus became a conceptual critique on the hegemonic character of the co-creation discourse.

3.7 Analysis of empirical materials

For Article 1, the analysis process focused on social practices. The transcription of the interviews in Gujarati took place twice. During the first time, my co-author professor Ankur Sarin organized a research intern employed at the Public Systems Group of IIM to first transcribe the interviews in Gujarati. I then searched for a translation agency to translate the transcripts into English. The quality of the Gujarati transcripts did not comply with my expectations, and thus I searched for a translation agency to redo the work. This time the quality was better, although still utterances and verbal repetitions were not included in the transcripts. The English transcripts were inductively coded to categorize sections of the text into broad themes (Spiggle, 1994) that were derived from interview transcripts and several indepth discussions among the research team. The six broad themes, under which the practices were coded, comprised of "social innovation" (process and outcomes focused on meeting unmet societal benefits); "technological innovation"; "business model"; "public considerations"; "ecological costs" and "perceived health risks". These themes were then conceptualized further drawing on the literature on frugal innovation, institutional co-production and the marketing literature on co-production.

For Article 2, the interviews were first transcribed and translated, then together with the policy documents analyzed through thematic analysis (Eskola and Suoranta, 1998) on practices of co-production. The method of analysis can be called a theory-driven content analysis (Tuomi and Sarajärvi, 2009), where the interpretation of the empirical material takes place in interaction of theoretical reading, practical experience and the empirical material. For the interviews conducted in 2013, I started the analysis by labelling the text and talk with the help of themes: "practice"; "resistance"; "power"; "rationality" and "broader discourse". I then shifted the focus to manifestations of power, governance and co-production. For this purpose, the themes for the second round of analysis, as well as the interviews conducted in 2016, became "discursive power"; "material power"; "resistance" and "link to co-production". The policy documents were read and re-read in detail, but no systematic analysis was used for those texts; rather, they have a complementary role in relation to interviews. Finally, the analytical framework of governmentality was utilized to capture the discursively informed practices of co-production in the empirical material.

For Article 3, the conceptual analysis is based on Laclau and Mouffe's 'chains of difference', 'empty signifier' and 'floating signifier' which are introduced in detail in Article 3, as well as in Chapter 4. The analysis, drawing on Laclau and Mouffe's discourse theory, is what Jørgensen and Phillips (2002) have called as one of the purest forms of poststructuralism. As an analyst of frugal innovation discourses, I first worked mainly with written texts, identifying patterns in and across the scholarly articles (Jørgensen and Phillips, 2002) and exploring streams of literatures that connected the different articulations on frugal innovations. These different literatures and articulations on frugal innovations were categorized into three broad themes (frugal innovations "for", "by" and "with" 'the poor') which were then traced to their historical emergence. The historical

study of discourses allows for the establishment of distance to texts and empirical phenomena through a strategy of moving away from the centre through time. Such a strategy is common in studies employing an abstractionist view on discourses (Jørgensen and Phillips, 2002). In this process of studying the historical development of the concept, together with my co-author Martin Fougère, we expanded our reading to include sustainable innovation as a broader field of discursivity for frugal innovations. During the more in-depth study of the categories, the "for" became associated with business-driven articulations of sustainable innovations, the "by" chiefly related to community-driven grassroots innovation articulations, and the latest "with" was something that we termed governance-driven articulations. We focused on some key texts which we found to represent each of the three discourses. While reading the texts for the third, governance-driven discourse, it became clear that an important signifier was the notion of co-creation. We found that this signifier seems to tie together the categories of "for" and "by", thus creating a powerful empty signifier which is difficult to criticize or circumvent. In the second and third stages of our methodology, we worked more explicitly with Laclau and Mouffe's (1985) discourse theoretical concepts such as the logics of equivalence and difference (second stage) and empty and other ambiguous signifiers (third stage) in order to analyze the dynamics in the developments of the different discourses. Finally, we critically reflected on the power effects of the contemporary hegemonic discourse. The process is described in more detail in Article 3, and it can be characterized as a rather unstructured in comparison to a fixed method with clear steps to follow. This is typical of poststructuralist analyses focusing on conceptual phenomena (Denzin and Giardina, 2015). Due to the abstract distancing adopted in the article, the role of the analyst as researcher-subject is largely ignored.

4 WATER GOVERNANCE AS POLICY AND PRACTICE

Water governance and drinking water governance have been studied across multiple disciplinary boundaries. In this thesis, I draw from literatures on public policy, environmental geography and development studies to inform an interdisciplinary understanding on the complexities of water governance as policy and practice.

The concept of governance emerged in the 1990s. It has been regarded as a way in which societies organize their matters through a range of relationships between the different actors – including government, the public and private sectors, NGOs and community groups, and citizens (Franks and Cleaver, 2007: 303). As a conceptual lens, governance allows for a way of abstracting this constellation of relationships, enabling us to construct knowledge on how such actors interact and organize functions within a society. These relationships have emerged in particular historical and geographical contexts and continuously evolve through changing discourses and social practices at various levels. Since its broadened use, governance has acquired an increasingly central role in discussions around the government, society and development. As discussed later in this chapter, the emergence of governance as a form of doing politics has been attributed to the changing role of the state in decision-making and policy processes. In many contexts, citizens look to a network of actors for the services that may have been previously provided by the state. In the context of water, a discursive shift from water management to water governance in the last decade indicates the inclusion of wider range of actors (Conca, 2006): highly diverse providers cater for hybrid water service modalities, contributing to fragmented and contested water provisioning (Ahlers et al., 2014). This does not mean that national water supply policies do not have a legitimate space: public policies continue to shape and be shaped by a wide array of actors in governing access to water.

Water governance as a concept intrinsically places water as an object of study, and an object of governing. Water typically appears in statistical surveys and reports as a target of technical practice and measurement. Scholars of geography and beyond have critiqued this perseverance of water to have "been approached from a predominantly engineering, economic, or managerial" (Swyngedouw, 2004: 8) perspective. Rather, water should be viewed as being both produced by and productive of political and social relations – not only a "backdrop to politics" (Bakker, 2012: 617). In other words, water is not external to politics and social relations but rather internalizes and expresses them (e.g. Bear and Bull, 2011; Budds and Hinojosa, 2012; Loftus, 2009).

Studies on water governance predominantly focus on society's relationship with water, and the social processes *around* water. Starting from the 1990s, increasing recognition has been placed also on the social nature of water itself, and the agency of water in shaping and being shaped by social relations, societal structures and subjectivities (Linton and Budds, 2014: see e.g Swyngedouw 2004, 2007; Bakker 2012; Kaika 2004, 2005). Politics are embedded in, and mobilised *through* the production of water. Within these processes, water can have multiple ontologies and epistemologies (Barnes and

Alatout, 2012). Not only does water itself flow and transform through multiple states of being, through multiple materialities, but also the knowledge about how to govern flows with water. In this thesis, water transforms through multiple materialities: spring water, Narmada water, municipal water, borewell water, filtered water, unfiltered water; all of which embed differing social relations and knowledges. As these knowledges and stated expertise flows, "it generates new sets of political relationships across time and space" (Barnes and Alatout, 2012: 486).

4.1 Geographies and statistics of unequal access to drinking water

Before moving on to the policy processes pertaining to water governance, a snapshot on common water discourses and global statistics on access to water are worth presenting. Although social and environmental challenges related to water have persisted for millennia (Langford, 2005), the recent six-fold increase in the utilization of water during the 20th century (UNFPA, 2003), the scale of pollution of rivers and lakes, salination of aquifers and depleting ground water levels have triggered intensified measures to legitimize various types of policies, discourses and social practices to address concerns related to water. Contemporary water issues are widely portrayed through dualistic lenses; whether in terms of comparing the inequalities pertaining to access to clean water experienced by the poor as compared to the rich; the workings and efficiency of the public versus the private sector in water provision; or water as a human right versus water as a commodity (Agnew, 2011; Bakker, 2007). Portraying water issues in such dualist oppositions is simplifying, and most practices of water governance exist along a continuum between these opposing framings.

The latest global Joint Monitoring Program for Water Supply, Sanitation and Hygiene report estimated that 844 million individuals fall into a category of people not having access to basic drinking water service[3] (WHO/UNICEF JMP, 2017). While this figure has shown a slight positive development on a global scale over the last two decades, regional inequalities have increased. As an example, there has been an increase of 65 million in the absolute number of people without access to safe water across Africa between 1990 and 2010 (AMCOW and WHO/UNICEF JMP, 2012), and the basic coverage of access to water has been decreasing in 10 countries over the period of 2000-2015 (WHO/UNICEF JMP, 2017). Although the Millennium Development Goal regarding access to water was met successfully in 2015, global inequalities do persist. Worryingly enough, it has been estimated that without significant changes in the current water governance processes, the number of people residing in water-stressed or water-scarce regions by 2025 would reach an amount of three billion people (Hanjra and Qureshi, 2010).

Although access to water supply in terms of ensuring quantity of water has traditionally outweighed interventions on water quality in policy processes, this does not mean that

[3] In the JMP report, "basic drinking water service" is defined as either using improved water sources for which collection time does not exceed 30 minutes, or unprotected wells and springs (unimproved sources), or taking water directly from surface water sources.

people would not take actions to improve the quality of their drinking water. The treatment of water at the household level is becoming a significant practice to combat some of the effects of poor water quality (Vandewalle and Jepson, 2015). The amount of people practicing some form of household water treatment has been estimated at over 1.5 billion (Rosa and Clasen 2010). Household water filtrations systems of numerous sort and boiling of water are some of the most used mechanisms to treat water for drinking and cooking purposes.

4.2 Water policy processes

Water governance and water policy processes around the world have undergone large changes over the last decades. In the 1970s, at the time when international development community started to pay attention to clean water as a basic need that should be equally available to people beyond the wealthy, a coordinated effort for improved water supplies and sanitation in the global South was launched in 1977 World Water Conference (Black, 1998). The urban and rural poor were constructed as entitled for infrastructural improvements to cater for their basic need of clean drinking water (Bell and Franceys, 1995). From a bio-political perspective, the health benefits of clean drinking water, namely reducing incidents of infant and child diarrhoea, became incontestable and therefore justified investments into health sector. The International Drinking Water Supply and Sanitation Decade followed in the 1980s, carrying the slogan 'Water and Sanitation for All'. The aim of the decade was to raise awareness of water-related inequalities, to question the high-tech image of water governance, and to mobilize the international development community to achieve the goal of universal access to water by 1990 (Nicol et al., 2012).

The objective of the decade proved to be unattainable, and during the 1992 World Summit in Rio de Janeiro in the Dublin Statement, it had become increasingly legitimate to solve the problem through attaching economic meaning to water. According to the statement's principles, "water has an economic value in all its competing uses and should be recognized as an economic good" (The Dublin Statement, 1992). The follow-up clarification of the principle formulated access to clean water and sanitation as a basic right – instead of basic need - of all human beings at an affordable price (The Dublin Statement, 1992). The statement was contested by various NGOs and human rights organizations, who demanded water to be defined as a universal right in opposition to a commodity status (for an overview, see e.g. Sultana and Loftus, 2012). The 'commodity' approach was approved by many multilateral organisations, such as the World Bank, the International Monetary Fund and several donor agencies, who supported the idea that water should be affordably priced and the costs of providing water should be recovered by end users (Langford, 2005). Adding to the international development community, water governance policies in many parts of the world shifted towards the opening up of the market and promoting the involvement of the private sector (Langford, 2005).

Due to the increasing pressures of dissenting voices and failed attempts of privatizing public water governance, an amendment to the Dublin Statement was realised in 2010, and water became defined as a human right by international law (Neville, 2017). Access

to drinking water was now accepted as "a legal entitlement, rather than a commodity or service provided on a charitable basis" (WHO, 2003; 9). States that were able to provide access to safe water to their citizens were constructed as aligning with the principles of 'good governance'; achieving approval within the international development circles in reaching development goals (Sultana, 2013). In theory, every state has the duty to protect the right to water for individuals, although in reality the promise has not been translated into meaningful change (Gerlak and Wilder, 2012). What is interesting in the 'human right to water' discourse is that it does not exclude meanings of 'affordable water', and this in turn enables commodification of water to take place. In the Sustainable Development Goals (SDGs), SDG 6 similarly strives to achieve universal access to 'affordable' and safe drinking water for all.

4.2.1 The changing role of the state in policy processes

Intertwined with complex globalization processes, the traditional role of the state has arguably come under change in policy making processes (Giddens, 1990; Held, 1995; Rosenau, 1997). This change has been framed through different discursive explanations, such as the state's legitimacy crisis (Habermas, 1980), the loss of regulatory capacity (De Sousa Santos, 2013), the neoliberal roll-*back* of the state's functions (e.g. Kelsey, 1993) or controversially the neoliberal roll-*forward* of the state (e.g. Foster et al., 2014). The legitimacy of the state in relation to the interests of citizens has been accompanied by other actors emerging in the arena of public governance: the focus has diluted away from political decision-makers to a much wider assemblage of actors who engage in different ways with the processes of water governance, for example (Asthana, 2009). Due to this "multiplication of all kinds of governance" (Rosenau 2002: 230), several scholars have argued for the decreasing role of the state in policy making (e.g. Jessop, 1999; Strange, 1996). Other researchers, conversely, have pointed to the transformation of the state rather than its erosion: the state still holds a substantial degree of authority in public governance, although some aspects of economic governance are not within its sphere of control (e.g. Weiss, 1998). Depending on the geographical location and the type of public policy in question, certain aspects of government conduct have been diminishing, while new types of activities are being expanded (Peck and Tickell, 2002).

Moving away from the debates around the influence and legitimacy of the state, the globalization-induced adjustments in the operation mechanisms of the state have received a lot of scholarly attention. Research on neoliberal political economy posits that since the 1980s, pressures on financial globalization, deregulation and the extension of markets to previously governmental spheres of public sector operations have triggered large transformations on a global level (Harvey, 2010). Especially in the global South, structural adjustment programs, mostly channelled through the International Monetary Fund and World Bank have followed such neoliberal ideologies of the increased role of the market and the prioritization of private enterprise (Finger and Allouche, 2002). The ideology has further been argued to reproduce private sector methods and depoliticized ideals such as efficiency at the expense of equality (Hood, 1991; Pollitt, 1990, 1995).

4.2.2 Water policy processes in India

India has a long history of community-based water governance that dates back to the pre-colonial era. While lengthy discussions on the historical developments of neoliberalism and (post)-colonial relations in their various forms are out of the scope of this thesis, it is worth mentioning here that during the British rule, much of water as a resource was brought under the control of the state for the benefit of the colonial project (Asthana, 2009). The centralized approach has since taken new directions, and similar to the context of Ethiopia, recent water policy processes in India are closely interlinked with the broader political decentralization processes typical of the last few decades. Following the economic liberalization which began in 1991, the Indian government decreased its support to individual states as part of various social and economic decentralization programs. Water being under the control of the states, the state governments are primarily responsible for the governance of urban water. In practice, the several state departments and municipal corporations administer and manage water for the purposes of public use.

For water governance in India, the year 1991 can be viewed as a turning point from the post-independence administration during which provision of water was to a large extent planned and implemented by the public sector. Drawing on the contested message of the 1992 Dublin Conference which framed water as a scarce resource that should be used and managed efficiently by attaching an economic value to it, the Indian government's policy framework increasingly started to view water as an economic good. In 1996, the report of the Expert Group on Commercialization of Infrastructure Projects characterized the Indian water sector with negatively connoted management concepts such as low tariffs, high costs, low cost recovery, and poor demand management (EGCIP 1996). The report and its approach has been severely contested and critiqued by activist groups and NGOs in India, as it renders water through the technical discourse of management, where problems related to water can be more efficiently handled by the private sector actors rather than the state or community actors (Asthana, 2009).

Influenced by the World Bank and the EGCIP report, the contents of the National Water Policy were developed in 2002 with an intention of promoting private sector participation and incorporating higher user fees for water supply (Ranjan et al., 2017). Throughout the reform processes between 1991 and 2000, however, water became considered a politically sensitive subject and in the end reassured its position as a public good. Drinking water and household supply continued as a responsibility of the government in the National Water Policy in 2002, highly subsidized by the government agencies. What followed then could be described as a typical reform of neoliberal governance, where state governments of India experienced fiscal pressure by the central government to reduce their financial support of the provisioning of public services such as water. This led to insufficient investments in infrastructure maintenance and water supply in general. The latest Joint Monitoring Program for Water Supply and Sanitation indicates that in India, 75 million people are still excluded from access to improved sources of drinking water. Although in India, such statistical access figures have

generally shown positive outcomes for over the past 15 years, the encouraging direction is now showing signs of stagnation especially in urban areas. (WHO/UNICEF JMP, 2015) In the review of the water policy one decade later in 2012, the emphasis on private sector participation was dropped due to increasing resistance towards private ownership (Singh et al., 2013). Instead, public-private partnership models were encouraged, where the role of the state would change from a provider to a regulator of services and a facilitator for "good governance": monitoring and capacitating institutions in their mandates of planning, implementation and administration of water (Singh et al., 2013).

Even though in public discourses the Indian state is constructed as a responsible body that acknowledges drinking water as a human right, yet the practices I have documented in Article 1 portray another reality: government officials are embedded in processes which render drinking water towards a resource that may be managed through innovative technologies provided by non-state actors. Article 1 analyses social practices of households and water filter entrepreneurs in co-producing drinking water, and how these practices further construct individualized processes of governing quality of drinking water. Both in terms of water quantity and water quality, the findings of Article 1 illustrate how citizens in higher social classes manifest their agency for example by drilling unregulated private bore wells within their housing societies. At the household level, innovative measures are actively co-created jointly with local small-scale water filter entrepreneurs to shape the filter technology for the purposes of testing and modifying water quality based on meanings associated with good quality water. In the urban city of Ahmedabad, the infrastructural context and policy making have provided opportunities for the small-scale, quasi informal private sector to become an acknowledged means of water service provisioning.

4.2.3 Water policy processes in Ethiopia

Water governance in Ethiopia comprises of a variety of governmental, non-governmental, communal, international and private actors all with their specific mandates, interests and meaning systems. The Ethiopian water sector has gone through substantial changes in the last decades, with the "WaSH Implementation Framework" from 2011 and the multi-sectoral sector-wide approach "One WASH National Program" launched in 2013 being the latest government policies guiding the processes of water governance. These water and sanitation policies have characterized the sector as fragmented in terms of the various existing service delivery approaches, and as lacking harmonization across actors (FDRE, 2011; FDRE, 2013). The premise of fragmentation has been attributed to competing agendas and a disregard for government frameworks by several NGOs working in water governance (WaterAid, 2011), as well as the large-scale decentralization processes starting in 1995 as part of the new state constitution of Federal Democratic Republic of Ethiopia (Nevell, 2017).

To solidify the fragmented activities of NGOs in water governance, the WaSH Implementation Framework has mobilized an expectation of NGOs to be integrated into governmental water governance structures at all levels, as well as to harmonize their activities with government procedures (FDRE, 2011). The political tensions between

NGOs, donors and the government are complex and mostly fall outside the scope of this thesis. As a historical background, as Campbell (2001) has pointed out, there was a dramatic increase in NGO activity in Ethiopia after the collapse of the Marxist Derg regime in 1991 (Campbell, 2001). The interaction between the NGOs or between the NGOs and the government was observed rather minimal after the civil war and food shortages in the 1990s (Campbell, 2001). As the new government began to consolidate power, it increasingly started to criticize the work of NGOs, their development strategies, and the ways in which their activities were "perpetuating an unnatural dependency on relief assistance" (Clark, 2000: 6). But the presence of international donors and NGOs continued, and Ethiopia was among the top five countries receiving development aid almost every year between 2004 and 2013. In 2009 there were 3,500 domestic and international NGOs and Community-based Organisations (CBOs) in Ethiopia engaging in a range of sectors from water and food security to physical infrastructures and capacity building (Teshome-Bahiru, 2009). Legitimized by the anti-NGO political discourses, in 2009 and consequently in 2011, two bills were passed to limit the rights and capacities of NGOs in the country.

The decentralization of water sector governance is another phenomenon having an important role in the water policy processes in Ethiopia. In technocratic terms, one of the main objectives of decentralization was to improve water supply service delivery through institutional rearrangement and the transfer of planning, implementation and monitoring to the local level (Gebre-Egziabher and Berhanu, 2007). With "local level" the woredas, i.e. administrative geographical districts are referred to here. The approximately 800 woredas were established to manage many social, economic and political matters – such as water governance - without interference from central federal government. However, the woredas remained financially frail and lacked the necessary administrative and technical resources through which autonomous rule would have been possible (Ayenew, 2002). Ayenew (2002: 146) criticized the illusion of decentralized autonomy by concluding that "instructions [still] flow from top to bottom in an unbroken bureaucratic line from the regional government to the zones".

A lot has happened after 1991 in terms of water sector policies but also in terms of material access to water. In the beginning of 1990s, water supply coverage was reported at 14%. By 2011, coverage of rural water supply had increased to 49%. These seemingly encouraging statistics only represent the level of access in theory. Working as a water sector professional in the Ministry of Water at the time of publishing the National WaSH Inventory results in 2011, I witnessed several debates among various actors on the trustworthiness and accuracy of the results. Research conducted by Mebrahtu (2012); Mitiku (2013) and Mogesse et al. (2016) furthermore showed that only around 30% of the users of operating water schemes obtained 15 litres of water per capita per day within the radius of 1,5 km distance, which is the amount targeted by the national policies. The construction of progress and over-reporting in terms of access to water supply is seemingly politicized and influenced by the pressures of the international donor community and Ethiopia's nation-building efforts. Moreover, qualitative issues relating to water point reliability, water quality, and even cases of water source appropriation by

powerful actors are often not considered in the reporting of progress through statistics (Nevell, 2017).

In Ethiopia, decentralized water governance gained prominence alongside with wider decentralization processes. As argued in the promotional brochure of the Community Managed Project (CMP) approach, - one of the main implementation approaches for decentralized rural water supply - many centralized top-down approaches arguably failed to recognize the under-utilized potential of local resources such as communities and micro-finance institutions that could accelerate the implementation and management of water points (CMP, 2012). This discourse, which is influenced by the broader affection towards participatory governance within the development actors, has shifted the emphasis towards placing responsibilities on rural communities. Community management has become widely implemented approach in Ethiopia during the last few decades. Article 2 in this thesis takes a closer look into the governance of community managed water in rural Ethiopia. With a focus on an extended array of actors and a discursive shift to co-production, the paper analyses the ways in which the language of community management is transpiring in water governance practices in the co-production of water.

4.2.4 Co-production of drinking water

The discourse of co-production bears a long history starting in the 1970s, as narrated in Article 2. The global discourses on water policy processes and public governance influence nation-level policy making and practice in multifaceted ways as discussed in this chapter. Against the global political background of contested water policy processes, Articles 1 and 2 of this thesis focus on contextualized empirical settings where co-production as policy and practice unfolds in the interaction and relationships of various local actors. Contrary to the so called classical view of public policy making, where public policies are assumed to be prescribed as appropriate solutions to rationally identified problems, in this thesis, co-production is seen as a discourse that incorporates the subject-making processes that construct citizens, governmental and other actors as active producers of access to drinking water. This is typical of new forms of neo-liberal governance which render citizens as important actors in participatory water governance (Asthana, 2009). The various actors interact through a bundle of social practices to gain access, provide, and monitor drinking water; their interaction constitutes new meanings, thereby producing new social practices (Ahlers et al., 2014: 2). These practices are intermediated through technologies and technological innovations as discussed in Article 1, and riddled with power effects as illustrated in Article 2.

5 TECHNOLOGIES, INNOVATIONS AND SOCIETY

There exists a large number of diverse definitions on technology. These articulations vary in their focus on the material and social aspects of technologies, in their emphasis on requiring vs. constructing knowledge and skills, and in the ways in which technologies shape societies and vice versa. Innovation, on the other hand, has been dominantly associated with technological change for a long time. The term dates back to Greek and Roman antiquities, at a time when innovation was considered disparaging. The discursive use of innovation has changed substantially over time (see Godin, 2010; Godin, 2012) and several new streams of scholarly literature have emerged around the topic in the last few decades (Fagerberg, 2004), ranging from sociology, management, geography and economics to policy research (Fagerberg and Verspagen, 2009).

In this thesis, technology and innovation are approached from different perspectives. Article 1 analyses the web of social practices undertaken by the governmental actors, water filter entrepreneurs and end users in constructing the need to innovate new types of frugal water filters for household use. The meanings of such co-creation processes are further discussed in Article 3, which looks at the changing meaning systems around frugal innovations and the discourse of co-creating frugal innovations. In Article 2, on the other hand, hand-pumps are a material technological solution through which co-production is achieved as part of Ethiopia's water policy processes. The multiple governing mechanisms revolve around the construction and maintenance of the hand-pump with complex interactions and discourses pertaining the practices and discursive talk of various actors involved in the process.

5.1 Perspectives on technology and society

Philosophers, social scientists and many others continue to have a keen interest in the relationship between technology and society. Throughout the history of technology, overwhelmingly complex questions have spurred vibrant discussions: Are humans free to use technology, or does technology use us? Is technology deterministic in its ability to cause specific sets of changes? Is there an inevitable, universalist, linear path of technological development and change? Does technology allow us to imagine and construct new futures? Or rather, does it make us dependent and bind us more tightly to the social order of the status quo?

Scholarly work on technology and society provides a variety of perspectives towards these questions. One of the most predominant approaches is that technology transforms society – an approach which pre-positions studies to analyse the various effects of technology on society (Fisher, 2010). Two assumptions often characterize this 'technologistic' approach (Robins and Webster, 1999): neutrality – technology is an a-social force that has developed outside any power struggles and with a detached history of its own (see e.g. Bijker, 1995; Feenberg, 1995; Robins and Webster, 1985); and inevitability – technology determines the organisation and structures of society, transforming it in alignment with its inherent, mystified mechanisms (see e.g. Feenberg, 1991; Winner, 1977). Apart from the 'technologistic' approach, critical approaches to

technology have tried to challenge the assumptions of technological determinism by suggesting that society shapes technology and not vice versa (Fisher, 2010). Many of such studies have focused on the construction, dissemination and use of technology (Fisher, 2010), and share "an insistence that the 'black-box' of technology must be opened, to allow the socio-economic patterns embedded in both the *content of technologies* and the *processes of innovation* to be exposed and analysed" (Schint and Edge, 1996: 866). What Fisher (2010) identified common to both the 'technologistic' and critical views is an engagement with an instrumentalist view on technology, i.e. technology as an instrument to reach a certain goal. What follows from this assumption is that technologies cannot be judged on their intrinsic characteristics, but only on their use. Another way to look at the relationship between technology and society is the 'technology as discourse' approach inspired by social constructionist ideas (Fisher, 2010). In this approach, the discourse on technology is not a mere reflection of the technological realities pertaining to the functioning of societies. Rather, through material and non-material discursive practices the discourses on technologies are constitutive of the operation of societies. A discourse on technology does not merely reflect the centrality of technology, but plays a constitutive role in societies, thereby enabling that exact centrality (Fisher, 2010). [4]

This thesis adapts the 'technology as discourse' approach. The constitutive role of technology as discourse was discernible already in the writings of Herbert Marcuse from the Frankfurt School of Critical Theory in the 1960s. He argued that there is no ahistorical, stable technological rationality that develops in a social vacuum; rather, the nature of technological rationality and the material artefacts and social practices resulting from such rationality are constantly changing. In this account technology is social as opposed to essentialist, and thus influenced – among other complex phenomena - by public interests and processes. The essentialist view of technology was criticized also by Jürgen Habermas on his essay "Technology and Science as Ideology" (1970) where he formulates the ideological purposes of the technology discourse. Habermas's focus is on the ways in which we use technology to interact with society, and more notably how the language of technology has spread to political spheres to convey legitimate, depoliticized ways of doing politics (see also Feenberg, 1991). Habermas pointed towards the reduction of the role of politics to finding technical means to achieve certain goals - for example economic growth - through instrumental rationality, and argued for a political debate instead. Habermas's argument of the technology discourse as a political legitimation discourse has been influential for analyses focusing on the depolitization of politics through technocratic governance.

5.2 Technological innovations and the discourse on economic imperative

As stated earlier, innovation has strong associations with new technologies and technological change. The concept of innovation was not always tightly coupled with

[4] The categorization of the various approaches vary between different authors. Andrew Feenberg, for example, in his book 'Questioning tech nology' (1999) posited that most interpretations of technology fall into two major types: instrumentalism or substantivism. Feenberg would separate instrumentalist and determinist approaches from one another.

technological meanings, but in the aftermath of industrial revolution, innovation as a phenomenon became narrowly perceived as a technological affair (Godin, 2012). The associations between innovation and technology have since then remained closely interlinked, although the concept has traversed to other social contexts as well – social innovation being one example of breaking the technological boundaries. Rogers (1983: 11) defined innovation through a non-technical, sociological perspective as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption." This definition places the subject at the centre of the innovation discourse, and relies on a modernist understanding of the human with abilities to perceive the newness of the innovations through an objective lens (Fougère and Harding, 2012). The contextual settings as well as power structures that would transpire in the individual's subjective interpretations of what is considered innovative, however, are not present in Rogers' definition (Fougère and Harding, 2012). Similarly, Van de Ven (1986: 591) defines innovation as: "…a new idea, which may be a recombination of old ideas, a scheme that challenges the present order, a formula, or a unique approach which is perceived as new by the individuals involved." Both of these sociological undertakings to define innovation have gradually become replaced with more instrumental approaches that believe in the nation-level measurement of innovation in order to increase innovating within societies. What is often missing in these instrumental approaches is the subject, the innovator: it seems as if innovation had become a de-personified, genderless, decontextualized force that brings about change in societies.

Innovation has long been a political yet contested concept, through which change can be introduced to a society to transform the established order. As a concept, innovation carries inherently positive meanings, implying a transformative potential to resolve many societal problems of the modern society (Godin, 2012). Indeed, to label innovation as something positive and desirable is a rather recent norm when put into a historical perspective. For over 2500 years, innovation was mainly considered a destructive force, carrying with it a very negative baggage. It was not before the 19th century that innovation started to be seen in a more optimistic light. Apart from the technological character of innovations being challenged by other meaning systems, the inherent positivity of the concept is also continuously contested. Innovation carries with it a hope of progress that can be very powerful in many contexts, and much of the academic literature remains focused on the positive effects of innovations. Yet critical innovation scholars have repeatedly pointed towards the need to study the undesired impacts of innovations, recognizing that innovation may come with associated risks and unintended consequences (Giddens, 1999; Martin, 2016; Mulgan, 2016; Witt, 1996). The hegemonic positivity of innovations has been argued to stem from the ways it has been constructed as a panacea for economic growth (Godin, 2012). In the 1960s, many governments became convinced about technological change as a foundation of economic progress (Godin, 2012). This was preceded by Joseph Schumpeter setting innovation as the creation and diffusion of novel ways of doing things at the centre stage of economic growth: "The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forces of industrial organization that capitalist

enterprise creates." (Schumpeter, 1943: 83) Technological change is then formulated as "a fundamental force in shaping the patterns of transformation underlying the globalization of economic activity" (Freeman, 1988: 2). These statements have contributed to the pervasive meanings connecting innovation and market-based economic growth, and in this process often leaving the societal effects of innovations outside the policy making processes and economic discourses.

5.3 Technology and innovation in water governance

Institutionalized water governance processes are typically framed through technological and managerial discourses. Centralized water treatment plants, piped networks, pumps and filtration mechanisms as technological systems are brought to function through complex social processes. Between 1980 and 1990, the International Drinking Water Supply and Sanitation Decade (Water Decade) focused on trying to define water governance outside the persisting high-tech overtone of international development. This emphasis was influenced by the Appropriate Technology Movement which started in the mid-1970s, emphasizing the need for simple, autonomous technologies that would rely on local labour. Simultaneously, the Water Decade aimed at challenging the power of Western technology – a fundamental tenet in the discourse of international development in general, and water governance in particular (Bell and Franceys, 1995).

It was perceived that investment-heavy centralized technologies, often implemented under colonial regimes, would need to be replaced with locally embedded technologies. One of the key messages of the Water Decade was the argument that sophisticated technology alone could not succeed in meeting the human right to drinking water. As an alternative, participatory approaches and decentralized technologies were promoted to reach the urban and rural poor. The focus on technology and its transformative potential thus sustained during the Water Decade; however, it was acknowledged that the ways in which technologies are used are conditioned by their social and economic contexts, and that top-down centralized systems would need to be complemented with other technological solutions.

A broad spectrum of scholarly work has documented the role of water technologies, and infrastructures in relation to processes of development (see e.g. Bakker 2004; 2010). Water technologies have been argued to construct certain types of political subjectivities which produce tight regulatory connections between citizens and the state (Loftus, 2006), or contribute to change of social institutions (Birkenholtz, 2009). During the course of the Water Decade, governments and international donors found it essential to redefine and emphasize communities and individuals as active agents of change rather than mere recipients of technology and public service. The promotion of low-cost, decentralized technologies such as hand-pumps enabled the sharing of responsibility for infrastructure and service provision with the newly defined 'active' end users.

What then followed, as the national targets were not fulfilled as per the promise of the Appropriate Technology movement, was a temptation of development planners and government officials to apportion some of the blame to the end users and decentralized

technological solutions (Huston, 1985). The failures of sustained use of decentralized technologies also triggered wider criticism towards participatory approaches to development. The consensus model on which community management was based became questioned for its naivety: how could external agency and community values fall in perfect alignment, and why would communities voluntarily contribute to technological projects induced by outsiders? (Bell and Franceys, 1995)

The dissatisfactory results of water governance in general, and technological solutions in particular have triggered an accelerated quest for technological innovating within water sector. A few years ago, the OECD Environmental Outlook to 2050 report stated that innovation would be a requisite for the world to confront the looming crisis in water (Leflaive et al., 2012). Painting a fearful picture, the same report warned against the consequences of inaction (i.e. not innovating) being colossal (Leflaive et al., 2012). With intensified positive meanings of innovation discourses within the water sector, the role of private sector actors gets often emphasized. This is due to the assumed capabilities and resources of the private sector to innovate market-based technological solutions to private and public problems (Baumol, 2002). Underlying this hope of finding lasting solutions through the private sector are market-based innovations that assure to provide for the needs of previously neglected communities and individuals (Ahlstrom, 2010). This private turn in water innovations has material consequences: Spending on bottled water, household water storage and treatment systems, private boreholes, and informal water vendors is estimated to surpass expenditure on water provided by public bodies any time soon (Gasson, 2015).

5.3.1 Discourses on 'water problems' and the mobilization of technological solutions

The ways in which innovations and technologies are perceived useful to issues pertaining water governance depend much on the social construction of the problems they seek to solve. And vice versa: framing water as a technical field justifies interventions that strive to solve problems through scientific expertise and technological solutions (Budds, 2009). Articles 1 and 2 of this thesis revolve around two broad 'water problems': *quality* of water, which provides opportunities for a variety of actors to legitimately construct what becomes viewed as 'good' and 'bad' water, or 'safe', 'unsafe' and 'contaminated' water (Article 1); and *quantity* of water, which is associated with access to water, or availability of water (Article 2).

The social construction of access to water as opposed to biophysical analyses of material aspects of scarcity focuses on how the problem of availability is intentionally and non-intentionally constructed by a variety of actors, and how such formulations may influence the ways in which user groups are differentiated from one another (Mehta, 2001; 2003; 2007; Wutich and Brewis, 2014). In the context of Ethiopia, for example, the measurable amounts of water targeted for each household in the policy documents vary significantly between rural and urban dwellers, thereby differentiating these groups. The little amount of water defined as 'access' in the rural contexts (15 litres of water per capita per day within the radius of 1,5 km distance) further justifies the technology choice

of decentralized hand pumps instead of piped systems. The politics of distribution and technology choice are legitimated through the discourse of water scarcity in the rural areas (Mehta, 2007).

Water quality as a problem, on the other hand, invites dualistic articulations such as safe water vs. contaminated water to mobilize technological solutions to solve the issue, and to disaggregate people to those having access to safe or non-safe water. Recent work by Tesfaye (2018) examined the ways in which private actors selling purified water in a rural village of Rajasthan, India, transformed 'contamination' into a powerful concept through which drinking water gained meaning. During the process, the meaning of decontaminated water increasingly shifted towards a privatized discourse of safe water. Here the market-based purification technology of decontamination played a central role in constructing the meaning of safe water. When brought to the private realm, water quality can serve as a basis for inclusion and exclusion through the question of affordability. Safe drinking water no longer exists in the discourse of free water, but rather in the category of affordable water. The emphasis on affordability is typical of market-based innovations and technologies that shift previously free resources towards the market rationality. Similarly, in Article 1, what is perceived as safe and healthy water by the users of water filters is constructed in social interaction with water filter entrepreneurs of the private sector.

In this thesis, the two dimensions of quantity and quality are not portrayed in a dichotomist manner, rather in Articles 1 and 2 they are intrinsically intertwined in ways that constitute each other as problems. In Article 1, the water quality problem is triggered by the digging of informal, private bore wells by end users who sought to solve the problem of intermittent water quantity in the urban societies. Household water filters then become necessary to solve the salinity problem of the groundwater which gets pumped from the private bore wells. In Article 2, the discourse on 'non-awareness' attributed to end users in relation to understanding the importance of 'good' quality water from wells as opposed to other sources of water serves as one rationale for the governing practices of the governmental officials towards the rural communities.

5.4 Co-creating frugal innovations

As a management and marketing concept, co-creation has been defined as the intentional involvement of end-users in various phases of product or service development processes (Prahalad and Ramaswamy 2000; Vargo and Lusch 2004). To depart from the general use of participation, which might also refer to passive involvement, co-creation as a concept claims to put more emphasis on the active involvement of end-users (Voorberg et al., 2014). Within the co-creation literature and practice, there appears to be an underlying assumption that involvement of end users is a virtue in itself, thereby transforming co-creation to a goal in itself (Voorberg et al., 2014). An implicit assumption places the two parties, i.e. customer and provider, in a relationship where both become resource "integrators and beneficiaries of the exchange" (Edvardsson et al., 2011: 332). As a result, customers become active in creating meaning in the process (Cheung, 1997).

The idea and practice of involving customers in companies' activities is not new. Ritzer (2004) documented the ways in which McDonald's restaurants utilized customers to serve themselves and clean the tables after finishing their meals. Similarly, in automated teller machines (ATMs) and internet banking, the customer engages in transactions formerly conducted by the bank's personnel (Ritzer, 2004). Such involvement of customers to improve process efficiency has now traversed to the realm of product development and innovation, where the creative forms of consumers' work is put to use. It has been argued that in keeping the consumers involved and close, companies are also in control of the risk of consumers changing their behaviours to a direction not foreseen by the company (De Certeau, 1984; Lury, 2004). Due to the ways that consumers become governed through co-creation, the phenomenon has also been theorized through governmentality literature, connecting it to processes of governance. Zwick et al. (2008: 163) argued that the co-creation paradigm as a management technique constitutes a "modern corporate power that is no longer aimed at disciplining consumers and shaping actions according to a given norm, but at working with and through the freedom of the consumer". This resonates with Godin's (2012) analysis of innovation having become performative in itself: discourses on innovation inspire people to innovate and then incentivize them for doing so. In this case the reward would be more individualized, customized end product or innovation.

Co-creation as a concept became part of this thesis during the writing process of Article 1. It was first used as a construct for interpretations on the empirical material (the wording of co-production is used for co-creation in Article 1 and institutionalized co-production stands for co-production) and later as a discourse in Article 3. Articles 1 and 3 engage with the co-creation of frugal innovations both as a social practice and discourse of innovation. In both articles, the socially constructed processes of co-creating frugal innovations are highlighted, shedding light on the constitutive role of technologies in the society. A detailed analysis on the frugal innovation and co-creation discourses is presented in Article 3.

6 THEORETICAL SYNOPSIS

This chapter moves on to the theories and conceptualisations I have utilized to make sense of the processes of drinking water governance and the practices related to drinking water technologies and innovations in the studied contexts. In this thesis, theories are portrayed as languages of description (Bernstein, 1996) and the application of the theoretical lens as a translation of empirical materials into its vocabulary. Following this line of thought, the two theoretical approaches do not run through this thesis as monolithic narratives; rather, they should be viewed as languages through which the particular research questions in the two articles were addressed, with respect to a specific time and space.

Articles 1 and 3 of this thesis connect literatures from marketing, management, public policy and development studies on frugal innovations, whereas Article 2 draws on public policy, development studies and environmental geography to engage with community management. In order to scrutinize the governance discourses of co-production and co-creation through critical discourse-analytical lenses, this thesis used two separate theoretical frameworks to further its analysis on the underlying assumptions on these governance discourses beyond their functional intention. The next sections briefly outline the two main theoretical approaches used in the thesis: Foucault's governmentality approach (as in Article 2) and Laclau and Mouffe's discourse theory (as in Article 3).

6.1 Governmentality

The concept of governmentality was introduced by Michel Foucault as a perspective on the constitution of power (Lemke 2007). Foucault traced historical shifts in the rationalities of states in governing populations, ranging from disciplinary, coercive power to more liberal forms of governance. In more liberal societies, subjects would enter their governable subjectivities freely, giving their consent to reforms and ultimately self-regulating and conducting themselves (see e.g. Birkenholtz, 2009). This is the 'conduct of conduct' in governmentality: Instead of emphasizing the practices of state administration, governmentality focuses on the ways through which political rationalities use explicit, planned programmes of government to render subjectivities governable and administrable (Dean, 2010). Governance agendas of the state enter "the imagination, re-structure the sense of self, and re-direct the practices of willing subjects" (Rocheleau, 2007: 222). One of the main objectives of governmentality was to study the individual's capacity to self-regulate (Lemke, 2012). Governmentality then becomes understood as the organized practices (mentalities, rationalities, and techniques) through which subjects are governed (Mayhew, 2004). Foucault emphasized that the 'conduct of conduct' does not transpire through domination and coercive power but requires freely willing, active, entrepreneurial individuals and communities in order to function. 'Conduct of conduct' works through normalizing power (Foucault, 1975) that includes processes of both objectivation and subjectivation. Normalizing power establishes norms for proper, normal behavior, within which deviant practices are

condemned to invoke morality, guilt and self-correction. With objectivation, subject's deviant behavior is considered as an object for governmental intervention; whereas in subjectivation the subject would self-correct and self-regulate in order to be considered normal (Foucault, 1975; Cf. Cadman 2010). In this thesis, governmentality is used in Article 2 to analyze the practices of 'conduct of conduct', i.e. the mentalities, rationalities and techniques among the co-producing actors. Such an analysis illuminates the workings of normalizing power in the studied context: how subjects are objectivated, and how subjectivation works, or does not work, through subjects' self-regulation. Scholarly work that employs governmentality perspective to water governance is presented in Article 2. While this body of research is well established, the contribution of Article 2, and this thesis respectively, is the integration of a governmentality framework to the governance processes of co-production. In doing so, this thesis contributes to the otherwise depoliticized literature on co-production by highlighting the functionings of power through the discourse of community management.

6.2 Laclau and Mouffe's discourse theory: chains of difference

A foundational idea in Ernesto Laclau and Chantal Mouffe's discourse theory is that social phenomena are never static or finished. Meanings cannot be fully fixed, thus leaving space for constant struggles about definitions. These struggles in turn have social effects for people's identities and the formation of different groups. Laclau and Mouffe have conceptualised how reality comes to appear as natural. They propose that discourses fix meanings through hegemonic closures and in doing so, exclude all other potential meanings. The production of meaning thus becomes an instrument of power, whereby power relations are stabilized and naturalized so that they cannot be questioned (Jørgensen and Phillips, 2002). In order to challenge hegemonic closures and keep possibilities open for change, Laclau and Mouffe use a process of deconstruction, through which those entities which we see as natural and 'true', are in fact "contingent combinations of elements which could always have been articulated differently" (Jørgensen and Phillips, 2002: 186). Foucault's conception of power is adhered to in Laclau and Mouffe's discourse theory, although the focus is more on hegemonic struggles. This underlines the main difference between the analyses of power in Articles 2 and 3 of this thesis. Foucault analyses the effects of power (e.g. Birkenholtz, 2009) and Laclau and Mouffe focus more on how the exclusion of certain other social orders as an effect of power limits alternative possibilities.

Laclau and Mouffe's post-structuralist discourse theory provides various conceptual tools to deconstruct social phenomena. In this thesis, and more specifically in Article 3, I have focused on the concepts of chain of difference, empty signifier and floating signifier. Chains of difference articulate signifiers (typically, though not only, words) in particular ways. The character of a chain of difference is best described by comparing it with chains of equivalence – another concept from Laclau and Mouffe's discourse theory. When a word is included in a chain of equivalence, those meanings of the word that are more in alignment with the other signifiers in the chain come to predominate over the other, more dissonant meanings. In chains of equivalence, the appearance of the

dominant words as consensus neutralizes dissonant elements (Cornwall and Brock, 2005). The interplay between consensus and dissensus relates to Laclau and Mouffe's (1985) conceptualization of the universal vs. the particular. In a chain of equivalence, the particular message is co-opted into the universal message when the meaning of the particular is subsumed into the narrative of the universal. Each part of the chain has their own nuanced and particular meaning, yet these meanings are contained into a collective, universal meaning. Thus, 'chains of equivalence' typically form against a constitutive outside (see Laclau, 1996), and they particularly characterize counter-hegemonic movements framed against an established order.

In contrast, chains of difference refer to elements remaining differentially positioned but somehow structured in a chain, as part of the same system in any case. Examples of chains of difference often refer to an established order with institutionalized differentiations. Such chains may also develop dynamically as a result of a challenge to the hegemonic block or simply an attempt to consolidate a hegemonic order through a hegemonic project extending the reach of the hegemonic block – as in the case of co-creating frugal innovations. Both types of chains need powerful empty signifiers in order to be established and sustained. While a chain of equivalence needs an empty signifier and while the equivalence comes from a common difference to an outside, a chain of difference needs different kinds of signifiers, signifiers that draw connections between different identities – and between different demands – not by making them equivalent in their common difference to an outside but by affirming their difference to one another. In Article 3, co-creation is articulated as an empty signifier whose main function is not to create equivalence but to connect differences with one another.

Both chains of equivalence and chains of difference are closely connected to the notion that every discourse competes for hegemony within a field of discursivity, attempting to dominate this field (Torfing, 1999). While discourses that are already dominant often rely on a chain of difference, where societal differences are institutionalized in a hegemonic order, counter-hegemonic discourses typically rely on as broad as possible chains of equivalence in order to stand a chance in challenging the hegemonic block (see e.g. Fougère and Solitander, 2020). In order to hegemonize the field of discursivity a discourse needs to establish a chain (of difference or equivalence) that fixes the meaning of key 'floating signifiers' (Laclau and Mouffe, 1985), i.e. those signifiers whose meanings differ from one discourse to another. In this thesis, 'frugal innovation' can be understood as a floating signifier whose meaning varies across discourses – such as in business-driven discourses on sustainable innovation vs. community-driven discourses on sustainable innovation. Hegemony can be argued to be established if a single discourse succeeds in standing in for the whole field of discursivity. In this context, the discourses on 'innovations for the poor' and 'grassroots innovations by the poor' become undermined from the discursive field of sustainable innovations, from which the 'co-creation with the poor' overpowers or dissolves them by rearticulating their elements through a chain of difference (Jørgensen and Phillips, 2002). While a hegemonic discourse can be strongly naturalized as the one established way to understand a particular aspect of reality, it is never absolute, otherwise it would mean that we would

not be able to see its contingency as 'hegemony', but rather as fully 'objective' discourse (e.g., Jørgensen and Phillips, 2002). For example, sustainable development discourse as institutionalized through the SDGs has a vocation to be hegemonic. While it is difficult to resist its injunction to frame all sustainability endeavours in terms of SDGs, it is nevertheless not impossible to see SDGs as contingent articulations, which may be contested. Indeed, a feature of hegemony is that because of its contingent nature, it does not exist without resistance (e.g., Burawoy, 1979; Laclau and Mouffe, 1985). Given that hegemony for Laclau and Mouffe (1985) is inherently unstable, once provisionally established it necessitates discursive work to maintain and reproduce it (Spicer and Sewell, 2010).

7 DISCUSSION AND CONTRIBUTIONS

This thesis began with an interest towards water governance and 'drinking water problems'. At the time of starting the thesis, I imagined how water problems could be simply fixed with better planning, scaling up of best practices, or improving the availability of spare parts for water pumps. I still find myself in the same pattern of thinking. (This is not to disregard those solutions, as they are necessary in improving material access to water.) As for any individual – especially for someone embedded in hegemonic technocratic discourses and not having direct experience on the oppressive structures creating inequalities in relation to access to water-, it requires time and space for continuous reflexivity to maintain a critical relation towards the technocratic discourses on water. It is not that 'critical' would be closer to any 'truth' than 'technocratic' but departing from the dominant understandings within a certain field opens up possibilities for diversified knowledges. The different vocabularies and discursive resources related to the workings of power, subject-making processes and viewing conflict as natural can provide (at least temporarily) more diverse processes of knowledge construction with regard to water governance. Translating this into Laclau and Mouffe's discourse theoretical terms, the variety of different discourses co-existing or struggling to define the truth opens more space for change to take place. Ultimately, this is a prerequisite for changing the inequalities pertaining to social phenomena.

What is then problematic in formulating water through the mindset of problems? Focusing on technocratic problems typically entails a process of finding out what is it that is not functioning properly. Usually there is someone or something who has the responsibility, someone to blame for the poor functioning of the system – be it then the modality of the water governance, the technology, the private sector, or the end users. In this process, the groups with less structural power, voice and legitimacy are more likely to have the blaming fingers pointed towards them. Instead of focusing on the broader discourses on political systems creating unequal access to water, previous research has posited that issues pertaining to drinking water are increasingly problematized as outcomes of the conduct of individuals or communities (Birkenholtz, 2009; Dewan et al., 2014). Such a focus may shift the attention away from wider frames of neoliberal political economies which continue to hinder access to drinking water in many parts of the world (Brei and Böhm, 2011).

In an attempt to move away from individualized problematizations of water and creating more diversified knowledge on the workings of water governance, this thesis used the discourse of co-production to accommodate a wide array of actors into the analysis. In Article 1 and Article 2, the relations, practices and discourses among the multiple actors of water filter entrepreneurs, public officials, end users, artisans etc. were brought into focus. The discourse on co-production has been useful in articulating the multiple relations among the actors, in investigating how power works among those actors (Article 2), and the potential consequences of co-production (Article 1). The 'problem' of access to water is solved through a complex web of discourses and practices including technological solutions and practices of governing the communities. Resonating with

some of the ideas of the post-development literature (Escobar, 1995; Sachs, 1992; Matthews, 2004), this thesis continued to show how development interventions - such as technological solutions - may reproduce social inequalities rather than even them out. Drinking water interventions do more than deliver drinking water, but change relations between the social actors involved, especially the state and local people. Changing social relations as part of development interventions can be attached to reproducing problematic local governance structures (Li, 2007; Articles 1 and 2) or to reworking contextually embedded subject positions to align with the dominant groups' ideas of development (Birkenholtz, 2009; Article 3). Especially in the process of constructing communities and individuals as 'poor', these groups become treated as natural spaces ready for technological development interventions. 'Poor people' are then transformed into subjects who should be empowered to take responsibility for the improvement of their lives (Ilcan and Lacey, 2011; Li, 2007), i.e. in accessing drinking water in the case of this thesis.

The solutions addressing 'water problems', in this thesis, also focused on frugal innovations and the ways in which they are co-created. In the context of Ahmedabad, individual households are responsibilitized for solving the problem of water quality. They came to be constructed as active individuals responsible for knowing and addressing the risks related to the quality of drinking water (Butler and Pidgeon, 2011). In this process, those households with economic possibilities would turn to the private market to find solutions to their individualized problem. Together with local water filter entrepreneurs, technological solution, i.e. the water filter as an empirical construction of frugal innovations, became perceived as a normalized way to address issues of water quality. With changing concerns and problems arising in relation to water quality, new technological qualities for the water filter would be co-created together with the water filter entrepreneur. The discourse on co-creating frugal innovations itself and its broader consequences were further discussed in the conceptual Article 3.

7.1 Addressing the research questions

The overall aim of this research was to understand the processes of drinking water governance and the ways in which the use of drinking water technologies and innovations are socially constructed in the studied contexts. The analyses of the processes of drinking water governance incorporated the discursive constructions and practices related to drinking water technologies and innovations to emphasize the socio-technical meanings of water governance. I have indicated below the parts of this thesis addressing the separate research questions.

R1. How are governmental and private sector actors, as well as end users, socially constructing practices of drinking water governance in the studied contexts?

Research question 1 was addressed in chapter 4 of this thesis as well as in Articles 1 and 2. The social practices have been documented in the articles, whereas the discourses on co-production and community management in relation to water governance are addressed more thoroughly in chapter 4 and in Article 2.

R2. How do the governance discourses of a) co-production and b) co-creation influence the governmental actors, private sector and end users in constructing meaning systems to drinking water technologies and innovations?

Research question 2 a) on co-production has been discussed in chapter 4, and in Articles 1 and 2. 2 b) on co-creation was addressed in chapter 5, and Articles 1 and 3.

R3. Which discourses do the articulations of frugal innovations draw on, and what are the implications of the current meanings attached to the term?

Research question 3 was addressed in chapter 5, and in Article 3.

7.2 Contributions

7.2.1 Contributions to water governance

This thesis examined the links between water technologies, innovations and recent reforms in water governance, notably extended participation of communities and individuals in processes of water governance (Irvin and Stansbury, 2004; Madrigal et al., 2011; Mustafa et al., 2016; O'Reilly and Dhanju, 2012). Building on earlier scholarly work, Cook and Bakker (2012: 100) identified reasons why such reformist shift in both urban and rural water governance have taken place: due to changing discourses over the role of governments; new legal requirements; increased inclination and perceived need for public participation; dispersed networks of legitimate expertise outside of government; and constructions of concern regarding "low efficiency of water use, associated with ineffective management of resources and supply systems" (Brick et al., 2001; Gleick, 2000; Sabatier et al., 2005; UNWWAP, 2006, 2009). In this thesis, the extended participation of communities and individuals transpired through the discourses and practices of co-production and co-creation.

As this thesis suggests, the discourses and socio-technical practices of water use with regard to co-production and co-creation entail evolving forms of governance. The governance discourse of co-creation in Article 1 illustrated how technologies may facilitate meanings related to the private value of water, or "the shift of access, labor, and responsibility for acceptable drinking water from a relational axis between the citizen and state to one between the individual and the market" (Jepson and Lee, 2014: 1044)." Such reinforcement of private value and responsibility - and autonomy on the other hand - for technological solutions to perceived water problems may also foreclose collective processes towards political changes in the provision of water (see e.g. Vandewalle and Jepson, 2015). As documented in Article 1, the study in the city of Ahmedabad examined how concerns around water quality are alleviated at the household level with water filters. Although previous studies have looked into technologies for individualized demand management, such as water meters (Loftus 2006), or into technological solutions to secure water supply, such as water storages (Meehan 2014; Burt and Ray 2014), the focus on household level technologies that alter water quality is very recent (Vandewalle and Jepson, 2015). The contribution of Article 1 was its examination of the

processes through which drinking water provision through co-created household water filters changed and was changed by societal relations and peoples' role in water governance.

In Article 2, the novel attempts of governance practiced by the district government extended to the private sector suppliers, artisans and community water organizations; thus contributing to an extended influence of the state. The article showed how co-production in the studied context was characterized by mechanisms of governmentality's 'conduct of conduct' in producing contested water provisioning (see e.g. Ahlers et al., 2014; Mitlin, 2008). The paper built on the literatures and concepts of governmentality and community management, ultimately contributing to the co-production literature. In the paper, co-production as a discourse and practice suited the needs of acknowledging the various contributions of the different actors in producing access to drinking water in rural Amhara. However, as shown in the paper, these processes are not smooth but riddled with power effects. At the national and regional levels, policy documents and implementation manuals on demand-driven community management tend to frame water as a technocratic question of demand and supply. Such a focus hides the effects of water as it intersects, mostly at the local level, with human labour and power dynamics to produce quantifiable infrastructures. The various forms of citizen participation that include labour, various forms of organizing and financial contribution are constructed as empowering endeavors that ultimately are supposed to lead to sustainable water supply. This logistification of co-producing water with focus on demand and supply hides the discursive worlds of power, and the contested practices created within the complex social interactions during the construction and maintenance of water points. The uncovering of the functionings of power through the discourse of community management in Article 2 is a contribution to the otherwise depoliticized co-production literature and a contribution of this thesis. While bodies of research on water governance and water governmentalities are well established, this thesis adds to the discussions on co-production of drinking water by integrating a governmentality framework to highlight the workings of power among a wide array of co-producing actors.

7.2.2 Contributions to frugal innovation literature

In this thesis, technologies and technological innovations tie together individual social practices and society-level, political processes. A discursive view enabled the dissolving of the technical–social dichotomy and created possibilities for understanding the complexities of the phenomena studied in this thesis. Moreover, tying together technology and innovation with societal political governance processes allowed for considering the fundamental basis of technology and innovations in economic interests. Historically, technologies have mostly been developed as solutions for certain socially constructed problems (see Bijker et al. 2012). Thus, the ways in which social problems are discursively constructed shapes the way technologies and innovations become legitimate solutions to those problems in question.

Article 3 showed that there is no one discourse or perspective on frugal innovations. Practitioners and scholars draw on different discourses at different points in time.

However, the argument of the article posited how the governance-driven co-creation discourse is becoming hegemonic and what consequences it might have. Building on insights from critical marketing and critical management studies (Cova et al., 2011; 2015; Gabriel et al., 2015; Zwick et al., 2008), the contribution of this thesis lies in the historical study of the frugal innovation discourses in general, and that of co-creating frugal innovations in particular. As illustrated in Article 3, the governance-driven discourse on co-creating frugal innovations has evolved through the business-driven and community-driven articulations on sustainable innovations. The hegemonic understanding of co-creating frugal innovations, as argued in the paper, raises concerns of the heightened potential extraction, exploitation and scaling up of 'creative sustainability value' from individuals or communities. Frugal innovation has been hijacked and co-opted in a hegemonic project of governing and exploiting the poor in ways conducive to 'wealth creation' and 'economic development' as per mainstream, elite-driven definitions. The value of examining this hegemonic understanding lies in its ability to show what other understandings might get lost in the process. Frugal innovations hold a subversive potential in changing the meaning on innovations as sole products of the West. With 'co-creation', this potential gradually gets lots. As concluded in Article 3, grassroots articulations of frugal innovation can better relate to the need of using context-dependent resources that are locally at hand, in a frugal manner, rather than relying for everything on the global marketplace.

Water governance and frugal innovations are practical and managerial topics for many professionals. Based on the contributions of this thesis, it can be suggested that practitioners working in community management water in the water sector should be more aware of the ways through which governmental officials use the language of community management to extend their influence at local level. I believe that using co-production as a term instead of community management would be suitable in order to shift the discourse away from communities and towards power relations working beyond the communities (Hutchings, 2018). It would be naïve to assume that a change of wording would challenge societal power structures. However, it could be a small step towards that direction, supporting earlier studies which have identified co-production as a political process, through which citizens can also navigate to initiate changes in their power relations with government agencies (Mitlin, 2008).

It would also be helpful for public sector professionals to acknowledge some of the consequences of co-producing drinking water in the city of Ahmedabad and beyond. The reliance on water filter entrepreneurs and markets to provide the solutions for challenges related to drinking water means that the state is assumed to be redundant in addressing these challenges. Also, the growing number of citizens residing to reverse osmosis water filters has detrimental consequences for the water supply of the city, as the wastage of water is high in the technology. Water quality is an ongoing hindrance for many people living in the city, yet only a small portion of the population is positioned economically in a way that enables them to purify their water with filters. The issue of affordability within water filters further segregates people for those who can and cannot afford. Therefore, the continuous vigilance of the water quality of public water supply is the way to

guarantee clean drinking water for all. Here the governmental actors could take a much more serious role in mobilizing resources to address issues of drinking water governance.

Those interested in working with frugal innovations – and especially co-creation of frugal innovations - would benefit from reading reflecting on the reasons why the term has suddenly become so popularized and whether it might contribute to agendas that are not so visible at first glance. Furthermore, attention needs to be paid to the legal frameworks of frugal innovations: The grassroots co-innovators tend not to readily have access to ways to protect their frugal innovations, such as patents or other forms of legal protection. This might lead to an unequal situation, where business actors gain disproportionate benefits from co-creation processes.

7.3 Limitations and further research

With regard to literature on water governance, the discussion on water security as a concept was left out of the scope of this thesis. Water security is an increasingly important paradigm that shapes water policy processes in risk societies and discourses that constitute the "global water crisis" (Bakker, 2012; Bogardi et al., 2012). The use of water security as a discursive framing, however, is much debated (see Cook and Bakker, 2012) and the complex interactions between water security, technologies and innovations would require further research. Other related streams of literatures on water governance, such as the right to water (e.g. Sultana and Loftus, 2012) and the hydrosocial cycle (e.g. Budds, 2018; Budds et al., 2014; Linton, 2010) were not discussed in detail within the scope of this thesis. The scholarly work on hydrosocial cycle is grounded in the theorisations of Bruno Latour (1993) and Neil Smith (1990) on environment-society relations and on debates around 'social nature', i.e. social production and construction of nature. The utilization of hydro-social cycle as an epistemological and ontological approach would further help in avoiding the reproduction of dualistic lenses regarding water governance: access to clean water by the poor as compared to the rich; the efficiency of the public versus the private water provision; water as a human right versus a commodity (Agnew, 2011; Bakker, 2007). The hydrosocial cycle can work as an analytical tool in identifying the "assemblage of historical, hydrological, political, and technological circumstances that produce a given instance of "water" as well as to consider what might bring about change in the assemblage" (Linton and Budds, 2014: 177). Social relations are captured within instances of water and waters (Linton and Budds, 2014) and therefore social exclusions, inequalities and power become produced and reproduced *through* water and not only *around* water. The acknowledgement of the agency of water is limited in this thesis and would require further studies to fully embrace this perspective.

Another limitation of this thesis is the lack of engagement with questions and differences on urban versus rural governance of water. As pointed out by Rignall and Atia (2016), the global neoliberal governmentalities typically aim for an inclusion of urban populations as customers to the market system. For rural populations, on the other hand, processes of rural marketization aim for the production of self-governing entrepreneurs. Self-governing rural subjectivities – entrepreneurs of themselves – would internalize the

responsibility to reproduce market conducts and principles even in settings where institutional voids prevail. (Rignall and Atia, 2016) Such conceptualizations could have been incorporated throughout the thesis in order to focus on the functionings of neoliberal and authoritarian governmentalities in urban and rural contexts.

Yet another limitation of this thesis is the superficial engagement and analysis of the gendered practices and discourses surrounding water governance. In both empirical contexts, the complex interactions between men that were typically in expert positions (*woreda* professionals, artisans, suppliers and WASHCO representatives in Ethiopia; water filter entrepreneurs, government officials in India) and women that are the actual users of the technology and responsible for households' water needs in both contexts could have been explored more thoroughly. This limitation arises from my personal non-familiarity with gender and feminist research at the time of generating the empirical material for Articles 1 and 2. Acknowledging the gendered nature of water collection (O'Reilly et al., 2009) did not receive the importance it would deserve. The stress, anxiety and violence that women and girls in many parts of the world face daily in collecting, organizing or procuring drinking water while being responsible for their households' water needs (Sultana, 2018) was not addressed in this thesis. Further research could look into the gendered processes of co-creating water technologies and innovations, and frugal innovations. Further research could also document how gendered power structures transpire through the practices and discourses in co-producing access to drinking water.

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ANNEXES

ANNEX 1: ARTICLE 1

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Co-production of frugal innovation: Case of low cost reverse osmosis water filters in India

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Abstract

The increased role of market actors in the provision of drinking water has implied a greater salience to issues of affordability. With its emphasis of increasing affordability without compromising on quality, the idea of frugal innovation holds out particular promise in resource constrained environments. In this paper, we study the case of low cost household water filters using reverse osmosis (RO) technology in the Indian city of Ahmedabad. Using mixed methods, we find the citizen to be an active participant - a coproducer - in the frugal innovation process that allows small scale, local entrepreneurs to customize their products and services to the needs and price expectations of their customers. This co-production process, that has been facilitated by the proximity of the user with the local entrepreneur, has not only reduced private costs borne by users but also been as successful as their more expensive counterparts in meeting the diverse needs of end users. Further, we find that the context facilitating such service co-production is characterized by institutional co-production, with actions of both the state and citizen creating the demand for innovation around more affordable, private solutions. While there is much to celebrate in the value created by the frugal innovation, we believe the implications of the contested and unregulated water filter technology suggest reasons for caution.

1. Introduction

Innovation is a necessity if the world is to tackle the impending crisis in water (Leflaive et al., 2012; Shannon et al., 2008). This is considered true especially for water stressed societies like India. The debate on the kind of innovation that needs to be encouraged and how it can be promoted, however, is still an open one. With calls for governments to play an increasing role ring out (European Commission, 2014), the public sector is trying to negotiate a new role for itself in the provision of drinking water. Expenditure on bottled water, household water storage and treatment systems, private boreholes, and informal water vendors is projected to overtake spending on water provided by public utilities in a few years' time (Gasson, 2015). Despite repeated reminders that access to water is a human right (United Nations, 2010), market forces that rely on exclusion (Alchian and Demsetz,1973) continue to increase their influence in the water sector. Paradoxically, these market forces are also often credited for increased innovation (Baumol, 2002). The increased role of the market concomitant with the perceived state failure in providing basic services has implied that, in many societies, the human being is envisioned to have greater hope of accessing clean water as a customer than she is as a citizen.

Underlying this hope are market-based innovations that promise to meet the needs of previously underserved populations (Ahlstrom, 2010). Labeled many things including "bottom of pyramid" (BOP) innovations (Prahalad, 2009) and inclusive innovations (George et al., 2012), these activities seek to promote "inclusive growth [that] diminishes trade-offs between growth and inequality because the poor become enfranchised as customers, employers, owners, suppliers and community members" (George et al., 2012, p.662). A more recent term emphasizing a critical essence of the innovation process is the idea of frugal innovation (Radjou et al., 2012). The concept is used to designate innovations specifically developed for resource-constrained customers in emerging markets (Sehgal et al., 2010; Sharma and Iyer, 2012; Zeschky et al., 2014). Frugal innovation, it is claimed, "responds to limitations in resources, whether financial, material or institutional, and using a range of methods, turns these constraints into an advantage" (Bound and Thornton, 2012, p. 6). Despite the attention that the idea has received, there has been little discussion on the process of frugal innovation and the institutional contexts in which it develops.

Our study focuses on the dynamics of frugal innovation in the context of drinking water provision and uses a double lens of coproduction: we distinguish between institutional co-production (Ostrom, 1996) and co-production (Vargo and Lusch, 2004) of frugal innovation. Institutional co-production is characterized by a mix of activities that both public agents and citizens contribute to in the provision of public services. The former are involved as professionals or "regular producers", while "citizen production" is based on efforts of individuals or groups to enhance the quality and/or quantity of services they

receive (Parks et al., 1981; Brudney and England, 1983; Ostrom, 1999). We describe the institutional co-production of drinking water among the state and citizens as the context in which the frugal innovation process occurs. The idea of co-production has also been used in the marketing literature to refer to the participation of the customer in the creation of the core offering of the provider and happens "through shared inventiveness, co-design, or shared production (Vargo et al., 2007, p.11). However, it has predominantly been used in the realm of new product development and relatively less in service innovation (Chen et al., 2011), an area we extend the idea to. We argue that co-production plays a critical role in the creation of shared value between the consumer and the producer, and describe how the process has been facilitated by the proximity of the local entrepreneurs with the end user. Rather than being a passive consumer, we find the end user to be an active agent in shaping the technology developed and the manner in which it is diffused via innovations in business models. However, this active demand driven participation that on the one hand encourages innovation also reflects the state's inadequacy in meeting the demand for clean drinking water and regulating the private response to it. Coupled with concerns on the ecological footprint i.e. water wastage of the RO technology that are now being raised in formal governing bodies (Press Trust of India (2015)) leads us to recognize the tensions in evaluating the social implications of these frugal innovations.[5]

2. Frugal innovation: responding to resource constraints

The term frugal suggests "using money or supplies in a very careful way" (Merriam Webster, 2015). While that remains a defining characteristic of the idea of frugal innovation, it has also come to mean more in the literature. Other terms often used for frugal innovation include Gandhian innovation (Prahalad and Mashelkar, 2010) or jugaad (Sharma and Iyer, 2012; Radjou et al., 2012); terms that emphasize attributes often associated with frugal innovation. Such attributes include the creative and improvisational nature of the innovations (the word jugaad in Hindi) as well as the emphasis on "affordability and sustainability, not premium pricing and abundance" (Prahalad and Mashelkar, 2010, p.2). As The Economist (2010) points out, "frugal innovation is not just about redesigning products; it involves rethinking entire production processes and business models." The idea of frugal innovation has contributed to a richer understanding of the process of innovation and like the literature on grassroots innovations, it has brought recognition to the value of solutions developed in contexts where the problems themselves are located (Gupta et al., 2003; Smith et al., 2014). It has questioned notion of innovations as primarily outcomes of resource intensive processes and the exclusive domain of more developed economies with budgets to fund large investments in the development of technology (Kaplinsky, 2011). In doing so, the recognition has also overturned dominant views of developing economies as being

[5] A recent report states that "it takes about 3 gallons (12 L) of wastewater down-the-drain to create one gallon (4 L) of clean water" with an RO technology (Comprehensive Initiative for Technology Evaluation, 2015, p.31).

mere recipients of technology transfer to having lessons in innovation for their more developed counterparts as well (Bound and Thornton, 2012).

Despite the attention it has received, the idea of frugal innovation remains under theorized (Bhatti, 2012; George et al., 2012). In part, this stems from the challenges in distinguishing it from other concepts like reverse innovation (Govindarajan and Trimble, 2013) or frugal engineering (Sehgal et al., 2010). In a very useful contribution, Soni and Krishnan (2014) disambiguate frugal innovation to three types: frugal mindset, frugal process and frugal outcome and organize existing related concepts to these three types. By mindset they refer both to the motivations (e.g., inclusive innovations (George et al., 2012)) as well as mental frames influencing problem solving (e.g., bricolage (Baker and Nelson, 2005)). Process, in their definition, refers to the process of production (e.g., lean (Womack and Jones, 2010) and the outcome, being the product or service (e.g., appropriate (Schumacher, 1973)). In examining the process of frugal innovation, attention has predominantly been engineering based and specifically on the ingenuity of the producer in being able to strip down the product to its bare essentials, catering to the resource constrained needs of the consumer. This conceptualization of the consumer as a passive agent in the innovation process is inconsistent with our empirical findings. Instead, we find that by being an active co-producer, the consumer plays a critical role in helping the innovator discover the sweet spot that allows a significant reduction in costs without compromising "the essential functions people seek to satisfy with a given product" (Cunha et al., 2014, p.206).

3. Co-production as a context and as a dynamic feature of frugal innovation

As described, frugal innovation takes needs of the resource constrained consumer as the starting point and "instead of adding ever more bells and whistles … strip[s] products to their bare essentials" (The Economist, 2010). The task of discovering the essential needs of the consumer, what features constitute the "bells and whistles" and what the "bare essentials" cannot be an easy one. Unpacking how the frugal innovator is able to create shared value in doing this, is critical to understanding the frugal innovation process. Moreover, the context in which such innovation process develops requires greater examination. The lens of co-production that has been used both in the literature on public services (Ostrom, 1996) and the marketing literature (Normann and Ramírez, 1993; Prahalad and Ramaswamy, 2000) serves as a useful way to do so. While the public services literature and the marketing literature rarely speak to each other, the case of frugal innovation by private actors in the water sector transcends conventional sectoral and disciplinary boundaries pointing to the interactions between the state, citizens and market actors in co-producing new modalities of water provision (Ahlers et al., 2014). In this paper we investigate both the institutional co-production of public goods as a pre-defining context for demand-driven frugal innovation process, and co-production as a dynamic feature of frugal innovation. Thus, we conceptualize co-production on two different levels. In doing so, we place the user as a central actor in both processes.

3.1 Institutional co-production of water supply

Institutional co-production can be seen as a continuation of a new order that is characterized with a "fragmentation of authority, the increasing ambiguity of borders and jurisdictions; and the blurring of lines between the public and private sphere" (Kobrin, 2009 p. 350). Joshi and Moore (2004) suggest two different sets of motivating forces for institutional co-production: inefficient provision of services by the state; and the complexity and variability of the context for which the public service is targeted. These sets of drivers motivate citizens to take action, and leads to the continuous re-negotiation of production activities of public goods among the different actors. The technologies that are utilized in delivering the public good play a crucial role whether production activities of a service can be shared among both regular and citizen producers (Pestoff, 2013). In the dominant discourse, institutional co-production is viewed as a positive development in the provision of public services (Voorberg et al., 2014). Such studies argue for institutional co-production promoting participative democracy (Ostrom, 2000; Fung, 2004); contributing to greater satisfaction of users to services (Brandsen et al., 2013); ensuring the development of service quality in public services (e.g. Parks et al., 1981; Bouchard et al., 2006); promoting the emergence of social innovations (Voorberg et al., 2014); and accelerating diffusion of innovative products where structural challenges of inequality do not hamper such diffusion (Jerneck and Olsson, 2013). This positive portrayal of institutional co-production sees people as active agents, growing their capacity and confidence through active participation in service provision. In contrast to this literature, there is a growing criticism towards the celebrated forms of institutional coproduction. Vancoppenolle and Verschuere (2013) suggest the involvement of private organizations in public service provision through co-production threatens public accountability. Moreover, institutional co-production seems to encourage heterogeneity due to its possibilities for customization (Brandsen et al., 2013). Heterogeneous services may then risk public services becoming dependent on social class or geographical area. In particular, institutional co-production increases fragmentation in the provision of public services (Brandsen et al., 2013) and blurs the roles and responsibilities of the different actors. Harrison and Waite (2015) further conclude institutional co-production to be a double-edged sword: for some it can be value-enhancing and empowering, whereas for others it can be value-destructing and disempowering. Further criticism notes how co-production places additional demands for people using the services, contributing to citizen burden, and responsibilitization of citizens (O'Malley, 2008).

In the context of water provision, institutional co-production has been studied especially in the global South. Olivier de Sardan (2011) describes how local actors exploit the spaces of opportunity created by the initiatives regarding water provision in Niger, referring to "informal privatization" and co-funding of public services. Solo (1999) discusses how public policies have supported small-scale entrepreneurs in water provision while the monitoring of the quality and price of the services the entrepreneurs provide remained the state's responsibility. Her study focused on a great range of urban areas in Africa, Asia and Latin America. In the context of Europe, Wehn and Evers (2015) show how ICT-

enabled citizen observatory technologies enabled new roles for state actors and citizens, further highlighting the role of technology in institutional co-production in the water sector. The literature on institutional co-production as a driving force for frugal innovation in the water sector, however, is non-existing. In this study we strive to fill this gap by introducing institutional co-production as an enabler of co-produced frugal innovation and point to some of the social implications of this phenomenon.

3.2 Co-producing value through frugal innovation: the seller consumer dyad

The appropriateness of using the theoretical lens of coproduction in the conceptualization of frugal innovation becomes evident if the value from innovation is understood as emerging from the provision of not just a product, but a service e defined as the "process of providing benefit[s]" (Vargo and Lusch, 2004, p. 6). This is the direction that is pointed to by Bhatti (2012) as well who argues that "… affordability [in frugal innovation] extends beyond simply the cost of the solution to operational and disposal costs. A product or service needs complementary solutions, resources and infrastructure to continue performing to its worth." (Bhatti, 2012, p. 15). The service dominant view (Vargo and Lusch, 2004) in marketing has led to an increasing recognition of the salient role of the customer in creating shared value. As we elaborate on later, a significant aspect of the value resulting from the frugal innovation is the high degree of "customer centricity (which) means more than simply being consumer oriented; it means collaborating with and learning from customers and being adaptive to their individual and dynamic needs. A service-centered dominant logic implies that value is defined by and co-created with the consumer rather than embedded in output" (Vargo and Lusch, 2004, p. 6).

4. Research methods

Case studies are a well-established research strategy in social sciences (Eisenhardt, 1989; Piatt, 1988; Yin, 2003). Our study utilizes a mixed method approach, drawing both on qualitative and survey data to inform the case of low cost household RO filters in Ahmedabad. A mixed method approach is particularly suitable for capturing the interactions between overarching societal structures and the agency of individuals (Fries, 2009) while allowing the use of multiple methods to address research objectives (Creswell and Clark, 2010). Such approach was embarked upon as a variety of data types are required to address the aim of our research. We used quantitative statistical survey data on the diffusion of the RO technology, statistical open-ended questions on perceived water quality and health concerns; and, qualitative in-depth interviews on RO entrepreneurs' business models and the dynamics of coproduction of drinking water.[6]

[6] Prior, and partly in parallel to this study, one of the authors participated in a technology evaluation project on water filters during June-July 2014. This work enabled the formation of contextual understanding on issues surrounding RO filters and water quality in Ahmedabad. Moreover, media articles and initial results of the CITE project provided useful background information on the topic.

4.1 Questionnaire survey

The survey results utilized in this study were collected as part of a larger technology evaluation project. The project targeted urban and peri-urban households in the Ahmedabad metropolitan region. Data collection took place in June-July 2014, and with the support of trained enumerators, altogether 264 household surveys were generated. The sampling was purposive, rather than randomized, based on the larger project's overall objectives.[7] 50 of the surveys were with households owning a low cost RO filter, 50 with households owning a branded RO filter. For this paper, we only use data from these households to primarily the describe user backgrounds and estimate aggregate measures of expenditures on different types of filters in order to describe the diffusion of RO filters.

4.2 Semi-structured interviews and focus group discussion

The qualitative data consists of ten semi-structured interviews and two focus group discussions (FGDs) with end users, as outlined in Annex A. The semi-structured interviews were conducted with five RO entrepreneurs, one water filter distributor, one representative of water filtration business association, three representatives of the Municipal Corporation and quasi-governmental organization. The interview guides were developed around RO entrepreneurs' business models and customer relationships, end users' perceived water quality and health risks, and public water supply in Ahmedabad city. Most of the RO entrepreneurs were identified through the prior survey study on water filter suppliers in Ahmedabad as part of the technology evaluation project. Participants for FGDs consisted of women responsible for household water, selected from relatively similar socio-economic backgrounds. In each organization, we interviewed information-rich (Patton, 2005) individuals who were responsible either for the business, or for the public sub-sector activities. [8]

The transcripts were inductively coded to categorize sections of the text into broad themes (Eisenhardt,1989; Spiggle,1994; Strauss et al., 1990) that were derived from interview notes and several indepth discussions among the research team. These themes were then conceptualized further drawing on the literature on frugal innovation, institutional co-production and the marketing literature on co-production.

[7] Specific filter category users were targeted to ensure enough respondents from each category while also covering all income groups from specific communities throughout the city to ensure substantive representatives.

[8] Six interviews were conducted in Gujarati language with consecutive translation, and four interviews were undertaken in English language. The FGDs were facilitated by the research assistant, trained on the method by the researcher. The language used in the FGDs was a mix of Gujarati and English. All interviews and FGDs were recorded. The recordings were transcribed in detail, resulting in 127 pages of single-spaced interview text.

5 Results and discussion

End users, RO entrepreneurs, government authorities, RO filter manufacturers, importers, and health professionals interact through a set of social, material, and financial relations to access, manage and provide water supply in urban Ahmedabad. Not only is Ahmedabad one of the fastest growing cities in India, the "Gujarat model of development" that it emblemizes has come to be celebrated as a template for the rest of India (The Economist, 2015). Our study shows how drinking water is being institutionally coproduced, and how this links with frugal innovation with regard to low cost RO filters. In the next paragraphs, both our quantitative and qualitative data are crafted into a dynamic set of research accounts, emphasizing the perspectives of the different actors within the co-production processes.

5.1 Low cost RO filters and their diffusion: a case of frugal innovation

In this section we highlight the frugal characteristics of the low cost RO filters by comparing them with their "non-frugal", branded counterparts. Low cost RO filters are not only cheaper to acquire, but also cheaper to service and maintain. The average purchase price of the low cost RO filters was Rs. 6895 ($108); and Rs. 11758 ($185) for the branded RO filters. Similarly the annual servicing costs were Rs. 2075 and Rs. 3124 among the low cost and branded RO owners, respectively. Compared to the owners of branded filters, the owners of low cost RO filters are less educated, have lower incomes and are less likely to have used water filters while growing up as shown in Table 1. These results suggest that the low cost RO filters have indeed deepened the market for RO technology, reaching less affluent consumers than the branded ones and thus responding to the needs arising from resource constrained environments.

Interestingly, owners of low cost RO filters do not differ much from their branded counterparts on factors that influenced their purchase decision, except on the influence of the "brand" (see Table 2). Over 73 percent of branded RO filter owners report being influenced by the brand in their choice of filter, while only 41 percent of low cost RO filter owners report the same. Perhaps indicative of the reduced information asymmetry between buyers and sellers, compared to 58.5 percent of branded filter owners, nearly 74 percent of low cost RO filter users report that their purchase price was about what they had expected to pay. Similarly, while 32 percent of branded filter users report the purchase price as being more than what they were expecting, the number is around 17 for low cost filter users. Overall, 96 percent of low cost RO users report being satisfied with their water filter as compared to 92 percent of branded RO users.

The low cost substitutes also find scientific validation on the quality of their product. In one of the few scientific examinations of the performance of water filters in the Ahmedabad market the authors find the local ROs to be "… designed similarly to the highpriced RO filters. But, it was evident that some features were eliminated and there was the use of cheaper materials for the dolphin filters [a term often used to refer to the locally assembled low cost RO filters]. Nonetheless, in terms of performance the one we extensively tested, the Clean Water ($100), did as well if not better than the much higher

cost Tata Swach Platina ($300).” (Comprehensive Initiative for Technology Evaluation, 2015, p. 50). The scientific validation and the fact that it has occurred and significantly reduced costs are indicative of reasons that make this an interesting case to understand the dynamics of frugal innovation.

5.2 Elements of institutional co-production in quantity and quality of drinking water supply in Ahmedabad

Our study shows how institutional co-production of drinking water takes place between the state and the citizen. Within this dyad, business opportunities open up for RO entrepreneurs to fulfil the needs of users that actively seek for solutions to improve the public service.

5.2.1. Co-producing the quantity of water

With a population of around 6 million, the context of Ahmedabad city is interesting in terms of water supply. Historically, groundwater was the dominant source of water for the residents of Ahmedabad. In the last 30 years, the city experienced scarcity of

Table 1
Profiles of users by filter type (percentages).

Demographic data from the survey	Low cost RO filter	Branded RO filter
Completed 12th grade	70,7	90,5
Own a car	64	74
Monthly Income		
High income group (>$550)	61,3	80,0
Middle income group ($250-$550)	19,3	17,5
Lower income group ($125-$250)	9,8	0
Economically weaker section (<$62.5)	9,8	2,5
Size of household (number of persons)	4.61	4.477

Table 2
Factors influencing decision to buy the filter the respondent currently owns.

Factor	Low cost RO filter	Branded RO filter
Price	36,6	33,3
Design/Looks	31,7	34,1
Performance	85,4	88,9
Size	40	52,3
Brand	41	73,3
Warranty	72,5	68,2
Customer care	66,7	68,2

water and the main source of supply was changed from groundwater to surface water (Bhatkal et al., 2015). Today, water supply per capita within Ahmedabad city is estimated at 170 L per day [9]. The Ahmedabad Municipal Corporation (AMC) further estimates that 90 percent of the current water supply stems from surface water (Herma, 2013) e a shift that was enabled by linking Narmada river into the city of Ahmedabad. This percentage, however, does not take into account the unregulated private bore wells that enable a continuous flow of water to middle and upper middle class housing societies, as compared to the intermittent municipal water supply.

5.2.2. Co-producing the quality of drinking water

Narmada's surface water is relatively low on TDS and the AMC monitors several water quality parameters within their water treatment plants [9]. These serve as the basis for the belief among the interviewed government officials that "there is no need of RO, we are publicly announcing that we don't need RO in Ahmedabad city."[9]. However, when mixed with brackish groundwater from private bore wells at residential areas, the TDS levels rise accordingly. According to a recent study, water being consumed in Ahmedabad has a high TDS level; the median TDS value being 639 mg/L (Comprehensive Initiative for Technology Evaluation, 2015). The shift because of mixing high-level TDS ground water with municipal water supply, coupled with distrust in the water supply network infrastructure of AMC, appears as a key driver for citizens to opt for household RO water filters [12].

5.2.3. Business opportunities in-between the state and the citizen

The RO entrepreneurs that sell and service the low cost RO filters have relatively simple operational model: they buy parts for RO filters from importers and wholesalers and assemble filters in their shops or storage spaces that are much smaller and cheaper than traditional retailers selling branded RO machines. RO entrepreneurs have a wide supplier base, with Ahmedabad being the second largest hub in India for importers of water filtration technology [7]. The relative simplicity of the core business model, the lack of state regulation and technology certification schemes has implied low barriers to entry. There are no exact figures on the number of RO entrepreneurs in Ahmedabad, but the chairman of the newly established Water Purification and Treatment Association of Gujarat (WAPTAG) estimated the number to be more than 7000 [4]. The ambiguity in the numbers also stems from the informal nature of some of the businesses, with many choosing not to formally register to avoid tax payments [7].

In contrast to the government officials the entrepreneurs are optimistic about the future of their business around RO filters. They are encouraged by the new residential areas with bore well water continuously being constructed, the increasing public awareness of the poor quality of the drinking water and the rising distrust towards public services. In a clear pointer to the manner in which the demand for low-cost RO filters is generated, entrepreneurs look at the future optimistically:

"In Gujarat, water and rivers are not there, so levels of water are going to fall lower. The more the depth from where water is taken, the higher the salts, so it [the rising demand for RO filters] will continue. The demand will keep increasing if the government does not put emphasis on this. If this happens, our business will reduce a bit. But everybody will not trust the government … they will install their own filters. I see a lot of growth in the coming 10 years. I feel it. People in my home village also have started installing RO." [3].

"And the health has become one of the priority for people here. So this is one of the reasons why, you know, the volume on the industry have grown substantially. It's not like 10%, 20%. I am talking in 1,000 times like what I used to do in 2002 or what I do today, it's 1,000 times." [7].

5.3. Demand-driven co-production of frugal innovation

"We will need to provide three aspects simultaneously. One, sell cheap, two, sell good quality, and three, provide technology." [4]

The co-production of the frugal innovation takes place in the context of institutional co-production, between RO-entrepreneurs and users. Here, we describe specific ways that enable the deliverance of a service that creates customer value despite reducing costs and the role and end users play in the process.

5.3.1. Making "quality" visible

The investment in water filters represents private investment in improving water quality. While the AMC monitors several water quality parameters within their water treatment plants [9], the TDS[9] becomes the one and only measurable parameter at the household level with sales and service staff frequently demonstrating TDS levels using easy to use and interpret meters. We also find some end users owning TDS meters themselves. As a result of its easy measurability, TDS comes to define water quality for users and becomes the subject of constant negotiation and customization.

"I tell the agent who visits many times to check the TDS in front of me. So, whenever he is visiting once or twice a year, I ask him to bring the TDS measuring machine so that I would know whether my water is clean or not." [12].

[9] TDS, a key measure in our study, originate from natural sources, sewage, urban and agricultural run-off, and industrial wastewater (WHO, 1996). According to the World Health Organization (WHO), the presence of TDS in water may affect its taste, making it more of an aesthetic attribute rather than health hazard. While water with extremely low concentrations of TDS may also be unacceptable because of its flat, insipid taste there are also concerns about the adverse health consequences (e.g. cardiovascular disorders, tiredness, weakness or muscular cramps) of drinking "demineralized" water (Kozisek, 2005). The Official Indian government standards classify as "acceptable" concentrations of 500 mg/l but also classify as "permissible" a limit of 2000 mg/l, in the absence of an alternate source.

Concerns about the TDS were also the most frequently mentioned reason for buying RO filters (33 percent of respondents). While RO filters promise a reduction in TDS, most users are also watchful of low TDS levels, associating it with the absence of essential minerals [11; 12]. Anxiety around Vitamin B12 deficiency and its potential relation to drinking desalinated water was frequently mentioned and so were solutions engineered by endusers and the local RO entrepreneurs [11; 12]. Such solutions included utilizing normal water for cooking to increase the TDS intake [11]; and removing the whole RO membrane and turning the filter into a purifier [12].

While end users discussed their health anxieties with doctors, they also turned to their local RO entrepreneur for solutions.

> *"I telephoned the RO person and told him that according to him, this should be the TDS level, but the doctor states that my health has deteriorated due to RO water. Please show us a way out. The RO person stated that it is true. If those salts are not present which the body needs, this may happen. Take tap water in a big utensil and boil it and then cool it. Mix this water with the water in your earthen pot. Adopt this method, your problems will reduce." [11].*

In other cases, the RO entrepreneurs find their own advice unheeded by customers and feel compelled to innovate to mitigate health issues:

> *"We do explain that based on TDS count, requirement is of purifier only. Then the customer states that their doctor has asked them to drink RO water only. So on customer's insistence, we install the machine. Then we put a different TDS control valve, so that the TDS can be improved from 50 to 150. The customer does not know that TDS can be set up. This needs to be done so that we don't lose the customer. We won't create a health problem for the customer." [2].*

The closeness to end users enables RO entrepreneurs to stay tuned to their concerns. New technologies that are in continuous development, such as anti-scalar balls, mineral cartridge, alkaline cartridge (addressing issues of water acidity), and TDS control valve make it possible for RO entrepreneurs to customize filters to their customers' type of water supply, tastes and perceptions about the optimal TDS [2; 3; 4; 7].

The increased choices also imply more responsibilities for the end user. They are responsible of monitoring the water quality, the maintenance of the water filter, as well as the responsibility to choose between different technologies, designs and brands to meet their requirements for water quality. Often interpreted as increased citizen burden in the institutional co-production literature, the RO entrepreneur often steps in to ease the burden. This might be through the kind of suggestions described above or through provision of customized services. For example, a long-term insurance for good water quality requires maintaining the RO filter regularly. While this naturally falls within the responsibility of the households, RO entrepreneurs respond to this need in ways that not only meet the customers' specific needs but also helps develops relationships of trust.

5.3.2. Service as a means of creating value

While low cost RO entrepreneurs have significantly driven down the costs of ownership of a technology, selling the product at a lower price is no guarantee of success (for instance see Dhume (2011) on the celebrated case of the "world's cheapest car"). This is particularly true in a technology like RO filter that requires regular maintenance and service. RO entrepreneurs are acutely aware of the need to go beyond the selling of a low cost product: they not only emphasize the importance of providing good maintenance service but also use it as a means of gathering information, building trust in their customer relationships and substituting for other marketing efforts.

The entrepreneurs train and employ long-term maintenance staff: trustworthiness of personnel is an important characteristic as these people visit end users' homes. Our surveys suggest women are predominantly responsible for maintaining water filters in the household [74 percent in the survey] and thus security becomes an important issue. In the ideal situation, one maintenance person would always cater for the needs of the same household, thus establishing a long-term relationship [4]. With each maintenance encounter, social relations are reproduced, and the relationship between the end user and the service provider gets strengthened if end users are satisfied with the service. Contrary to this, it was commonly narrated that the maintenance services provided by large manufacturers were impersonal and expensive [3; 4; also evidenced by the survey]. The flexibility and timeliness of RO entrepreneurs' maintenance services was regarded valuable to the end users:

> *"Because also he came on Sunday, we had a problem with our motor, he came on Sunday and he fixed. And we were not left without water for more than 5 h" [12].*

The entrepreneurs are cognizant of this. When conducting maintenance, fast response time to end users' request was regarded essential:

> *"If a customer faces any problem, we respond within 6 h and that is our resolution time, which is counted from the time the customer makes a complaint call …""We provide on the spot replacement of part which has a defect."[4].*

The RO entrepreneurs in our study did not incur any marketing expenses; instead they counted on the word-of-mouth marketing of their current client base. Such word-of-mouth marketing is assumed to be the direct result from providing good maintenance services and is perceived as the main mechanism for obtaining new customers [6]. The RO entrepreneurs also leverage on the marketing efforts undertaken by larger branded filter companies such as Kent and Eureka Forbes. We observed brochures on Kent filters in one RO entrepreneur's shop [3] and found the key selling arguments of the RO entrepreneurs downplaying the differences between assembled and branded RO filters [1; 3; 4; 7; 12]. Some RO entrepreneurs furthermore hold customer data records, either manual customer cards [3] or digital customer management systems [4]. However, these are fairly rudimentary and instead rely on their closeness to the customer and quick response times to customer complaints.

6. Conclusions

Water provision in urban contexts entails challenges that neither the public and private sector have been able, or willing, to deal with adequately (Ahlers et al., 2014). In this paper, we shed light on the complex and multifaceted phenomenon of the institutional co-production of drinking water, where multiple actors interact in the realm of public good provision in the city of Ahmedabad in India. In studying this case, we have taken a step in trying to understand and conceptualize the dynamics of innovation among local entrepreneurs and end users of low cost water filters that use the reverse osmosis (RO) technology.

Prima facie, there appears to be a clear division in responsibilities between the public and private spheres: quantity of water being provided by the state, and quality of water being delivered to middle and high income population by private actors through market based solutions. However, we find these two separate functions to be closely interlinked. The restricted quantity of water provided by the state has propelled the establishment of private bore wells, thus shifting the monitoring of water quality out of governmental actors' control. Distrust towards the water distribution network moreover diminishes the efforts undertaken by the government to purify water within centralized water treatment plants. We discuss how the private sector responds to this opportunity provided by state failure and user demand, focusing on the activities of local entrepreneurs in innovating solutions around RO water filtration technology. The innovation process that is consistent with the label of frugal innovation, has not only reduced costs but provided space for urban middle and high income residents to play an active role in the co-production of the water they drink. Illuminating the role that end users play in the co-production of frugal innovation is a contribution of this paper and we hope it is a line of inquiry that can further our understanding of the frugal innovation process.

Studies examining the consequences of the increased role of the private sector in water provision have typically looked at the privatization of water utilities and private activity is often portrayed as a direct consequence of state failure and withdrawal (Haughton, 1998; Bakker, 2010; Bakker et al., 2008). We extend this depiction by including the citizen as an active agent both within the institutional co-production through which space for private activity is being created; and as co-creating the frugal innovation process jointly with the RO entrepreneur. In our case, user demand for water innovations is tangibly expressed, unlike in many parts of Europe where it is public policy that is expected to play that role (Krozer et al., 2010). While the state can be faulted on the insufficiency of water supply, users of household RO systems do not segregate the storage of surface (with acceptable limits of TDS) and ground water. This seems to leave them with the RO filter as the only means of obtaining drinking water that is acceptable to their palate and perceptions about water quality. If service co-production or co-creation is considered as a value in itself, as the systematic literature review by (Voorberg et al., 2014) suggests it typically is, then we have evidence of that happening in the realm of water provision in Ahmedabad. Unfortunately, while the private sector (as represented

by the local RO entrepreneurs) and a section of the society appear to gain from it, efforts of the public sector are annulled by citizen behaviour.

Users' own anxieties around the relationship between drinking RO processed water serve as a key driver behind some of the innovative practices of the local entrepreneurs. But the risk is that users make choices on what is easily measurable. The innovations that have resulted include mixing a certain percentage of the inlet water (untreated by the RO process) to increase the TDS count as a means of remineralization (Bhaduri et al., 2015), raising questions about the necessity of using the RO process itself. While the consequence of demineralized water on health awaits more rigorous inquiry (Catling et al., 2008), the ecological consequences are better understood. The depletion of ground water and accompanying salanity that makes RO technology even more attractive is unlikely to be sustainable due to the large amounts of wastewater generated within the RO process. For municipalities where water is scarce and/or expensive to buy, this issue of wastewater and disposal is also a cost concern (Comprehensive Initiative for Technology Evaluation, 2015). The failure of the state to intervene in the market and act to address the wastage and health concerns are probably signs of either the state's unwillingness or inability, a topic that would require further research.

In a modern society, where “desires of individuals are considered as a driving force for learning, development and innovation, which is believed eventually to improve the quality of people's lives” (Vollenbroek, 2002, p. 216), innovation of the kind exhibited by the local RO entrepreneurs is typically celebrated. However, our paper raises several critical questions around the dynamics of frugal innovation in a sector like water. Most frugal innovation seeks to meet choices being made by individual consumers by transactions in the market. As Chataway et al. (2013, p.13) remark, “the more inclusive innovations reduce the acquisition cost of products, the more likely consumption decisions will be made at the individual or household level”, and not at the collective level. As the technology rapidly diffuses with reduction in costs, the imperative for regulation increases even further. However, the regulator will have to balance public health and ecological concerns against the benefits to consumers of rapid innovation that are enlarging the market and meeting heterogeneous consumer preferences. In trying to achieve this balance, it might be beneficial for it to turn to the idea of institutional co-production (Ostrom, 1996). Our study highlights that the end user is willing to be an active agent in the production of clean water and finds a willing partner in the local RO entrepreneur. Similarly, the state would need to innovate new ways to engage with citizens.

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Annex 1.A. Interviews and FGDs of the study.

Code	Type of organization	Position of respondent(s)	Interview/FGD date
[1]	RO entrepreneur	Owner	8.7.2014
[2]	RO entrepreneur	Owner	9.7.2014
[3]	RO entrepreneur	Owner	10.7.2014
[4]	RO entrepreneur	Owner and technician	11.7.2014
[5]	Home appliance shop; Distributor of KENT water filters	Owner	12.7.2014
[6]	RO entrepreneur	Owner	15.7.2014
[7]	Business community	Vice President	16.7.2014
[8]	Quasi-governmental organization	Retired project manager	17.7.2014
[9]	Municipal corporation	Chief City Engineer	18.7.2014
[10]	Municipal corporation	Medical Officer of Health	18.7.2014
[11]	N/A [FGD of five participants]	End users	14.7.2014
[12]	N/A [FGD of six participants]	End users	18.7.2014

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ANNEX 2: ARTICLE 2

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Co-producing drinking water in rural Ethiopia: governmentality in the name of community management

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Abstract

In rural drinking water governance, the reliance on community management has permeated development programmes and water policies for decades. Moving away from a community-centric view, this paper expands the focus to a broader landscape in order to investigate how the state, citizens and other non-state actors co-produce drinking water in the Amhara region of Ethiopia. The study seeks to understand what kinds of power relations are being (re)produced among co-producing actors through the discourse of community management. The conceptualisation of power relations is undertaken by employing Foucault's governmentality perspective. As its empirical material, besides an examination of policy documents, the study utilises interviews with community Water, Sanitation and Hygiene Committees (WASHCOs), woreda (district) and regional water officials, private suppliers, NGO representatives, artisans and other actors. As a conceptual contribution, the paper makes power visible in the otherwise depoliticised literature of co-production. For governments and development practitioners, the study urges the opening up of spaces for discussion by showing how the vocabulary of community management can be appropriated to (re)produce power structures.

KEYWORDS: Co-production, community management, governmentality, rural drinking water governance, Ethiopia

Introduction

As a concept, community management emerged as an eminent form of rural water governance in the 1980s, during the first UN-declared International Drinking Water Supply and Sanitation Decade. At that point, a demand-driven community-management approach started to gain prominence (Whittington et al., 2009) in response to an increasing dissatisfaction among communities, governments and other sector professionals with supply-driven models. Commonly regarded as an extension of the participatory paradigm from international development policy into the water sector, community-based approaches quickly became mainstreamed into a sequence of policy statements instituting the "global water consensus" (Cleaver and Toner, 2006; Cleaver

et al., 2005; UNMDP, 2005). The consensus was grounded primarily on ideas such as community participation, cost sharing and ownership (Cleaver and Toner, 2006). These principles soon became celebrated as a panacea for effectiveness, sustainability and community empowerment and they legitimised a rapid construction of community-managed water points in rural contexts around the world. Despite the surprisingly enduring support and enthusiasm for community management from governments, international donors and NGOs, the approach has not reached its anticipated potential. A generation of scholarship has pointed out he practical and theoretical flaws of community-managed drinking water (Brown, 2011; Chowns, 2014; Cleaver, 1999; Cleaver and Toner, 2006; Harvey and Reed, 2006; Jones, 2011; Meinzen-Dick and Zwarteveen, 1998; O'Reilly and Dhanju, 2012; RWSN, 2017; Whaley and Cleaver, 2017). Rural water points continue to break down before the end of their design period, with more than a third of community-managed handpumps being non-functional at any given time (RWSN, 2017).

In policy and practitioner discourses, the low levels of water point functionality have been attributed to several causes: affordability of maintenance, limited demand or acceptability of water points among communities, changing community-management structures, low technical quality of pumps, environmental issues that lead to the drying up of wells, and weak post-construction support (Harvey, 2008; Koehler et al., 2015; Madrigal et al., 2011). In the past, the need for ongoing post-construction support from governmental or other development actors has materialised in the so called "community management plus" approaches (Baumann, 2006) and the broader movement to create "enabling support environments" that would help communities sustain the use of water points (Lockwood and Smits, 2011). The underlying aim of these sets of supporting practices is to ensure that communities are not left alone without adequate support from governments and other agencies in maintaining and managing water points. In an attempt to acknowledge the joint responsibilities of communities and state and non-state actors, recent scholarly work has started to utilise co-production – instead of community management – as a concept in water governance (see, for example, Ahlers et al., 2014; Hutchings, 2018). This discursive shift relieves the community of some of its responsibility and creates more realistic expectations of community-level institutions (Hutchings, 2018); also, with such a change in vocabulary, mechanisms for holding governmental and other actors to account for their anticipated support become normalized.

This paper looks at community-managed drinking water programmes in the Amhara region of Ethiopia. An early empirical finding in the study revealed that processes of sustained use of water points are very much entangled with relations among communities, governmental, non-governmental and private sector organisations, that is to say among an extended array of actors. Utilising the label of community management and focusing mainly on communities did not correspond to the practices unfolding in the context of this study, even though the vocabulary of community management was prevalent in the interviews and policy documents. The choice to examine community-management programmes from the perspective of co-production allowed for a more

pluralist and empirically grounded view of water governance, one that went beyond the binary and normative divides between the state or NGO, and communities (Ahlers et al., 2014). Co-production of drinking water is typically envisioned to take place in a neutralised, collaborative effort between communities and governments or NGOs, in a process that involves user communities at each phase of the implementation; however, such a consensual approach contradicts a long line of research that frames water as inherently political and riddled with power effects (Bakker, 2000, 2003; Budds and Loftus, 2014; Gandy, 2008; Kaika, 2003; Swyngedouw, 1995, 2004). Recognising the political importance of water, the collaborative nature of co-production (see, for example, Farr, 2017) is questioned in this research, as the tensions and power relations among the actors tend to be hidden. The aim of this paper is to examine and make visible power relations that exist among the extended array of actors in co-producing drinking water in Ethiopia, and to examine the potential consequences of such power relations. Specific focus is placed on the community-management discourse and its utilisation in (re)producing power effects. For conceptualising power, Foucault's governmentality perspective is applied, with a focus on governing techniques and the processes through which people govern and freely produce themselves as governable subjects. The attention is therefore on the 'how' question: how power works, between whom, through which mechanisms, and with what kinds of consequences (Foucault, 2010).

The research contributes to the work of illuminating how power is (re)produced through water practices and governance discourses (Bakker, 2000, 2003; Gandy, 2008; Kaika, 2003; Swyngedouw, 1995, 2004), with a specific contribution to the co-production literature. This is undertaken through qualitative interviews and policy documents on community-managed drinking water, focusing on simple technologies such as hand-dug wells and spring-protection developments meant for domestic use of water. The following section presents a literature review on co-production and outlines the theoretical framework of governmentality that guides the analysis of this paper. In the third section, the methodology of this study is presented; this is followed by an analysis of the empirical material. The discourses and practices of community management that are utilised in governmentality illuminate the power structures that are in play among a variety of actors in the co-production of drinking water. The final section offers concluding remarks and discusses the limitations of the study.

Co-production as a policy discourse and practice

Since the 1970s, a growing body of research and practice has emphasised the role of citizens in the active joint co-production of public services with state and non-state actors (Alford, 2008 Bovaird, 2007; Joshi and Moore, 2004 Ostrom, 1996; Parks et al., 1981; Stephens et al., 2008). Co-production as a public policy and practice has gained attention as "a process through which inputs from individuals who are not 'in' the same organization are transformed into [the] goods and services" they use (Ostrom, 1996: 1073). Eleanor Ostrom received a Nobel prize for her important work in changing mindsets around the perception of citizens as solely passive recipients of public services; however, after an initial interest in co-production, the concept experienced a steady

decline as an academic field of study. The New Public Management paradigm emerged in the 1980s, prioritising efficiency, target-setting, accountability and a more 'business-like' approach; it attracted the interest of researchers and policy makers alike. Recently, however, public policy literature has witnessed a resurgence in attention towards co-production (Alford, 2014; Brandsen and Pestoff, 2006; Osborne 2010; Osborne et al., 2012; Pestoff 2006; Thomas, 2012); this has been partially due to the failures experienced by private sector engagements in public service provision, as promoted in the New Public Management discourse. Bovaird and Loeffler (2012: 1136) framed the silence around user and community co-production to be "one of the best-kept secrets of public governance over the past few decades". As a policy discourse, it is now being 'outed' as a key element in improving public services and identified as an object of systematic management (Bovaird and Loeffler, 2012). Development practices and policies have a long history of involving people as co-producers through participatory governance mechanisms (Joshi and Moore, 2004; Olivier de Sardan, 2011; Ostrom, 1996; Solo, 1999). In 1996, a series of influential articles published during a symposium entitled "Development Strategies Across the Public-Private Divide" (also published in World Development journal, see Evans, 1996) mainstreamed co-production into the realm of development discourse (Ackerman, 2004). Co-production has often been promoted as a normative response to public governance failures in the Global South. The economics perspective suggests that especially poor communities would benefit from co-production, since they are expected to have a lower 'opportunity cost' of devoting time to co-production (Isham and Kähkönen, 1998; Joshi and Moore, 2004). In many countries, weak service provision by the state and issues of affordability increase the desirability of self-help and co-production (McGranahan, 2015; Mitlin, 2008); in turn, communities are arguably likely to get better public service than what they would otherwise be able to receive. Other streams of research promote co-production as a route to participatory democracy and empowerment (Fung, 2004; Ostrom, 2000), greater satisfaction in services (Brandsen et al., 2013), or better service quality (see, for example, Bouchard et al., 2006; Parks et al., 1981). The proponents of co-production argue for its potential to reflect democratic ideals beyond representative government (Bovaird, 2007; Fung, 2004; Ostrom, 2000) as participating in the process of co-producing public services presumes that citizens would have direct control over outcomes.

The positive portrayals of co-production as a new governance mechanism have been contrasted by critical studies examining it at a discursive level. Critics assert that co-production serves at best as an ambiguous and overly consensual approach that can depoliticise access to public services (Eriksson, 2012; McMillan et al., 2014). Even the prefix 'co' in the word itself contains the suggestion of an assumed collaboration and straightforward relations between state and non-state actors. This is reflected in the rejection of politics and power dynamics within the co-production literature in general (Boaz et al., 2016; Donetto et al., 2015; Mitlin, 2008; Ocloo and Matthews, 2016), and the circumscribed participation implicit in the literature in particular (Ackerman, 2004). Scholars have also pointed to the underlying assumption of public governance failure within the co-production discourse (for example, Joshi and Moore, 2004; Ricks, 2016); the suggestion here is that, through the rhetoric of failure, responsibility for producing

public services can legitimately be delegated outside the realm of government and towards the private market and citizens, thereby masking its political aims of neoliberal governance. Co-production has been analysed as reproducing neoliberal free market ideology and as a fix for the consequences of austerity (McGimpsey, 2016), where paid public personnel can be replaced by co-producing citizens (Fotaki, 2015). Another criticism concerns the practical implementation of co-production as a public policy. In that scenario, citizen organisations are often the result of top-down state policies rather than bottom-up organising for public services (Ricks, 2016); the democratising grassroots ideals of co-production are thus called into question. Despite the controversies, different varieties of institutionalised co-production prevail, especially in the Global South where participatory approaches to development – often incited by the international aid community – have for decades been mainstreamed into national policies.

Power, governmentality and water governance

This section comprises conceptual elaborations on how power is understood and analysed in relation to water governance. People's lives, experiences and subjectivities are entangled in the processes of accessing and using water and are therefore affected by power relations that transpire within and through water governance (Stern et al., 2015). As identified by Brisbois and de Loë (2016), water governance draws on several power perspectives, notably those of Foucault, Habermas, Gramsci and Lukes (Behagel and Arts, 2014; Dore et al., 2012; Zeitoun and Allan, 2008). In this study, Foucault's governmentality is chosen as an analytical lens to study how power works: between whom, through which mechanisms, and with what kind of consequences (Foucault, 2010). Governmentality is a useful lens through which to study the dynamics of power relations due to its focus on governing techniques and on the processes through which people govern and produce themselves as governable subjects. It is especially suitable for the study of co-production, as it does not distinguish who is governing whom and thus avoids reproducing dyadic state – citizen divisions; furthermore, governmentality approaches power as a diverse set of power relations between macro political truth regimes and micro practices of individuals (Foucault, 1991). It therefore becomes possible to link macro-level global discourses on neoliberal governance, co-production and community management, with micro-level practices and discourses which shape and are shaped by community members, private sector actors, and governmental officers in the studied context.

The concept of governmentality was introduced by Michel Foucault as a perspective on the constitution of power (Lemke, 2007). Foucault traced historical shifts in the rationalities of states in governing populations, ranging from disciplinary, coercive power to more liberal forms of governance. In more liberal societies, subjects would enter their governable subjectivities freely, giving their consent to reforms and ultimately self-regulating and conducting themselves (see Birkenholtz, 2009). This is the "conduct of conduct" (Foucault, 1975) in governmentality: instead of emphasising the practices of state administration, governmentality focuses on the ways through which political

rationalities use explicit, calculated programmes of government to render subjectivities governable and administrable (Dean, 2010). Governance agendas of the state "[enter] the imagination, re-structure the sense of self, and re-direct the practices of willing subjects" (Rocheleau, 2007: 222); governmentality then becomes understood as the organised practices (mentalities, rationalities and techniques) through which subjects are governed (Mayhew, 2004). Foucault emphasised that the conduct of conduct does not transpire through domination and coercive power, but rather requires freely willing and active individuals and communities in order to function; it works through normalising power (Foucault, 1975) that includes processes of both objectivation and subjectivation. Normalising power establishes norms for proper, normal behaviour within which deviant practices are condemned to invoke morality, guilt and self-correction. With objectivation, a subject's deviant behaviour is considered to be an object for government intervention, whereas in subjectivation the subject would self-correct and self-regulate in order to be considered normal (Foucault, 1975; cf. Cadman, 2010).

In the context of water, several studies have applied a governmentality perspective to water governance (for example, Birkenholtz, 2009; Boelens et al., 2015; Gemechu, 2018; Hellberg, 2014, 2019; Kooy and Bakker, 2008; Rogers et al., 2016; Vos and Boelens, 2018). Looking at water governance through the lens of governmentality has produced analyses on water reforms in various geographical contexts (for example, Boelens et al., 2015; Birkenholtz, 2009; Rogers et al., 2016). Such analyses have documented states' techniques not only in governing water (through, for example, expansion of the bureaucratic apparatus, support of state-convenient market actors), but also on states' attempts to control or co-opt water user groups through water policy reforms (Boelens et al., 2015). States may attempt to gain 'consent' for their efforts to devolve state control through decentralising water governance – as in cases where public awareness campaigns have been used to promote decentralised groundwater conservation (Birkenholtz, 2009), or in normalising water scarcity through the media in order to legitimise state interventions (Hellberg, 2019; Mehta, 2001, 2003). Hellberg's (2019) study in South Africa, for example, showed how 'water scarcity' was used as a physical phenomenon to regulate the poor, conflating the political reasons why poorer people have historically suffered from unequal access to water. Babu's (2009) work on water governmentality in India shows how the state's promotion of active citizenship serves as a governmental technique. Active citizenship discourse works as a rationality of subjectivation, through which communities freely redefine and reformulate their rights as duties, and resistance as ignorance. A separate stream of research has focused on the subjectivation of end users in turning towards market-based solutions and technologies in relation to water problems (Gemechu, 2018; Ekers and Loftus, 2008; Loftus, 2006). These water governmentalities entangle national policy with the need to meet the market needs of international and national investors (Boelens et al., 2015; Birkenholtz, 2009; Hansson, 2014), foregrounding the transnational character of water reforms. In this study, governmentality is used to analyse the practices of conduct of conduct, that is to say the mentalities, rationalities and techniques among the co-producing actors. Such an analysis will shed light on the workings of normalising power in the studied context: how

subjects are objectivated, and how subjectivation works, or does not work, through subjects' self-regulation.

Methodology

This article draws on interviews with individuals and groups in Ethiopia and on an examination of the country's main policy documents on rural water governance. Qualitative interviews were conducted with 56 individuals or groups, including 27 community organisations (Water, Sanitation and Hygiene Committees), 9 government officials from the Woreda (administrative district) Water Offices (WWOs), 10 spare parts suppliers, 1 artisan association, 1 microfinance representative, and 5 NGO representatives; the rest of the interviews were conducted with individuals at the regional and federal levels (see Annex 1 for all interviews). For the policy analysis, six main water policy documents were studied (see Annex 2) in order to gain an understanding of the policy processes and strategies of water governance in Ethiopia.

At the time of data generation, I had been working for two years in a bilateral development project on community-managed drinking water governance in Ethiopia. Some of the interviews took place in April and May 2013 in the Amhara region and in the city of Addis Ababa while I was still employed by the project; others took place as part of separate field research in February 2016[1]. I chose Amhara as the geographical site for conducting interviews since it is the region of Ethiopia that has the longest (since 1994) and most intensive experience of community water management. In all of the nine woredas visited, community-managed water governance was practised with more or less its intended results; three modalities had been adopted in the districts: Community Managed Projects (CMPs), Woreda Managed Projects (WMPs), and NGO Managed Projects. The woredas were selected based on regional- and federal-level consultations with water sector professionals working on community management, and on the WWO's knowledge of the specificities of the communities and water points. A community was selected, for example, if it practised organised income-generating activities such as selling grass, or if it made use of microloans from the financial maintenance reserve. Such a sampling strategy can be identified as stratified purposeful sampling (as in Patton, 2002), where the first level of the stratified sample is geographical districts (Patton, 2002).

The interviews were conducted in either the Amharic or English languages. I was able to follow many of the Amharic interviews, however a water sector consultant translated the interviews when required. The semi-structured interview guide was designed around questions pertaining to community water management, participatory governance, and maintenance of water points. The interviews were then transcribed, translated and analysed through thematic textual analysis on practices of co-production. I started by analysing the practices of co-production of different actors within the co-production

[1] It should be mentioned here that at the time of generating the empirical material, the developments brought by the One WaSH National Programme and the WASH Climate Resilient Development programme were not incorporated into the research.

processes, then narrowed the focus to discursive themes of power and resistance in order to build the analytical concepts. Supplementing the interviews, several policy documents (see Annex 2), guidelines and web sites on rural water governance in Ethiopia were studied in detail; moreover, the first field research comprised four weeks of observations, which yielded 84 photographs on water points and 35 pages of field notes. These empirical materials served as background.

Being perceived as a foreign, upper middle class woman influenced my positionalities – and thus the interview situations – in several ways. For WWO officials, I was often regarded as an evaluator, or a channel through which improvement ideas related to the project or claims for better financial employment compensations, could be addressed. This was due to my affiliation with the bilateral project that paid for the individual per diems of WWO staff members and provided vehicles and other material benefits to the water offices. Due to my younger age, gender and ability to have simple conversations in Amharic, however, I was able to have frank discussions with many government officers, something which clearly did not always happen. In the villages, I was generally welcomed with tense curiosity. These tensions were partially caused by my arrival at the village in a federal car, accompanied by woreda-level water technicians. Despite these tensions, interestingly, I was able to have several critical discussions with WASHCO representatives. My presence in the interview situation also facilitated a space where WASHCO members were able to express their independence with regard to the WWO, raise issues of government neglect, or negotiate for benefits; sometimes, however, the interviews became sites for WWO officials to assert their 'expert knowledge' and to explain situations on behalf of WASHCO members.

Findings

Access to safe drinking water remains a challenge in rural Ethiopia. According to the latest National WASH Inventory (2013) data, the coverage figure for rural water supply was at 49%. Regarding sustainability of the already-constructed water points, the average national functionality rate for rural water supply schemes was reported to be 74% (Butterworth et al., 2013). In Ethiopia, the implementation and overall management of rural water schemes has traditionally been carried out by governmental bodies and by donor and charity projects. In the last few decades, the idea of utilising local resources has shifted the emphasis towards the "active participation" of rural communities in the construction and maintenance of water points (Ethiopian Water Sector Strategy, 2001: 14).

In Ethiopia, community-managed rural drinking water governance was implemented first in the Amhara region in 1994, through a bilateral development programme (Behailu et al., 2015). Since then, the government and international donors have gradually expanded the approach throughout the country. Already in 2001, in line with the global trend towards community-managed water supplies, Ethiopia was including principles of community management into its National Water Resource Management Policy. Despite the hype around community management, scepticism prevailed among sector

professionals on the long-term sustainability of the approach; however, many audiences were convinced by the large-scale experiences with community management in the Amhara region and, in 2013, community management in the form of a Community Managed Project approach became one of the four official rural water implementation modalities in the WASH Implementation Framework (WIF) (Water, Sanitation and Hygiene Implementation Framework, 2013).

Having set the conceptual grounds, in the following sections the perspectives of co-production and governmentality are applied to the empirical case of community management in the Amhara region of Ethiopia. First, the practices of the various co-producers are discussed in relation to drinking water governance; second, the lens of governmentality is applied in an examination of the concept of 'conduct of conduct', through which subjects are rendered governable. The focus is on the processes of both objectivation and subjectivation, as they are part of governmentality's framework on normalising power.

Practices of co-producing drinking water in Ethiopia

This section covers the practices of the various actors in co-producing drinking water in the Amhara region; it starts with regional-level actors and then proceeds to other groups of actors. At the regional level, a key task of governmental bodies and NGOs is monitoring the quantifiable metrics of rural water supply. One crucial metric for the purposes of governing is how much the community contributes to the total cash, labour and local materials required for the construction of water points for a community-managed water supply, and what percentage of the necessary regular contributions does it make during the post-construction phase. 'Community contribution' corresponds to the principle of cost sharing within the wider development discourse (Cleaver and Toner, 2006). Other important metrics for the governing bodies include percentages of coverage, fund utilisation, and water point functionality – the former two resonating with the efficiency principle, and the latter with a sustainability discourse. A countrywide statistical investigation into these figures took place in 2013 the last time the National WASH Inventory was conducted. The monitoring of figures is important for the government's state-building efforts, as well as for the international donors; both are required to report progress towards universal coverage of water supply in Ethiopia. Besides their task of monitoring and reporting, the regional actors administer the financial flows from the federal government and wield decision-making power in terms of allocating funds to certain woredas.

For governmental actors at the woreda level, the processes of co-production start with training activities. After participating in regional- or zonal-level trainings (that is, capacity-building activities on the technical aspects of community management), the WWO officials conduct 'awareness-raising' activities in the rural communities. During these events, the officials inform communities about the possibility of acquiring a water point and about the procedures and necessary contributions required for a community-managed water supply. This awareness raising – or information dissemination – is a

managerial step in constructing a demand-driven approach; in the process, communities receive instruction on how to officially apply for a water point in their respective locations. Later, the WWOs manage the applications for water point construction that are submitted by rural communities; they also train local artisans and WASHCOs, liaise between microfinance institution (MFI) and the community, monitor the construction process, and actively participate in the post-implementation phase through activities related to the maintenance of water points.

For most communities, the process starts at the awareness-raising event; community members gather for these communication events and organise for the selection of a representative governing structure, the WASHCO. Prior to this selection process, each household must decide whether they want to participate in the construction efforts and whether they will make the financial contribution that is required for most community-managed modalities. Such collective decision-making processes require time and effort of the organisation's members. In order to align itself with the development policies of most donors, the WASHCO is formed with a female quota. It then files the application and delivers it to the water office, often travelling a long distance to reach the WWO.

After the water point applications from WASHCOs have been evaluated by the WWO and the selected communities decided upon, the WASHCO members participate in trainings organised by the WWO. Topics such as contract management, construction supervision, procurement and water point maintenance are covered in these trainings. In some of the modalities, the WWO officials also then select and train local artisans to do the masonry work for the water points; this is to ensure the availability of skilled masonry workers at a time of heightened demand for construction work (due to the dry season) within a geographical locality. The water experts of the WWO or zonal water department, together with representatives from the community, will then jointly choose a location for the water point; this choice will depend on geological conditions, social desirability and permission from the owners of the land. For this endeavour, the community again organises for deciding upon the location with the WWO official. A simple technology is chosen at this point; whether a spring protection development or a hand-dug well fitted with handpump. At the time of generating the empirical material, most of the donor funding was directed to these simple and arguably outdated technologies (see Bakker, 2012 on the persistence of the global rationale for maintaining the use of simple technologies in rural water governance); despite the will of the communities, possibilities for the construction of deep wells or other more complicated technologies were ruled out. During the construction of the water point, WASHCO and other community members monitor the construction work of artisans or contractors. Formal documents exist to guide this monitoring practice; they specify the recommended daily progress of the width and depth of the well, as well as the quantities of the materials required and artefacts produced. During the construction, community members often do the laborious work of digging the well and of carrying stones, sand and wood; some members cook meals or cater water for the labourers and some travel to towns to procure construction materials. All the efforts are organised within the community, recorded, and reported to the WWO as the community's contribution to the water point's installation.

In the community-managed project modality and in some NGO modalities, the communities enter into a contract with the artisans and often procure all the supplies themselves; in such cases, the WWO will also sign off permission for the WASHCOs to withdraw their financial instalments from the microfinance institution. The WWO typically handles the procurement of handpumps in bulk and advises the WASHCOs on procurement activities by providing price lists and contacts for potential suppliers. Transportation of supplies such as cement, sand, iron bars etc. is all organised by the WASHCOs in the CMP modality. The usage of construction materials is also monitored by community members so as to ensure accountability towards the artisan and the WASHCO.

At the end of the construction phase, WWO officials and WASHCO members assume their new responsibilities. As per the policy, minor maintenance of water points is to be conducted by the trained caretakers of the water points; during the interviews, however, it became clear that, with regard to maintenance, policy and practice do not necessarily go hand in hand. In itself this is not surprising; what is interesting, though, is the variety of power dynamics that exist between the WWO, community members, the WASHCOs, and artisans. Once the water point is constructed, it becomes embedded in the web of differing practices that sustain its functioning. The various actors' interactions and their continued co-production of water depend on the availability of spare parts suppliers, the practices regarding water point maintenance as adapted by the WWO, the ability and willingness of the communities to procure spare parts, and their skills in maintaining the water points. These practices are entangled in the realm of material and discursive power dynamics that will be illustrated in the following sections.

Governmentality in co-production: Processes of subjectivation and objectivation

The governance of rural water supply in Amhara region, as described above, is decentralised through a plethora of evolving and fluid processes and discourses among various co-producing actors. These processes are not limited to the traditional governing relationship between WWO officials and communities; rather, they include governance mechanisms between WASHCO members and community members, between WWOs and suppliers, and between WWOs and microfinance institutions. These processes are a mix of technocratic governance practices which utilise the vocabulary of community management as a means to further control communities as well as other actors. What is common in the governing techniques discussed in the following section is their linkages to governmentality's 'conduct of conduct' and to the processes of subjectivation and objectivation, which shed light on the power relations among the various co-producers.

Construction of the 'non-aware' water user

One central governance discourse is the sustained attempt to cast community members as 'non-aware'; this is aimed at strengthening the governing position of WWOs vis-à-vis the communities. The term lends itself to the vocabulary of community management,

where communities are 'made aware' of their need for clean drinking water through various awareness-raising events.

What emerged during the interviews was the strong motivation for WWOs to blame communities for certain problems, especially their failure to properly maintain water points; a community's ostensible failure to meet this responsiblity rendered it governable through objectivation, thus legitimising the WWO's intervening practices and authority. The community's failure in water point maintenance was often explained through an objectifying 'lack of awareness' discourse. The 'non-aware water user' was constructed as being in need of continuous capacity building and of the WWO's support; this construct gained its meaning in relation to water quality. Clean drinking water was viewed as a crucial part of the modern, hygienic lifestyle narrative; the scientific understanding around clean water was typically framed as something that farmers were made aware of only through governmental interventions; communities needed to be 'capacitated' with the necessary knowledge on the benefits of clean drinking water. Without such capacity building, users would not become aware enough to pay maintenance contributions, construct fences to protect the water point, or engage in other activities that would arguably sustain the water point once constructed. This 'lack of capacity' enabled their categorisation as 'non-aware': they were not scientifically aware enough to recognise the health risks in a water source. In this way, the larger inequalities pertaining to unwillingness or inability to pay for maintenance were transformed into a technical and simplified problem of being 'non-aware'; a problem that called for a governance solution on the part of the WWO:

> Because they cannot afford it! It is real. Even in some communities they cannot afford one birr per month, they are resisting. Actually it is lack of awareness, we have to work a lot to raise the awareness of the rural communities to use potable water rather than to use unsafe water. So we have to work hard. After working hard and after eh… raising awareness of the rural communities we will make the beneficiaries into consumers. (Interview 49: regional WASH government official)

The 'lack of awareness' is further transformed into a lack of need for better technologies and additional water points. Not being aware of the benefits brought by clean water justifies the unequal access to piped water utilities and even access to clean water itself. The Ethiopian Universal Access Plan currently defines water supply access coverage as having access to 15 litres per capita per day (l/cap/day) from an improved water source that is within 1.5 km from the home (UAP I, 2011); for the urban population, the amount is 20 l/cap/day within 0.5 km from home (UAP II, 2011). Communities are not presented as in need of access to water, or in need of a policy change in terms of financing the maintenance of water infrastructure, but rather as requiring a cultural and value change (Mukherjee, 2006); the dimensions through which awareness of clean water is measured, however, fall within the economic and material rationalities. Controversially, the cultural or value change becomes measurable through the willingness to pay for drinking water: those communities that contribute money and resources to the maintenance of the water point are equipped with 'awareness'. In an incident where the water point breaks down and the community turns to the river as a source of water

instead of collecting money to repair it, the community becomes labelled as 'non-aware' with regard to water quality; this is interesting, as the communities have already shown a lot of 'awareness' for water quality by contributing extensively through labour and cash to the construction of water points. From the WWO's perspective, 'non-awareness' only emerges as a construct when it comes to the maintenance of water points. It is at this point that such governance discourse is utilised to construct the communities as being in need of the WWO's governance efforts.

The utilisation of 'non-awareness' as a governance discourse is not limited only to the relationship between WWOs and the communities; it has also spread into the language of WASHCOs, who often described other community members as 'non-aware' for not contributing for water point construction or maintenance:

> Indeed as a committee, it was a tough task to bring awareness into the community on the benefits of accessing sustainable water supply facility, given that many people had no awareness about it. But as I am also part of the kebele [village] leadership, I had previous awareness about the benefits. (…). Some people were reluctant to contribute labour through participating in the digging of the well and in collecting stones and other construction materials, fearing that the water harvest might not be found at the end. (Interview 5: Bahir Dar Zuria woreda, WASHCO Chairperson)

This is an example of how governmentality's conduct of conduct can function across hierarchical social structures: WASHCO members become subjects within the non-awareness governing technique, reproducing it in order to expand their own governing position vis-à-vis community members.

Contested community contributions

The vocabulary of community contributions encourages other sets of governmentality practices by the WWO in relation to communities. Through water point functionality reporting, the WWOs have the authority to gain information about the maintenance of the water points. This monitoring practice ties the WWOs and communities together even after the completion of the water point construction; it does not, however, end in mere recording of water point functionality: many WWOs have taken it upon themselves to control communities' access to the microfinancing accounts where the community contributions – that is, maintenance savings – are kept. In most cases, the communities deposit cash at a local microfinance institution before the construction of the water point, money which is meant as a reserve for future maintenance-related costs. In many instances, the WWOs have placed themselves as mediators between the community and the microfinance institution; communities then need to ask for the WWO's permission to withdraw money from their savings account, a practice which has caused many communities to mistrust whether they can actually access their savings account at all. For the WWO, such a practice is constructed as a rational governance mechanism aimed at motivating communities to contribute more money for maintenance purposes. This is an instance of governmentality's objectivation and of a government's attempts to make WASHCO members and microfinance institutions governable; ostensibly, deviant

behaviour in the form of using the savings only for maintenance purposes – or the fear of such deviant behaviour – has required government intervention in order to properly regulate the relationship between WASHCO and the microfinance institution. As a response to this, many WASHCOs have opted to manage cash contributions on their own and have thus refused the WWO's objectivation.

Among WWOs where the number of water point applications submitted by communities exceeds what the WWO is able to implement, another practice related to community contributions prevails whereby communities are selected based on the amount of their contributions; the greater the contribution of labour, local materials and cash deposits, the higher the probability that a community will obtain a water point. This can be regarded as a culmination of the demand-driven approach, where communities would need to compete in economic and participatory terms to co-produce drinking water supply. Through a governmentality lens, such a practice is evidence of a community's high level of subjectivation, that is, their willingness to self-regulate in the form of financial contributions; however, such a preferential system runs the risk of reducing communities to merely the source of the materials needed for 'co-produced' projects resources of co-production and shifting the focus away from the political nature of access to water and into the economic realm.

Governmentality through post-construction support

The selling and provision of spare parts after the water point has been constructed is an area that ties together WWOs, WASHCOs, private sector suppliers, and artisans. In most woredas, the WWOs hold to a practice of either providing spare parts for free or selling them to the communities; with regard to community-management vocabulary, this is justified in the name of poor availability of spare parts. The potential market transaction depends on whether the WWO has established a revolving fund at the water office and whether they have ordered handpumps with spare part sets that they can either give or sell to the communities. The WWO's influence as a market actor naturally affects the possibilities of private suppliers or artisans for participation in the co-production process. Such a practice does not allow private suppliers to start a business around spare parts, as the WWO governs the market through their already-established relationships with the communities. The rationale for WWOs to sell spare parts is partially justified through the role of the WWO as 'patron' of the community. Many WWOs position themselves as protecting WASHCOs from opportunistic private sector suppliers who would otherwise charge unnecessarily high prices for spare parts; in governmentality terms, private sector actors require objectivation due to their deviant, potentially opportunistic behaviour, and governmental intervention is thus justified. The lack of technical knowledge on the part of WASHCO members also keeps water officials securely in their position as experts; insufficient training on water point maintenance forces WASHCOs to seek support from the WWO in technical questions regarding spare parts.

As the WWO exerts its power over private suppliers through the discourse of poor availability of spare parts, so do the communities hold the WWO accountable in

sustaining the use of water points; in many cases, the unwillingness of communities to pay for spare parts results in a situation where the WWO needs to organise free spare parts or come up with new ways to sell spare parts at low prices. Again, through the lens of governmentality, communities do not adhere to the conduct of conduct; rather, in many instances, they reject self-regulation and instead request government intervention. Gaining free spare parts from the WWO, however, was not a practice in all woredas; communities with better financial resources and more efficient water point caretakers took pride in their independence from the WWO in terms of maintaining and sustaining their water points on their own, sometimes involving local artisans and sometimes calling on caretakers from other communities for maintenance work.

The power of the artisans

Certain modalities of community management incorporate the training of artisans as local masonry workers to construct rural water points. Equipped with better skills than water point caretakers, in the community-management discourse artisans are also increasingly viewed as a solution to the persisting maintenance problems of water points. The rationale for training local artisans stems from the government's need to create job opportunities at the rural level, as well as from the perceived need to improve accountability mechanisms for the quality of construction. There are often limited grievance channels open to communities who wish to hold external contractors accountable for faulty masonry work or corruptive use of construction materials. The work of artisans from local communities can be better monitored by the community; community members can regularly document and report on the work of the local artisans – a duty for which the subjectivation of communities typically proceeds as per the intentions of the government. Artisans, however, have also formed associations and often refuse to take over the role of maintaining water points, the reason given by artisan associations being linked to the poor profitability of the maintenance business; another potential reason for local artisans not maintaining water points may be linked to the willingness of WWOs to travel to communities for that purpose and, in the process, collect their per diem; still another reason may be the regular surveillance visits to communities by state officials. In cases where the artisan lives within the community, the responsibility for fixing the wells is often placed on them; artisans, however, also occasionally choose otherwise, instead opting to use their newly obtained skills for work with higher salaries.

> You see, at the community level we are selecting farmers who are interested to work on any water points, whether it would be for the construction or for the maintenance. These farmers that recruited from the communities will be trained as artisans. But sometimes, [after having received the training] they will go to Gondar, to Bahir Dar, to the bigger cities, you know. There they will get paid much more… they will get much money. In the kebele [village] maybe they would get 50 birr per day, but when they work in Bahir Dar city or similar, the salary is 80 birr, 100 birr, like that. (Interview 53: regional NGO representative)

The general discourse around artisans and their anticipated role as suppliers and sellers of spare parts is much promoted at the level of federal and regional policy makers; as per

the assumption, artisans would be better to cater to the needs of the communities than to the private suppliers or WWOs located in towns. For the artisans, however, the business does not seem to be of interest, the reasons being their limited availability, the low profitability of travelling to the water points during construction season, and the greater profitability of work in urban areas; it may also be that, because the WWO dominates the spare parts market, artisans do not want to encroach. Whatever the case, it remains to be seen whether WWOs will gain new governance mechanisms to better discipline the artisans; – according to the governmentality perspective, artisans are not subjected to be governable.

Power dynamics within communities

For most WASHCO members interviewed, co-production of water points was generally perceived to be a positive change in their villages. During the interviews, the construction process was described as a fairly straightforward, performative action. Historically, there is little state involvement in groundwater supply in Ethiopia, making it a new type of practice for farmers; the role of the state in mobilising rural communities for other labour-intensive tasks, however, is not a new phenomenon in the country. Rural populations are summoned to support environmental governance activities such as terracing and soil erosion prevention, or other developmental activities. Communities are accustomed to paying land taxes and the annual fees of, for example, the Amhara Development Association and the Red Cross. The conduct of conduct can be regarded as rather successful with regard to the construction of the water point, as subjects voluntarily enter their subjectivities as contributing members of the community. The withdrawal of some members during the construction work was attributed to mistrust of WASHCO members or the government, or to the experiences of nearby communities who dug several wells without reaching the necessary groundwater level. After placing considerable amount of work and care into the construction process, the WASHCOs typically viewed the end result of the process as something positive.

> We made our water, health and sanitation demands known to the woreda and received the water point. It was installed at an identified site that suits the needs of women who have to endure the burden of fetching water. Water committee was established, and an annual fee of 10 birr is being charged per each user household. And we pay wages to the guards [of the water point]. We deposit the remaining amount in the bank through the cashier. The community is willing to do so. They have been willing to participate in digging the well on a voluntary basis. They were very much looking forward to seeing the completion of the project, which was highly needed. (Interview 5: Bahir Dar Zuria woreda, WASHCO Chairperson)

After the construction phase, when water points break down, the governance discourse between WASHCOs and community members changes. Within communities, the power dynamics (as perceived within the scope of this study) revolve around the divisions between WASCHO members and other community members; as mentioned earlier, some of these tensions transpire through the discourse on 'non-awareness'. In addition to the difficulties of collecting regular financial contributions for maintenance from community members, WASHCO members also complained about the mistrust regarding

the per diems they received for attending the capacity-building activities organised by WWO; such "misunderstandings" (as described by the WASHCOs) are attributed to the non-awareness of the community members. As a consequence of this mistrust, some WASHCO members had ended up paying for spare parts from their own pockets. In terms of governmentality, this can be interpreted as a failure to render community members governable either by the state or the WASHCO elites. In order to change this, WWO officials and WASHCO members repeatedly stated the need to include all community members in the capacity-building trainings organised by the WWO; it was hoped by WASHCO members that such a practice would further reduce the amount of internal conflict on financial maintenance contributions among community members.

Power dynamics within the communities are also gendered. The policy documents on community management preach the empowerment of women. Through a quota system, women are supposedly well represented in the WASHCOs, constituting three out of five of their members; during the interviews, however, the silence of women was obvious. In several cases, women were not present but were represented by their husbands. A few of the discussions with women and male WASHCO members provided glimpses into the gendered governing practices, showing another type of reality:

> Most of the problems have something to do with the security guard in charge, particularly when they [women who are fetching water] quarrel with him. They [women] complain to the committee, accusing him [the guard] of refusing to let them in by opening the gate on time despite receiving wage, which is alleged to be 100 or 200 birr per month. They are insisting to convene a committee meeting. When I asked them about the reason, they accuse him of favouritism in queue, and indifference towards separating fellow people when quarrelling, and that he is not opening the gate on time. Accordingly, we convened committee meeting upon request, and in the course of the meeting, they demanded that the keys to the gate be given to another person in charge, and we took the keys away from him and gave it to another female replacement in charge. Because females are like-minded to each other, she is opening the gate in time and is performing her duty smoothly. And no complaint has been received afterwards. Just because she is female, they understand each other very well. (Interview 5: Bahir Dar Zuria woreda, WASHCO Chairperson)

The objectivation of women in the above quote is visible, as 'females' are constructed as a group of people requiring an intervention by WASHCO members to solve their water problems. After the ideal solution was undertaken by WASHCO, women would dutifully be subjectivated and thus would self-regulate their activities as per the governmentality approach. As interviews with women and community members were limited in this study, neither a detailed gendered analysis nor an in-depth analysis into the internal power dynamics within the communities was undertaken.

Discussion

This paper is positioned within a stream of scholarship criticising the theoretical and practical failings of community management in rural water governance. Studies of community-managed drinking water are disposed to take communities or development policies as focal points of study, typically highlighting the multifaceted effects of policies

on the lives of community members (see, for example, Madrigal et al., 2011; Mustafa et al., 2016; O'Reilly and Dhanju, 2012). Aligning itself with recent calls to bring about a discursive change from community management to co-production (Hutchings, 2018), in this paper the lens of co-production was used to shift the analysis towards a wider array of actors. The paper showed how community-managed water projects in the Amhara region in Ethiopia are far from being managed solely by the community. I showed how a variety of different actors within rural water governance can be included in an analysis that utilises co-production as a discursive lens; these actors include community members, members of WASHCOs, government water offices at the federal, regional, zonal and woreda levels, spare parts suppliers, microfinance institutions and local artisans.

Another important tenet of this paper was its focus on water as inherently political and as a site for contested power relations. The aim of this paper was to examine and make visible the power relations among different actors by using Foucault's governmentality as a conceptual lens. Departing from the application of co-production as a depoliticised co-operation between state and non-state actors for the provision of public services (Joshi and Moore, 2004; Lam, 1996; Ostrom, 1996; Tendler, 1997), this study questioned the collaborative nature of co-production (see, for example, Farr, 2017). Not only has power been neglected in the co-production literature in general (Boaz et al., 2016; Donetto et al., 2015; Mitlin, 2008; Ocloo and Matthews, 2016), but to understand the various forms of governance in community-managed water, power has become an important aspect of theoretical focus (Mayo and Moore, 2002). This was undertaken by bringing in a framework of analysis based on governmentality's 'conduct of conduct', and more specifically, on the processes of subjectivation and objectivation among co-producing actors.

The 'conduct of conduct' of governmentality, and the processes of subjectivation and objectivation by which subjectivities are rendered governable, worked on the co-producing actors through different organised practices (mentalities, rationalities and techniques) (Mayhew, 2004). The processes of objectivation, as indicated in this research, included intervening practices when subjects would deviate from 'normal' expected behaviour. For WWOs, co-producing access to water allowed them to use the language of community management to expand their influence on an extended array of actors, including on WASHCOs, private suppliers and microfinance institutions. The WWOs' governmentality practices in relation to communities centred around the construction of 'non-aware communities'. 'Non-awareness' or 'lack of capacity' was a common discourse of objectivation; it allowed for a powerful position to be gained in relation to people who were constructed as inferior, thereby justifying interference and surveillance. The discourse of non-awareness also extended to the vocabulary of WASHCOs in their attempts to reinforce their governing position in relation to community members. Such elite capture of a discourse runs the risk of reproducing already-existing power relations within the user community (Mosse, 2005; Molle, 2008; Mustafa et al., 2016). The WWOs also borrowed another discursive resource from the vocabulary of community management in framing "contribution" as an element of co-

production; monitoring contributions became an essential feature of their governing practice, although the communities would typically regulate and govern themselves, especially during the construction of water points. WWOs also control the possibilities and activities of private suppliers in selling spare parts of handpumps to the communities: they act as infomediaries to the communities and govern the need for private sector involvement in terms of selling spare parts or providing them for free.

The subjectivation processes, through which the various actors would freely self-govern, included practices such as communities digging the wells and monitoring the construction work, WASHCO members contributing time and finances in organising maintenance of the water points, and women regulating the use of water points. In several instances, however, the practices of populations and individuals did not proceed in accordance with the plans of public water programmes and strategies, despite government interventions. Local practices of populations were more complex and antagonistic than imagined and expected (Ferguson, 1990; Scott, 1998). In terms of governmentality, the 'conduct of conduct' did not take place as intended. The examples of artisans refusing to conduct maintenance work, communities keeping their savings with WASHCO cashiers instead of with the microfinance institution, and community members refusing to contribute finances for the maintenance of water points can be interpreted as instances where the attempts at conduct of conduct were not succeeding as intended. The reasons for the failed processes of objectivation and subjectivation require further study; there is a need to examine individual subjectivities in order to create meaningful analyses on the failures of governmentality techniques. Such further studies need to investigate the nature of everyday resistance and "counter-conducts" (Foucault et al., 1991; also see Odysseos et al., 2016) performed by the different actors, as well as the recent changes in the political economy of Ethiopia, developments in the water sector, and their relations to liberal governance. What is interesting, however, is the circular effects of governmentality with regard to resistance. Despite the remarkable work that communities do for co-producing access to water, their role is systematically undermined both in policy documents and in interviews with government actors. The focus is not on what communities do for their water supply, but what they fail to do. Instead of viewing WASHCOs and community members as unsupportive of fully embracing community management for fear of a heightened financial burden, because of challenges in reaching consensual practices among community members (Garces-Restrepo et al., 2007; Vermillion, 1991), or for any other reason, this study illuminated how the discourse on 'non-awareness' conflates the community's resistance to render it governable. Refusing to contribute is interpreted as 'non-awareness' by governmental actors.

Why is it important to focus on the power relations between the various actors, except as a conceptual contribution to the co-production literature? For governments and development practitioners, this study provided a pluralist perspective on community management and highlighted the multifaceted power dynamics and frictions that unfold among the co-producing actors. In order to avoid reinforcing and reproducing already-existing power relations among co-producing actors, government actors and

development practitioners could pay more attention to the language of community management. The discourses on 'non-awareness' and 'lack of capacity' or even 'capacity building' (indicating that there is a lack of capacity in the first place) invoke appropriation and encourage objectivation, be it unconsciously or consciously. As proposed by Hutchings (2018), perhaps the change from community management to the concept of co-production would promote a sense of responsibility shared between the various actors and would facilitate more equal power relations. The tendency to hold communities responsible for the failures of community management would need to be balanced with a sense of shared accountability. It would be naïve to assume that a change of wording would challenge societal power structures, however it could be a small step in that direction. This is supported by earlier studies which have identified co-production as a political process through which citizens can navigate to initiate changes in their power relations with government agencies (Mitlin, 2008).

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Annexes

Annex 2.A: List of respondents

Code	Name of the woreda	Type of organization	Respondent position
District/Village			
[1]	Bahir Dar Zuria	WWO	Head of WWO
[2]		WASHCO	Cashier
[3]		WASHCO	Storekeeper
[4]		WASHCO	Cashier
[5]		WASHCO	Chair person
[6]		WASHCO	Chair person
[7]		WASHCO	Cashier
[8]	Bure	WWO	Head of WWO, WaSH Coordinator
[9]		WASHCO	Chair person
[10]		WASHCO (CMP)	Chair person
[11]		WASHCO (NGO)	Caretaker
[12]		WASHCO (NGO)	Secretary, WASHCO member
[13]		Supplier	Shop owner
[14]	Dembecha	WWO	Head of WWO
[15]		WASHCO	2 WASHCO members
[16]		WASHCO	2 WASHCO members and cashier
[17]	Derra	WWO	Head of WWO
[18]	Farta	WWO	Water Supply Process Owner
[19]		NGO	CARE North Gondar Zone Program Office, Construction Supervisor
[20]		WASHCO (NGO)	Chair person's spouse, caretaker & storekeeper, WASHCO member, user
[21]		WASHCO (NGO)	Chair person
[22]	Fenote Selam	WWO	Head of WWO
[23]		Supplier	Shop owner
[24]	Fogera	WWO	CMP Supervisor
[25]		WASHCO	Cashier
[26]		Supplier	Shop owner
[27]		Artisan association	3 members of the artisan association
[28]	Guangua	WWO	Head of WWO
[29]		WASHCO	Storekeeper
[30]		WASHCO	Secretary, 2 storekeepers, guard
[31]		Supplier	Shop owner
[32]		Supplier	Shop owner
[33]		Supplier	Employee of the shop
[34]	Mecha	WWO	Head of WWO
[35]		WASHCO	Chairman, guard, 11 users
[36]		WASHCO	Chair person, spouse of a WASHCO member
[37]	Yilmana Densa	WWO	Head of WWO
[38]		WASHCO (CMP)	Guard, 8 users
[39]		WASHCO (CMP)	Secretary, user/community elder

[40]		WASHCO (CMP)	Storekeeper, previous cashier, current cashier
[41]		WASHCO (CMP)	Chair person, secretary
[42]		WASHCO (NGO)	Document keeper
[43]		WASHCO (NGO)	Chair person
[44]		WASHCO (NGO)	Cashier
[45]		Amhara Credit & Savings Institution ACSI	Branch manager
[46]		NGO	KfW/GIZ Focal person
[47]		NGO	World Vision woreda office, Development facilitator
[48]		Supplier	Shop owner
Regional			
[49]	Bahir Dar	Water Bureau	Amhara National Regional State Water Resources Development Bureau, CMP Coordinator & Water Supply Process Owner
[50]		Supplier / importer	Owner
[51]		Supplier / importer	Regional office manager
[52]		NGO	Organization for Rehabilitation and Development in Amhara / Executive Director
[53]		NGO	Glimmer of Hope / Organization for Rehabilitation and Development in Amhara, WaSH Project Advisor
Federal			
[54]	Addis Ababa	Ministry	Ministry of Water and Energy, Director of Water Supply and Sanitation Directorate
[55]		Ministry	Ministry of Water and Energy, Procurement Specialist & Team Leader on One WASH National Program Procurement
[56]		Supplier / importer	Marketing manager

Annex 2.B: List of policy documents

Name of the policy document
Water, Sanitation and Hygiene Implementation Framework, 2013
One WASH National Program: A Multi-Sectoral SWAp. Addis Ababa: The Federal Democratic Republic of Ethiopia, 2013
The Second Growth and Transformation Plan (GTP II). Draft. Addis Ababa: National Planning Commission, 2015
National Rural Water Supply Operation and Maintenance Management Strategic Framework
Universal Access Plan UAP I. Part I, Revised Rural Water Supply Universal Access Plan. Federal Democratic Republic of Ethiopia, Ministry of Water and Energy, 2011
Ethiopian Water Sector Policy. Addis Ababa: The Federal Democratic Republic of Ethiopia Ministry of Water Resources, 2001

ANNEX 3: ARTICLE 3

This article was revised based on reviewers' comments and was submitted to Journal of Business Ethics in January 2021.

Frugal innovation hijacked
The co-optive power of co-creation discourse

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Abstract

In this paper we investigate how different discourses on frugal innovation are articulated, and how the dynamics between these different discourses have led to a certain dominant understanding of frugal innovation today. We analyse the dynamic interactions between three discourses on frugal innovation: (1) innovations for the poor, (2) grassroots innovations by the poor, and more recently (3) co-creating frugal innovations with the poor. We argue that this latter discourse is articulated as a hegemonic project as it is designed to accommodate demands from both business and poor communities. We draw on Laclau and Mouffe's concepts of 'chain of difference', 'empty signifier' and 'floating signifier' to explain the advent of the hegemonic discourse on co-creating innovations with the poor. We show how a floating signifier with radical potential, frugal innovation, has been hijacked and co-opted in a hegemonic project that has leveraged powerful ambiguous signifiers, with co-creation acting as an empty signifier. To clarify what is problematic in this hegemonic intervention, we expose how contemporary frugal innovation discourse contributes to a project of governing and exploiting the poor in ways conducive to 'wealth creation' and 'economic development' as per mainstream, elite-driven definitions.

Keywords

chain of difference, co-creation, empty signifier, floating signifier, frugal innovation, sustainable innovation

Introduction

'Innovation' continues to be a catch-word with positive associations, a signifier that is deployed in business and policy to imply good impacts on the economy and society (Godin, 2016; Gripenberg et al. 2012; Perren and Sapsed, 2013). Having become a defining feature of (Western) hegemonic modernity during the twentieth century (see Godin, 2016), the term today stands for that which provides the solutions for market needs and wants, as well as for a variety of societal ills and problems – thus, its absolute positivity is taken for granted (see e.g., Gripenberg et al. 2012; Liu and Pechenkina, 2017). While it was not a particularly dominant concept in the Brundtland report (WCED, 1987), 'innovation' has now become highly prevalent within contemporary sustainable development discourse – apparently 20 times as prevalent, from being mentioned only 13 times in the Brundtland report's approximately 400 pages, to 26 times in the 40-page Agenda 2030 document (UN Sustainable Development, 2015). The UN Sustainable Development Goals (SDGs) have explicitly made innovations the key for tackling sustainability challenges of numerous sorts: "without innovation there is no way to overcome the challenges of our time" (UN Secretary-General, 2017).

Various types of innovation concepts have recently proliferated in the arena of sustainable development: inclusive, reverse, grassroots, green, social innovations – just to name a few – have created diverse sets of meanings under the umbrella of sustainable innovation. This paper looks into the recent emergence of a new member in the family of sustainable innovations: *frugal* innovation. In its literal sense, the word frugal means "simple", "plain", or "using money or supplies in a very careful way" (Merriam Webster, 2019). Frugal innovations are typically framed as innovations driven by scarce resources and regional circumstances of poverty and exigency (Pansera and Martinez, 2017). Commonly credited for enhancing efficiency of resource utilization (Zeschky et al. 2014), frugal innovations generally refer to products, technologies and services developed in and for resource-constrained environments. A typical example would be the Mitticool, a clay refrigerator that does not require electricity and costs less than 50 USD (Wierenga, 2015). Mitticool was developed by a clay craftsman in a Gujarati village and it continues to be an economic success story of frugal innovations.

The idea of frugal innovation is not new: developing "good-enough", simple products for 'the poor' can be traced back to the appropriate technology movement in the 1970s, initiated by Ernst Schumacher (Kaplinsky, 2011; Schumacher, 1973). Frugal innovations have gained heightened attention in their countries of origin (The Economist, 2014), and their growing global reputation has attracted powerful actors from the global North to get involved in the business as well (Hossain, 2016; Pansera and Owen, 2017). Transnational corporations such as Philips, Bosch, General Motors and 3M have allegedly adopted frugal innovation practices in their subsidiaries and established collaborative research centers in India, Kenya, China and South Africa.

Despite the increasing popularity of frugal innovations, the academic literature on them remains scant and calls for more empirical and theoretical studies (Bhatti, 2012;

Hossain, 2018; Knorringa et al., 2016; Tiwari et al., 2016). In this paper we investigate how different discourses on frugal innovation relate to the 'sustainable innovation' field of discursivity, and how the dynamics between these different discourses have led to a certain dominant understanding of frugal innovation today. We find that discourses on frugal innovation can be traced back to discourses on (1) innovations *for* the poor, and (2) grassroots innovations *by* the poor. In illustrating the community-driven discourse on grassroots innovations *by* the poor, we particularly draw on the context of India. We also find that more recently, a third discourse drawing connections with these two discourses has advanced a more governance-driven perspective on co-creating frugal innovations *with* the poor. We argue that this latter discourse is articulated as a 'hegemonic project' (Torfing, 1999) as it is designed to accommodate demands from both business and poor communities, and deployed in order to govern the poor through the increasingly usual discursive mix of 'empowerment' and 'responsibilization' (see e.g., Ilcan and Lacey, 2011), complemented by an exploitation of the resulting activation of frugal creativity, as enabled by 'co-creation' (Cova et al., 2011; Zwick et al., 2008).

For our analysis, we draw on Laclau and Mouffe's (1985, p. 130) concept of 'chains of difference' to illustrate the hegemonic formation of the governance-driven discourse of co-creating innovations *with* the poor. We separate the discourses and their historical developments in a sequence for presentational purpose, although we do acknowledge their parallel and interactive character. By focusing on the unfolding of the meanings surrounding frugal innovation, we want to explore and trace the three discourses, which are reinforcing, contesting and shaping meanings associated with the concept of frugal innovation. In framing our study through discourse theoretical concepts such as 'chain of difference', 'empty signifier' and 'floating signifier', we contribute to the analysis of the foundational ideas and notions underpinning frugal innovation, and we expose how contemporary frugal innovation discourse serves a purpose in a hegemonic project of governing the poor in ways conducive to 'wealth creation' and 'economic development' as per mainstream, elite-driven definitions. We engage with 'theories' of frugal innovation and co-creation not to 'improve' or 'contribute to' them but instead to problematize their impacts and power effects. We believe there is an inherent value in problematizing and unpacking how 'theories' attached to hegemonic projects have undesirable effects when deployed as powerful discourses, and thus we do not pursue a 'theoretical contribution' to these theories. Our approach here is 'ethico-political' (see e.g., Bell and Willmott, 2020), and we could describe its inherently critical stance towards contemporary neoliberal hegemony as follows: we take issue with the 'one policy fits all' neoliberal solution of making as many people as possible 'innovators' and 'entrepreneurs' while prioritizing capital accumulation for already powerful investors and assuming that all will go well, despite the abundance of evidence over the past 50 years that such neoliberal policies lead to rising socio-economic inequalities. We show how a floating signifier with radical potential, frugal innovation, has been hijacked and co-opted in a hegemonic project that has leveraged a powerful empty signifier (co-creation) and other key signifiers (Bottom/Base of the Pyramid, partnerships, scaling up), all associated with marketing and business ethics. And to make it clear what is

problematic in this hegemonic intervention, we discuss a number of critical implications of the advent of the co-creation discourse on frugal innovation.

In the next section, we introduce Laclau and Mouffe's (1985) post-Marxist discourse theory, focusing in particular on the concept of 'chain of difference'. We then move on to our analysis of discourses on frugal innovation in relation to the sustainable innovation field of discursivity, in four parts. Our discussion is then devoted to critical implications of the current hegemonic discourse on frugal innovation.

A discourse theoretical approach: methodological and conceptual considerations

The process of studying discourses on frugal innovation started with an aim to understand the complexities surrounding the use of the term in scholarly articles, as well as in the talks of practitioners. Managerial and academic representations on frugal innovations – as we perceived two years ago – were typically filled with positivity and numerous success stories, while critical perspectives on the phenomena were left out of the discussions. It was this hegemonic ambiguousness on frugal innovations that led us to explore the literature in more detail. We started by exploring the historical emergence of frugal innovation as an established concept, and continued to analyze its relationship with the broader field of discursivity of sustainable innovations. The historical study of discourses allows for the creation of distance to texts and empirical phenomena through a strategy of moving away from the centre through time. Such strategy is common in studies drawing on Laclau and Mouffe's post-foundational discourse theory (Jørgensen and Phillips, 2002) with ethico-political implications. As Bell and Willmott (2020) suggest, rather than appealing to established technical methodological norms, dealing with ethico-political critique entails relying on 'intellectual craftship' (Mills, 1959) in designing an idiosyncratic methodological approach. Although Laclau and Mouffe worked little on detailed analysis of empirical materials, their concepts can be useful tools for studying empirical phenomena (Howarth, 2005; Jørgensen and Phillips, 2002). Our methodology here involved four stages which were not pre-set from the beginning since the results of the first stage warranted the next three: (1) in a genealogical spirit, studying the historical development (e.g., Quistgaard Steensen and Villadsen, 2020) of the concept of frugal innovation, different discourses dealing with it, and identifying the contemporary hegemonic discourse on it; (2) analysing the differential vs. equivalential dynamics in the developments of the different discourses, in line with Laclau and Mouffe's (1985) distinction between logic of difference and logic of equivalence; (3) denaturalizing the contemporary hegemonic discourse (Fournier and Grey, 2000) by more closely studying its articulation through a chain of difference and a number of powerful ambiguous signifiers; and (4) critically reflecting on the power effects (Knights and Morgan, 1991) of the contemporary hegemonic discourse.

In the first stage of our methodology, as mentioned above, we studied the historical origins of the frugal innovation concept. This process was inspired by Foucault's genealogical approach with an aim to describe the 'conditions of historical appearance' (Foucault, 2002: 48). In the process of trying to understand the concept of frugal innovation and the conditions of its origin, we found out that (1) frugal innovation is mostly related with 'the poor', and (2) the key difference between discourses lies in the role assigned to 'the poor' in conceptualizing frugal innovation. In the early discourses on frugal innovation, there were two such roles: frugal innovation *for* the poor, and frugal innovation *by* the poor. The third role of frugal innovation *with* 'the poor' emerged later. During the more in-depth tracing of the categories within the 'sustainable innovation' field of discursivity, the "for" became associated with *business*-driven articulations of sustainable innovations (as particularly promoted in e.g. Prahalad, 2006; Prahalad and Hart, 2002), the "by" chiefly related to *community*-driven grassroots innovation articulations (as studied in e.g. Gupta, 2006; Smith et al., 2014; Pansera and Sarkar, 2016), and the latest "with" was something that we termed *governance*-driven articulations (as discussed in e.g.; Karnani, 2007; Simanis and Hart, 2009; Radjou and Prabu, 2014). Thus, we focused on some key texts which we found to represent each of the three discourses. While reading the texts for the third, governance-driven discourse, it became clear that an important signifier was the notion of co-creation. We found that this signifier seems to tie together the categories of "for" and "by", thus creating a powerful empty signifier which is difficult to criticize or circumvent.

In the second and third stages of our methodology, we worked more explicitly with Laclau and Mouffe's (1985) discourse theoretical concepts such as the logics of equivalence and difference (second stage) and empty and other ambiguous signifiers (third stage) in order to analyze the dynamics in the developments of the different discourses on the business-driven (previously philanthropy-driven) innovation *for* the poor; the community-driven innovation *by* the poor; and the governance-driven innovation *with* the poor. Within management and organization studies, a number of scholars have been inspired by Laclau and Mouffe's (1985) post-foundational discourse theory to investigate organizational phenomena with the conceptual tools provided by this theoretical approach (e.g., Islam et al., 2017; Kelly, 2013; Kenny and Scriver, 2012; Kenny and Bushnell, 2020; Nyberg and Wright, 2012; O'Doherty, 2015; Smolović Jones et al., 2020; Spicer and Böhm, 2007; Spicer and Sewell, 2010; Zueva and Fairbrass, 2019). By discourse, Laclau and Mouffe (1985, p. 105) refer to a "structured totality resulting from [an] articulatory practice", that is, "any practice establishing a relation among elements such that their identity is modified". In other words, an articulatory practice may lead to a change of meanings by modifying the identity of elements, yet it does not become a discourse until it is also characterized by a degree of 'fixation' in meaning (Jørgensen and Phillips, 2002). When articulatory practice modifies the meanings of elements, some of the meanings of those elements become fixed, transforming these elements into what Laclau and Mouffe (1985) call 'moments'. However, the degree of fixation of meaning is never absolute; instead, meanings are contingent upon possible different (re)articulations of discourses.

In this study, 'frugal innovation' is studied as a floating signifier; that is, different discourses engaging with the signifier 'frugal innovation' fill it with different meanings. 'Co-creation' is understood in this study as an empty signifier (Laclau, 1996), "meaning that it acts as a kind of anchoring and connective word that threads together the moments [and other ambiguous signifiers] that assemble [the now hegemonic] discourse" (Smolović Jones et al., 2020, p. 539) on frugal innovation, that of frugal innovation *with* the poor. What we mean by 'key signifiers' in this study refers to the other ambiguous signifiers that are other nodes in the discourse, such as 'Base of the Pyramid' and 'partnership'; they are not 'moments' since their ambiguity remains and contributes to the chain of difference.

Two other central notions of Laclau and Mouffe's (1985) discourse theory are the logic of equivalence and the logic of difference, the inspiration of which come from linguistics but which are applied to hegemonic or counter-hegemonic projects in the social realm. Contu et al. (2013, pp. 369-370) explain that "in the social domain, the elements [subjected to these logics] are social groups, their words and actions" and that "in the logic of equivalence, one element 'a', while still holding its particularity, comes to incarnate something that metaphorically brings together (i.e. makes equivalent) all the other elements 'b', 'c', and 'd' constituting a chain of equivalence that articulates a collective will". Thus, they note that this connective element (an empty signifier) is akin to what in linguistics is called synecdoche, as in one element standing for the whole. For such different elements to become 'equivalent', there needs to be an outside that threatens all the elements and against which all the elements are framed. Thus, 'chains of equivalence' typically form against a constitutive outside (see Laclau, 1996), and they particularly characterize counter-hegemonic movements framed against an established order. For example, successful populist movements tend to rely on chains of equivalence by being united against the elites or the establishment (Laclau, 2005; see also de Cleen et al., 2018).

In contrast, the logic of difference refers to a process where different elements a, b, and c remain differentially positioned but somehow are structured in a chain, as part of the same system anyway. Examples of chains of difference often refer to an established order with institutionalized differentiations, such as the Apartheid regime in South Africa (Howarth, 2000). Such chains may also develop dynamically as a result of a challenge to the hegemonic block or simply an attempt to consolidate a hegemonic order through a hegemonic project extending the reach of the hegemonic block. In these cases, a chain of difference might develop as a result of a discourse that to some extent succeeds at re-legimizing the hegemonic order, for example through arguing for a differentiated win-win-win for differentiated groups in society (see e.g., Fougère et al., 2017).

Both types of chains need powerful empty signifiers in order to be established and sustained. While a chain of equivalence needs an empty signifier often based on synecdoche and while the equivalence comes from a common difference to an outside, a chain of difference needs different kinds of signifiers, signifiers that draw connections between different identities – and between different demands – not by making them

equivalent in their common difference to an outside but by affirming their difference to one another. Thus, while the signifiers establishing and sustaining chains of difference might be just as ambiguous as empty signifiers associated with chains of equivalence, their main function is not to create equivalence but to connect differences with one another. While to date there has been a paucity of research on exactly how empty signifiers work in establishing chains of difference, one intuition from Contu et al. (2013) is that the kind of empty signifier needed might be akin to a *tertium quid*, that is, an "unknown or indefinite thing related in some way to two [or more] known or definite things, but distinct from both[/all]" (Collins, 2021).

Both chains of equivalence and chains of difference are closely connected to the notion that every discourse competes for hegemony within a field of discursivity, attempting to dominate this field (Torfing, 1999). While discourses that are already dominant often rely on a chain of difference, where societal differences are institutionalized in a hegemonic order, counter-hegemonic discourses typically rely on as broad as possible chains of equivalence in order to stand a chance in challenging the hegemonic block (see e.g., Fougère and Solitander, 2020; Kenny and Bushnell, 2020). In order to hegemonize the field of discursivity a discourse needs to establish a chain (of difference or equivalence) that fixes the meaning of key 'floating signifiers' (Laclau and Mouffe, 1985), i.e. those signifiers whose meanings differ from one discourse to another. In this paper, 'frugal innovation' can be understood as a floating signifier whose meaning varies across discourses – such as in business-driven discourses on sustainable innovation vs. community-driven discourses on sustainable innovation. Hegemony can be argued to be established if a single discourse succeeds in standing in for the whole field of discursivity. In this context, the discourses on 'innovations *for* the poor' and 'grassroots innovations *by* the poor' become undermined from the discursive field of sustainable innovations, from which the 'co-creation *with* the poor' overpowers or dissolves them by rearticulating their elements through a chain of difference (Jørgensen and Phillips, 2002).While a hegemonic discourse can be strongly naturalized as the one established way to understand a particular aspect of reality, it is never absolute, otherwise it would mean that we would not be able to see its contingency as 'hegemony', but rather as fully 'objective' discourse (e.g., Jørgensen and Phillips, 2002). For example, sustainable development discourse as institutionalized through the SDGs has a vocation to be hegemonic. While it is difficult to resist its injunction to frame all sustainability endeavours in terms of SDGs, it is nevertheless not impossible to see SDGs as contingent articulations, which may be contested. Indeed, a feature of hegemony is that because of its contingent nature, it does not exist without resistance (e.g., Burawoy, 1979; Laclau and Mouffe, 1985). Given that hegemony for Laclau and Mouffe (1985) is inherently unstable, once provisionally established it necessitates discursive work to maintain and reproduce it (Spicer and Sewell, 2010).

In our study of discourses on frugal innovation, we set out to look into what discourse today is closest to what could be called a hegemonic discourse on sustainable innovation, and what meaning frugal innovation is assigned within such discourse.

Discourses on frugal innovation and the sustainable innovation field of discursivity

Our discourse analysis focuses in turn on: (1) 'sustainable innovation' as an evolving field of discursivity; (2) different relevant historical articulations of sustainable innovations *for* the poor; (3) relevant articulations of sustainable innovations *by* the poor; and (4) more recent articulations of frugal innovations *with* the poor, which seem to be successful at creating a chain of difference, indebted to the 'co-creation' empty signifier and other key signifiers.

Sustainable innovation as an evolving field of discursivity

Before proceeding to analyzing frugal innovation in more detail, it is useful to relate its emergence to the broader narrative of sustainable innovation. The amalgamation of sustainability and innovation - two fundamental aspects of contemporary economic thinking and global governance – towards the different discourses on 'innovation for sustainable development' progressed against a background of dual separate developments. In the late 1980s, two parallel processes that would get to exert strong influence on policy and practice worldwide were initiated: The Brundtland report 'Our Common Future' on sustainable development; and the far less known two Nordic workshops (the first on the basis of a paper from the Nordic Science Council in 1988; the second in Oslo in 1989) that resulted in the first Oslo manual on measuring innovation activities. While the Brundtland report defined the new, hegemonic way of thinking about development and growth through the discourse of sustainable development (Brown, 2016), the Oslo manual can also be argued to have provided a hegemonic way of thinking about innovation (see Fougère and Harding, 2012), through collecting and interpreting innovation data from companies in different OECD countries. Coincidentally in the same year 1992, the Oslo manual was published while the Brundtland report which was redefining global governance agendas, was the basis for the first Earth Summit, the Conference on Environment and Development held in Rio de Janeiro. Like many earlier major UN activities such as the Development Decade in the 1960s, the Earth Summit came to affect corporations and to shape their discourses (Kolk, 2016).

The recent formulation of the UN Sustainable Development Goals (SDGs) signaled the broadening of the discursive field for corporations to legitimize their role in innovating for sustainable development (Voegtlin and Scherer, 2017). The role of corporations within the SDGs is part of a larger and contested narrative: private corporations, as important contributors of innovation, should gain a legitimate position in addressing problems of public concern relating to sustainability, based on their essential resources and room for action (Schrempf 2014; Voegtlin and Scherer, 2017; Young 2011). The win-win proposition of sustainable innovation lies in its ability to hold out a promise of solving sustainability challenges, while simultaneously contributing to economic growth. An opposing view to corporations' increased influence within sustainable development discourse emphasizes the necessity of addressing sustainability on a more collective

level. Such processes ought to proceed through democratic governance mechanisms, and limit the involvement of corporations in such issues of public concern (e.g. Edward and Willmott, 2008; Mäkinen and Kourula, 2012). This same controversial discussion on the position of corporations in the realm of sustainable innovations is present within frugal innovations: while the discourses on sustainable innovation *for* the poor obviously call for external actors (and today, mainly multinational corporations) to take a leading role in producing frugal innovations for the market needs, the community-driven discourse on innovation *by* the poor typically places the local needs as their starting point. In the following, we will have a closer look at the differences between these discourses, and proceeding to a description of the third discourse, on sustainable innovation *with* the poor, which we argue represents a hegemonic project.

Different articulations of sustainable innovation for the poor

Historically, two important articulations have advanced thinking on sustainable innovation *for* the poor: first, the Appropriate Technology discourse, which in some way merged into the Sustainable Development agenda in the 1980s, and second, as part of the business response to the latter agenda after the 1990s, the Base of the Pyramid (BoP) discourse.

Sustainable innovations at the 'local' level: the legacy of the Appropriate Technology movement

Going back to the historical roots of frugal innovations, many of the key notions in framing the idea of 'innovation for the poor' can be found in the Appropriate Technology movement of the 1950s. Bhatti and Ventresca (2012) even suggest frugal innovation to be a direct continuation of this specific movement. Appropriate technology is characterized as one of the most influential discourses on technology in the global development sector (Bell and Franceys, 1995). It started with a not-for-profit agenda, largely influenced by development economist E. F. Schumacher and his persuasive book 'Small Is Beautiful: A Study of Economics As If People Mattered' (1973). The movement arose from a recognition that most global technological solutions were directed to satisfy the needs of the global rich, therefore designed to operate in high-income environments (Kaplinsky and Farooki, 2010). Thus, from the beginning the question of desirable technology for different people around the world was framed in terms of *differentiated* needs, that is, in a differential logic. It grew during the time of the energy crisis in the 1970s and the burgeoning environmental movement, therefore encapsulating a strong emphasis on environmental sustainability (NCAT, 2011). The definition of appropriate technology was disputed since its emergence, but certain common denominators exist within the literature: appropriate technology encompasses technologies that are environmentally sustainable, energy-efficient, small-scale, decentralized, labor-intensive and locally autonomous (Hazeltine and Bull, 1999). Such technologies create workplaces located where people live, they are affordable for everyone to use, and they utilize local materials and simple techniques to create material objects for local consumption (Schumacher, 1973). They incorporate "appropriate" characteristics for a

specific time and place, thus rejecting the idea of universalistic, linear models of technology. The ideological aim of the appropriate technology movement was to demand for an alternative to the traditional technology transfer of capital-intensive products from industrialized nations to the global South (Akubue, 2000) towards the transfer of more appropriate technologies for the poor. In this sense, the logic of difference characterizing the Appropriate Technology movement was philanthropy-driven rather than business-driven, as the idea was to provide those technologies that the poor most needed, regardless of business opportunities.

After a quick rise, the Appropriate Technology movement experienced a steady decline from the late 1970s on. During the 1980s, many of the institutions built around promoting appropriate technologies either disappeared or lost their significance. Some of the technologies that had gained momentum as part of the movement, such as solar energy, windmill electricity, and composting and sustainable agriculture did survive, but without their previous ideological context which gave them political meaning (Pursell, 1993). The reasons for the decline of the movement are considered complex and political (see Pursell, 1993), and by the early 1980s, several concerns and internal disagreements emerged regarding appropriate technologies. Some interpretations suggest that the appropriate technology movement merged into the sustainable development discourse in the 1980s (Oelschlaeger, 1995), and continues influencing discussions around technology and its role in development on that arena. However, it is not by any means the dominant way of articulating sustainable innovation for the poor anymore, as the growing influence of the sustainable development agenda throughout the 1990s led to a much more aggressive, business-driven articulation of sustainable innovation for the poor.

Tracing back market-based innovations for the poor: Base of the Pyramid

The business-driven discourse developed as a corporate response to the overarching call for sustainable development launched at the Earth Summit in 1992. Business actors, represented by the World Business Council for Sustainable Development (WBCSD) first mobilized a set of solutions to the sustainable development question through the Corporate Social Responsibility (CSR) discourse. The CSR approach paved the way for corporations gaining a more legitimate space in social and environmental questions pertaining to sustainable development. Thus, it did not come as a surprise, when after a decade of CSR-led poverty reduction activities struggling to showcase satisfactory performance (Arora and Romijn, 2012), a controversial solution was revived on the international arena of sustainable development: making a profit while reducing poverty in developing countries (Prahalad and Hart, 2002). Towards the end of the millennium, market-based strategies for poverty alleviation were no longer considered as alternative or philanthropic and instead started to become dominant in discourses on global poverty (Chatterjee, 2014). A stream of literature and practice regarding the 'Base of the Pyramid' (BoP) then built upon this business-friendly idea (e.g., Calton et al., 2013; Dembek et al., 2019; Lashitew et al., 2020). Borrowing from economics, the BoP population refers to the poorest but largest socio-economic grouping of the world. This group consists of 3

billion people who lived on less than around $2.50 per day in 2002, as defined and popularized by Prahalad and Hart (2002). In the original discourse, the BoP was seen as a potentially vast market that had not been successfully "tapped" through the sales of products, services and technological innovations. Thus, the BoP population was naturalized as a market with specific characteristics in a system of differentiations as a basis for market segmentation and strategy. Adding to the profit arguments, other motives for businesses to engage with BoP markets would encompass the already attractive CSR agendas, or market entry justifications. The prominent theme in BoP thinking emphasized the opportunities for companies to make money from selling to people with low incomes, while at the same time improving their quality of life through material solutions. The underlying rhetoric thus touched upon the poverty-reducing benefits of companies operating in the BoP market. Such an inviting discourse was quickly adopted by business interest groups such as WBCSD. Significant tensions emerged, however, when simultaneously trying to pursue the goals of the BoP ideology in practice; consequently, in the academic discussions, the BoP discourse has contributed to decades' worth of heavily criticized results with the role of private business in reducing poverty (see e.g. Faria and Hemais, 2017; Banerjee, 2007; Prieto-Carrón et al, 2006).

Since its beginning, the BoP approach was very much focused on developing innovative new products and services for the poor, based on a seemingly clear logic of difference whereby transnational corporations make profits and the poor mainly consume their products. However, the idea of coming across other innovations while selling products to the poor developed simultaneously: in the early days of BoP, Hart and Christenson (2002) as well as Prahalad and Hart (2002) described rural markets as hotbeds of innovation that would act as sources of sustainable innovations. The poor should not only save money and consume products, but also become active in the sales and distribution of the products developed by corporations (Prahalad and Hart, 2002). The ideal BoP subject then becomes a 'consumer-entrepreneur' (Prahalad, 2006: 60) – preferably an informal one – as per the intentions of the broader neoliberal political philosophy that shifts the focus from the state towards the individual (Chatterjee 2014). This political philosophy, in its infancy in the original BoP discourse, later became central within the governance-driven discourse (analysed below) on co-creating frugal innovations *with* the poor, where individual grassroots entrepreneurs are celebrated as sustainability champions who not only distribute and sell products, but also develop innovative solutions to social problems.

Sustainable innovation by the poor: Community-driven discourse on grassroots innovation

The community-driven discourse is the second set of ideas that we identify as a historically influential discourse on frugal innovation.. The community-driven discourse lends its vocabulary to innovations arising from the grassroots through bottom-up processes mobilized by communities and users (Gupta, 2013). Such innovations are ideally based on the needs of the 'communities' and tap into already existing resources,

or traditional ways of coping with scarcity. Here, this discourse does not precede the actions of the poor communities and it is not necessarily framed as a response to the sustainable development challenge in the first place, but it packages already existing practices in a way that resonates with sustainable development discourse due to some of its characteristics (such as efficient use of scarce resources). Thus, while it originates in particular, contextualized practices based on specific conditions of scarcity in differentiated places, as a discourse it does have a somewhat equivalential effect of lumping the many grassroots innovation into one emancipatory movement of frugal innovation.

A general aim associated with the grassroots innovation discourse is the idea of obtaining control over the innovation process and actively participating in the planning of policies and regulations concerning technology and innovation (Letty et al, 2012). In grassroots innovations, the generation of innovation is attributed to civil society actors, instead of government or business (Tang et al., 2011), and the aims often support broader social changes (Hess, 2007). The value systems behind grassroots innovations are different than those associated with profit-driven, market-based innovations, and the discourse stimulates a debate about social and structural transformations in light of extant economic and political systems (Smith et al., 2014).

Many grassroots innovation movements are and have been politically radical, and hold out a vision to put an end to unequal knowledge regimes. Grassroots innovation discourse typically portrays innovations originating from common people who address very practical problems of everyday life, with limited material resources (Seyfang and Haxeltine, 2012). Such an emphasis has brought recognition to the importance of people's indigenous innovation capabilities, and the coping strategies needed for solutions to immediate problems (Smith et al., 2014). In contrast to BoP literature, grassroots solutions supposedly empower local communities through meeting basic needs endogenously, and *by* the people themselves. However, the grassroots discourse does incorporate aspects that frame them as malleable for corporate interests. Similarly to frugal innovations, grassroots innovations are locally specific yet widely applicable (Smith et al., 2014). This idea of scalability potentially resonates with market interests looking for growth potential, and we will see that the hegemonic discourse made this question of 'scaling up' central.

Grassroots innovations and the question of poverty

The legacy of grassroots innovations has a long and persistent history in India, and while there have been discussions of frugal innovation in other parts of the Global South, much of the discursive elaboration on frugal innovation originates in India. Mahatma Gandhi was a strong proponent of local solutions and innovations, and it is no surprise that grassroots innovations often continue carrying his name as 'Gandhian innovations' (Prahalad and Mashelkar, 2010). With a history of several grassroots innovation movements (see e.g. People's Science Movements and the Honey Bee Network), the context of India provides a complex and interesting setting for discussing grassroots

innovations. Today many scholars prescribe those grassroots innovations known as *jugaad,* a Hindi word designating rough-and-ready improvisations with limited resources to overcome seemingly overwhelming everyday problems (Gulati, 2010; Krishnan, 2010; Radjou et al., 2012), presented as unique to the Indian context (Nair et al, 2015, Bound and Thornton, 2012). The US Department of Commerce has singled out India for its innovative capabilities stating that "there are many Indian firms that have learned to conduct R&D in highly resource-constrained environments and who have found ways to use locally appropriate technology…" (US Department of Commerce, 2012). Radjou et al. (2012) further posited that "the West" should learn from places like India, China, and the African continent for a novel, bottom-up approach to sustainable innovation. In their argument, the time for corporations to follow the old formula that spurred innovation and economic growth for decades has come to an end. The old mix of top-down planning, and rigid, expensive, heavily structured innovation processes is not successful anymore.

Grassroots innovation movements have been influential in drawing global attention to the so-called 'below-the-radar innovations' in the Global South (Pansera, 2013), and paving the way for alternative narratives on innovations to occupy legitimate spaces. The power of the grassroots innovation discourse within the Indian context not only gains its strength from the neoliberal celebration of the entrepreneurially spirited creative individual, but also from the type of innovation that gets promoted within the discourse. Since its independence, a long-standing distrust towards foreign technologies, protection from international competition and strict regulations for technology transfer had an influence in isolating India from external innovations (Nair et al., 2015). Furthermore, many anti-imperialist voices, such as Mahatma Gandhi's, blamed the British technology for ruining the Indian economy, and wanted to promote simple, small-scale technologies and local development instead (Nair et al., 2015). In recent years, the Hindu nationalist Bharatiya Janata Party has also invoked similar sentiments by highlighting the superiority of indigenous Indian innovations. Grassroots innovations resonate well with such discourses, and simultaneously emphasize the uniqueness and diversity of Indian creative innovations. While there are equivalential aspects to this type of Global South populism framed against innovations coming from the Global North, there is also much exclusion and affirmation of difference in such nationalist political strategy, preventing frugal innovation from being a real counter-hegemonic project beyond domestic borders.

Changing perceptions on grassroots innovations – towards a governance-driven approach

The mandate for scaling up grassroots innovations has been strongly supported by the governmental bodies in India. As innovation policies have started to attend to issues of poverty, the idea of social inclusion advocated by grassroots innovation movements has gained attention for producing contextual knowledge required for constructing sustainable futures (Smith et al., 2014). In India, inclusive growth has been set as a priority in the national Science, Technology and Innovation Policy since 2003 (STI

Policy, 2003). Unlike much innovation research and development elsewhere, in the Indian context, there appears to be substantial focus on innovation that serves the need of the poor (Nair et al. 2015). The Indian government has taken a strategic supportive role in scaling up grassroots innovations. Established in 2000, the National Innovation Fund's (NIF) mission is to "help India become inventive and creative, and to become a global leader in sustainable technologies without social and economic handicaps affecting the evolution and diffusion of green grassroots innovations" (NIF, 2019). At the first biennial innovation competition organized by NIF in 2000, more than 1600 applications were submitted; in 2015 the submission rate reached 33 500 (NIF, 2017). The popularity of the initiative reflects the lucrativeness of the discourse on the creative grassroots inventor; it also taps into the desires of not wanting to be a rural peasant in a country with severe structural inequalities.

The recent shifts in India's innovation policies have gradually started to manifest themselves in the changing attitudes and discourses towards grassroots innovation. As an illustrative example, the concept of *jugaad* has experienced an interesting transformation during the recent decade. With its origins in the Indian countryside (Brem and Wolfram, 2014), *jugaad* used to be typically constructed as a rather negative phenomenon in the Indian context (Radjou et al., 2012; Sekhsaria, 2013). Adding to its semantic meanings associated with improvisation, *jugaad* can also refer to a "trick" or "cunning device" (Monier-Williams, 1899). The term has a historical baggage of referring to an informal, clumsy, stop-gap solution to a complex problem, which might not always conform with legal criteria (Birtchnell, 2011; Krishnan, 2010). Such a negative connotation may originate from the political context, since the governmental order in India has typically wanted to frame the messy informal sector with a degree of intolerance (Chatterjee, 2008). Recently, however, the discourse has changed towards something more positive. There has been an intentional attempt to transform the concept of *jugaad* into a distinguished form of improvised solution born out of smartness. This shift has been amplified by Radjou et al.'s (2012) influential book *Jugaad Innovation: Think frugal, be flexible, Generate Breakthrough Growth* – which is also the most cited publication on frugal innovation. In their book, the authors narrate untold stories of creative *jugaad* entrepreneurs and innovations to show how global corporations can endorse *jugaad* to succeed in a resource constrained world. Another form of the attempt in polishing the image of *jugaad* innovations has been the establishment of 'The Better India' media platform that shares positive and uplifting stories of "unsung heroes, changemakers, innovations" (The Better India, 2019) through newsletters and social media outlets. Financed by private investors, these stories are currently reaching tens of millions of people every month with a clear message of celebrating *jugaad* and grassroots innovations. The recent changes within the use of grassroots innovation discourse in India serve as an observation to support our argument on the hegemonic formation of the governance-driven discourse on co-creating frugal innovations, to which we now turn.

Sustainable innovation with the poor: Governance-driven discourse on co-creating frugal innovations

The governance-driven discourse on sustainable innovation has been directly inspired by the attempts of defining sustainable development as a governance challenge at various scales. This discourse has recently incorporated a local dimension into its sets of meanings and practices (UNDP, 2017). The governance-driven discourse is often centered around a neutralized partnership imperative between business and other actors (e.g., Glasbergen, 2010). When transferring such imperatives to the local level, partnerships have come to manifest themselves within the new approach of co-creating sustainable innovations *with* 'the poor'. The governance-driven discourse has become hegemonic through its injunction to 'co-create' frugal innovation, where the particular meanings of the BoP, Appropriate Technology discourse and the grassroots innovation discourse are crafted into a win-win-win totality that allows for all groups to share partial, superficial beliefs.

Co-creating innovations with the poor

As a concept originating in marketing and strategy, (value) co-creation has been defined as the active involvement of end-users in various phases of the product development process (Prahalad and Ramaswamy, 2000; Vargo and Lusch, 2004). Co-creation puts more emphasis on the active involvement of end-users than, for example, participation, which might also indicate passive involvement (Voorberg et al., 2015). Within critical marketing and critical management studies, the co-optive power of co-creation has been problematized in various ways. It has been noted that (1) co-creation leads to a problematic blurring of boundaries between production and consumption (Fontenelle, 2015; Zwick et al., 2008), (2) the logic of co-creation makes consumers contribute to producer innovation while preserving or enhancing producer power (Bauer and Gegenhuber, 2015; Zwick et al., 2008), (3) value co-creation literature tends to exaggerate the mutually beneficial nature of these processes, suppressing possible tensions (Cova et al., 2015b; Laamanen and Skålén, 2015), and (4) those consumer contributions to for-profit innovations are typically unpaid and thus entail some degree of exploitation (Cova et al., 2015a; Gabriel et al., 2015; Zwick et al., 2008). While the above cited authors have all taken issue with problematic effects of co-creation on the weaker party (variously framed as consumer, customer, user or beneficiary), none of them have explicitly taken a meta-discursive perspective, looking into how co-creation as a signifier may enable discursive interventions that help in achieving or reproducing hegemonic logics. Our argument here will be that in the context of sustainable innovation and more specifically in contemporary articulations of frugal innovation therein, co-creation acts as a powerful empty signifier that contributes to the hegemonic project of co-opting the innovative power of populations in the Global South, by enabling the notion of frugal innovation *with* the poor. The other discourses on frugal innovations thus become perceived as 'lacking' the element of co-creation. This is a characteristic of empty signifiers as the very condition of hegemony: they become present as that which is absent (Laclau, 1996).

In the context of sustainable innovation, co-creation has indeed become a panacea for innovating for sustainability. In the later versions of the BoP approach, which were developed in order to relegitimize the BoP proposition by making BoP less consumption-centred, the co-creative aspects of jointly developing products and services became popular (Arora and Romijn, 2009). Most of the profitable BoP ventures, namely, were not managed by Western corporations as intended by the original BoP approach. Success stories include e.g. the Indian Jaipur Foot project and the Aravind Eye Care Project (Karnani 2007), both of which contributed to the increasing interest towards Southern-led creative entrepreneurial initiatives. The observation that global corporations may not have particular advantages in competing in the BoP markets (Kolk et al., 2014) promotes the importance of facilitating partnerships and co-creation with local stakeholders, and fostering local entrepreneurship (Arora and Romijn, 2009). One interesting detail indicating this shift was the change from the wording of "Bottom of the Pyramid" to "Base of the Pyramid" (Arora and Romijn, 2009). This intentional change implies a broader message: "…the letter "B" in the abbreviation was re-baptized to "Base", to convey the positive idea of a platform or launchpad from which one can build upwards" (Arora and Romijn, 2009: 485). This is indicative of a shift from a top-down mentality of the global, business-driven discourse towards a discourse that also accommodates a bottom-up, local community-driven discourse.

Simanis and Hart (2009) propose that the fact that corporations failed at the BoP markets was illustrative of the necessary shift not only within the BoP approach, but also a sign of changing paradigms of corporate innovation strategy. Simanis and Hart (2009) categorize the so called previous 'BoP 1' model as the manifestation of the centuries-old 'Structural Innovation Paradigm' (SIP), where companies focus on solving the problems of customers in faster and cheaper ways than their competitors. The problem with this model, as Simanis and Hart (2009) argue, is that companies' innovation strategies and corporate growth remain disembedded from the society. Framing communities as target markets and only focusing on transactional engagement does not lead to long-term success at the BoP markets (2009: 13). Instead, they suggest that a new paradigm should be adopted, the so called 'Embedded Innovation Paradigm' (EIP). The EIP is based on incorporating broader societal values and the local environment into the business, thus 'embedding' the corporation into the local context. The focus is not on reaching increased material consumption for the consumers, but on stakeholder transformation that "creates new habits and identities necessary for realizing a new enterprise and strategic community intent" (2009:15). Through the processes of local engagement and 'becoming embedded', companies and communities can jointly build new, shared identities. Transforming potential consumers into stakeholders that share closeness and mutual commitment with the company constitutes 'business intimacy' (Simanis and Hart, 2009: 14), a competitive source of value.

The co-optive power of co-creation

The discourse on sustainable innovation *with* the poor thus combines BoP with co-creation – while using frugal innovation as a more ambiguous signifier than in the other

two discourses – also with other terms associated with grassroots innovations (such as *jugaad* in India, now used routinely by businesses), as a way to present themselves as SDG-responsible. This entails co-opting grassroots networks in a discourse where 'scaling up' is a key signifier. Business and scaled up grassroots innovations (preferably 'co-created', with grassroots labour and business benefit) thus become the ostensible best means to tackle the SDGs.

The empty signifier here is clearly 'co-creation', which might encompass anything from the most benevolent cooperation to the most extreme exploitation (where the labour of one of the 'co-creators' may often be tapped in by the business co-creator for no pay at all), at the same time as it makes an implicit and often explicit link to 'value creation'. In Laclau and Mouffe's (1985) terms, what this empty signifier does is establishing and sustaining a chain of difference, because while all people are claimed to benefit from frugal innovations with the poor, both the roles and ways of benefiting from frugal innovation remain fully *differentiated*. On the one hand, transnational corporations make a killing thanks to the scaling up of frugal innovations, and the Global South elites find a solution to their 'inclusive development' problem while getting more lucrative opportunities too. On the other, while some of 'the poor' are rhetorically 'empowered' and become (often exploited) 'entrepreneurs', most of the people living in poverty remain 'beneficiaries' from frugal innovation largely in a passive subject position. The 'co-' in 'co-creation' implies that parties with different identities and a belief in a common interest work together, and here lies the co-optive power of co-creation.

A signifier that resonates with 'co-creation with the poor' and consolidates the connection with BoP discourse is Porter and Kramer's (2006) 'creating shared value' (CSV) proposition, whereby a win-win is posited between value creating for business benefit and value creation for target communities. Besides BoP and 'scaling up', other key signifiers relied upon in this discourse include 'embeddedness' (Simanis and Hart, 2009) and of course the omnipresent 'partnership' which often serves as a discursive lever for business to co-opt communities and NGOs (see Burchell and Cook, 2013; Laasonen et al., 2012).

Thus, our interpretation is that the governance-driven discourse relying on sustainable development and SDGs has been quite successful as a hegemonic project, notably thanks to its central notion of co-creation *with* the poor. This discourse breaks with the particularisms of community grassroots innovations on the one hand and business innovations for the poor (and for profit) on the other, and hegemonizes sustainable innovation by presenting both the business-driven and community-driven articulations of frugal innovation as part of one broader, all-encompassing solution to sustainability challenges. And by doing this, the discourse also crushes any possibility of a counter-hegemonic chain of equivalence for a more grassroots-based frugal innovation discourse, instead sustaining a chain of difference in which the respective roles and benefits of all involved are differentiated.

Discussion

In this paper we have analysed how the recently popularized concept of frugal innovation has gained meaning through the business-driven, community-driven and governance-driven discourses on sustainable innovation. By analyzing these discourses as developing innovations *for* the poor, *by* the poor and *with* the poor we were able to trace a hegemonic struggle between different visions of frugal innovations. By accommodating interests from both the business- and community-driven discourses on sustainable innovation, the governance-driven discourse on co-creating frugal innovations *with* the poor is becoming hegemonic, and it seemingly is being successful in securing new benefits for the elites while promoting neoliberal entrepreneurialism for the poor. Our contribution lies in exposing the particular role of 'co-creation' as a powerful empty signifier originating from business studies. This signifier acquired co-optive power within the field of marketing (Zwick et al., 2008) and later was successfully imported into the discussion on frugal innovation, particularly via the BoP approach (also originating from strategic marketing) and as a way to bridge that approach with one framed as more win-win and more governance-oriented. What we believe is particularly novel in our analysis, at least within the fields of business and society and critical management studies, is how we unpack the role of particular signifiers in establishing and sustaining a chain of difference – in previous studies the role of empty signifiers in relation to chains of equivalence has been foregrounded, but not that in relation to chains of difference, even in those articles that discuss examples of chains of difference (Contu et al., 2013; Nyberg et al., 2018). 'Co-creation' works for the chain of difference because it is connective as any empty signifier should be, but it does not create equivalence. Instead it merely connects very different parties involved in frugal innovation from top-down and bottom-up perspectives, and plays the role of a *tertium quid*, an indefinite signifier that connects a number of definite signifiers, while distinct from all of them. In forming the chain, it is assisted not so much by definite 'moments' but instead by a number of other signifiers that are used in an ambiguous manner for the purpose of claiming benefits for all while keeping them differentiated, such as BoP, embeddedness, inclusion, partnership and scaling up.

It is not the first time that ideas associated with marketing and business ethics are shown to become powerful signifiers in the context of national and transnational governance – for example business-NGO partnerships (Laasonen et al., 2012), CSR (Zueva and Fairbrass, 2019) and multi-stakeholder initiatives (Fougère and Solitander, 2020) all have been discussed as signifiers from business studies with an impact on broader societal governance. Neither is it the first time that co-optive dimensions of empty signifiers have been discussed in business studies – a previous example being workplace mindfulness (Islam et al., 2017). But in contrast with previous studies, our focus is not mainly on one empty signifier that is 'co-opted' (Islam et al., 2017) or 'hijacked' (Zueva and Fairbrass, 2019) but on the dynamic discursive interactions between signifiers in a particular hegemonic intervention. Through this intervention, a floating signifier with radical potential, frugal innovation, has been hijacked and co-opted in a hegemonic

project that has leveraged powerful ambiguous signifiers (co-creation, BoP, partnerships) associated with marketing and business ethics. We believe that rather than contributing to business theories that have problematic power effects, exposing those effects is a particularly worthy endeavour that is a contribution in its own right.

Thus, our analysis urges us to be vigilant to a number of critical implications of the advent of the hegemonic co-creation discourse on frugal innovation. First, the inherent positivity of frugal innovations framed as win-wins (Meagher, 2018) combined with their corporate-friendly articulation may become yet another lever – besides philanthropy, CSR, business-NGO or multi-stakeholder partnerships, etc. – for corporations to reclaim legitimacy by delivering 'development' in environments where their social license to operate has been challenged (Böhm and Brei, 2008; Moog et al., 2015). For example, in the context of India, a company like Coca Cola, often strongly criticized for its negative impacts on local communities living near its production facilities, has been very happy to share its distribution channels with a social business called 'ColaLife' in order to distribute a package of frugal innovations that help fighting child mortality in remote communities (see Nari Kahle et al., 2013). This possibility of reclaiming corporate legitimacy through support for scaling up frugal innovations is often supported by national STI policies enforcing broader discursive legitimations for inclusive innovations for and with the poor, as in the case of India.

Second, following insights from critical marketing and critical management studies (Cova et al., 2011; 2015a; Gabriel et al., 2015; Zwick et al., 2008), one cannot but think of the possibilities of exploitation that come with 'co-creation'. Specifically in this context, what is likely to happen based on the new hegemonic understanding of frugal innovation is a heightened extraction, exploitation and scaling up of 'creative sustainability value' from individuals or communities. The grassroots co-innovators tend not to readily have access to ways to protect their frugal innovations (such as patents or other forms of legal protection), notably because they typically work in the 'informal sector' – while formal economic actors increasingly reap the benefits of frugal innovation (for a detailed description of how this happens, see Meagher, 2018).

Third, relatedly but going beyond mere exploitation of creativity, the hegemonization of sustainable innovation along the lines of co-creation can be seen as inscribed in a broader biopolitical project of governing the poor through including them more strongly in the market realm as entrepreneurs (see Varman et al., 2012) or, as BoP proponents would say, 'consumer-entrepreneurs' (Prahalad, 2006), thanks to the increasingly usual discursive mix of 'empowerment' and 'responsibilization' (see e.g., Ilcan and Lacey, 2011). In this project, co-creation is a key signifier for articulating an illusory win-win (Meagher, 2018). Here, the resulting further activation of frugal creativity, as enabled by 'co-creation', both heightens the possibilities of exploitation discussed above and is meant to serve as an engine for economic growth.

Fourth, and again relatedly, this reliance on entrepreneurs and markets to provide the solutions for challenges related to poverty also means that the state is assumed to be

redundant in addressing these challenges. This is particularly harmful since the state uses its championing of co-creation frugal initiatives to justify reductions in welfare interventions – all while inequalities are heightened by the new entrepreneurial logic (Varman et al., 2012). As Meagher (2018) concludes, countering the disempowering effects of frugal co-creation for informal actors instead should entail much greater mobilization of the state. Similarly to social innovation in the EU (Fougère et al., 2017), frugal innovation in developing countries tends to be used in policy as a way to legitimize a less redistributive state.

That said, the openness of the hegemonic discourse means that it remains contested, and thus the emancipatory – and subversive – potential of frugal innovation should not be assumed to be completely lost. The idea of frugal innovation has arguably contributed to a more diverse understanding of the process of innovation. With close connections to the literature on grassroots innovations, it has sought to create appreciation to the local embeddedness of innovations, and the value of solutions developed *by* people residing where the problems themselves are located (Gupta et al., 2003; Smith et al., 2014). It furthermore strives to probe the notion of innovations as primarily outcomes of resource intensive processes and the exclusive domain of economies in the global North with budgets to fund large investments in the development of technology (Kaplinsky, 2011). In doing so, it has been noted, the recognition has also reversed dominant views of economies in the global South as mere recipients of technology to having lessons in innovation for the counterparts in global North as well (Fougère and Harding, 2012; Bound and Thornton, 2012). And one learning that people embedded in different localities around the world could get from the original grassroots articulations of frugal innovation could relate to the need of using those highly context-dependent resources that are locally at hand, in a frugal manner, rather than relying for everything on the global marketplace, which is the main reason for how overwhelmingly unsustainable our world has become, and is entirely down to practices coming from the global North.

Compliance with Ethical Standards

Conflict of interest: The authors declare that they have no conflict of interest.

Research involving human participants and/or animals: This study did not involve human participants (other than the authors) nor animals.

Informed consent: Since this study did not involve human participants other than the authors, it required no one's formal informed consent.

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ANNEX 4

Interview guides for the empirical context of India

A4.1 Questions for the semi-structured interview guide for the local suppliers
(adding to the basic questions related to general information and water filters)

1. How do government regulations, rules and laws affect your business in general?
    a. How do taxation policies influence your business?
    b. How do the government rules and regulations affect your business on water filters?

2. How is the competition in the market?
    a. How is the competition in the market of water filters?
        i. Main competitors (amount of suppliers available)
        ii. Type of demand (uncertainty, oversupply, stock-outs)
        iii. Customer segments (consumer purchasing power)
    b. From your perspective, how are NGOs visible in the market of water filters?
        i. Is the role of NGOs/donors different from other customer segments?
        ii. Have you conducted business with development agencies/donors/NGOs? (if yes, more questions on the type of relationship and experiences will follow)
    c. How do you receive information about the market?

3. Who are your most important suppliers of water filters?
    a. Can you describe your relationship with your most important supplier (contracts, coalition with other retailers, similarity in size/finances/technology)
    b. How much capability the supplier(s) has/have in their dealings with your organization?
        i. Control of pricing/selling/order sizes/demanding sales plans
        ii. Legal action
        iii. Quality of products (possibility to return poor quality/unsold products)
    c. Future intensions of conducting business with the supplier (importance of the relationship, desire to increase/decrease business, trust)

4. How do you see your future business with regard to water filters?
    a. How about in general?

A4.2 Questions to Ahmedabad Municipal Corporation Chief Engineer:

1. What are the official percentages for drinking water supply provided by Narmada water vs. drilled boreholes vs. other sources in Ahmedabad? How has the ratio changed over the past 20 years?
2. How is the financing of drinking water organized in Ahmedabad? How are tariffs collected from end users? How are investments financed?
3. What are the estimations for leakages and wastage of water within the water distribution network of the city? How has the distribution improved over the past 10 years? How about the estimates for water wastage through household RO filters?
4. How is the groundwater table in Ahmedabad? Which factors have contributed / are contributing to potential groundwater contamination? What measures are being taken to prevent contamination?
5. What challenges prevail in monitoring the water quality of illegal boreholes and other groundwater sources of drinking water? How will the situation estimated to change in the future?
6. How is the demand for future drinking water forecasted?
7. What are the main challenges related to drinking water provision in the future? What are the main opportunities and solutions?

A4.3 Questions to Ahmedabad Municipal Corporation Medical Officer:

1. What are the main health challenges related to drinking water in Ahmedabad? How has the situation changed during the past 10 years?
2. How is the general level of awareness on water borne diseases in the city? How is information about water borne diseases communicated to citizens?
3. How does a person's immunity level develop to resist microbiological contamination?
4. What kind of health concerns are linked to high levels of TDS in drinking water?
5. What specific health concerns are related to the usage of RO filters? In your opinion, is the absence of microbiological contamination more important than lack of minerals?
6. There is certain misinformation among the end users about vitamin B12 deficiency being linked to RO filters. How did this information spread among the citizens, what do you think personally?
7. How would you see the overall health situation of the citizens of Ahmedabad to develop in the future?

ANNEX 5

Interview guides for the empirical context of Ethiopia

A5.1 Interview guide for group interviews with Water, Sanitation and Hygiene Committee (WASHCO) and/or water point caretaker at the community level in 2013

Section 1: Respondents' identification

1. Name of the *woreda* (district)
2. Name of the village/got
3. Name of the water supply scheme
4. Type of the water supply scheme
5. Year of construction
6. Names of the present members of WASHCO and/or caretaker
7. List of their respective positions in the WASHCO
8. Date of FGD

Section 2: Procurement, MRO

9. How was the procurement of construction materials undertaken? Where were the materials procured from?
10. How often has the water point required maintenance? What kind of maintenance was required? How long did it take to maintain the water point during its last breakage?
11. How is MRO taken care of? What kind of external support is required for MRO? How would you run it all by yourselves?
12. What type of MRO-related training has the WASHCO/caretaker received? How would you evaluate the training?
13. How is the procurement of spare parts undertaken? Where are the spare parts procured from? How would you evaluate the quality of the spare parts available in the market?

Section 3: Financial sustainability

14. What kind of knowledge does the community/caretaker have on the costs of different spare parts?
15. How much money is saved in the WASHCO account? How much do you pay per month on average? How do you see the adequacy of the saved money for purchasing necessary spare parts in case of break-downs?
16. Who is responsible for covering MRO costs? Why?
17. What kind of solutions would you suggest in order to lengthen the operational life time of the water point?

A5.2 Interview guide for *woreda* water office in 2013

Section 1: Respondent's identification

1. Name of the *woreda*
2. Name and position of the interviewee
3. Contact information
4. Date of the interview

Section 2: Sustainability of water points

5. What kind of governmental and donor WASH projects take place in the *woreda*?
6. What kind of capacity building/training for WASH is conducted by the *woreda* Water Office? How do you evaluate these support activities? How do the capacity building activities affect the sustainability of water points?
7. How are the responsibilities of MRO activities defined between the *woreda*, artisan and the community?
8. How do the WASHCOs manage their MRO activities? (Financial aspect) How would you evaluate the potential of WASHCOs to maintain their water points? How would you improve the capacity of the WASHCOs/caretakers in MRO activities?
9. How is the availability of spare parts in the *woreda*? How does the availability of spare parts affect the sustainability of water points? What other factors affect the long-term sustainability?
10. How efficiently do the WASHCOs procure materials and/or services? What are the reasons behind the delays, if any?
11. In policies and projects the users are regarded as "beneficiaries" rather than "consumers". In your opinion, what kind of implications does this have on the sense of ownership within the communities? How do you see the behavior of *woredas* treating the communities as beneficiaries, i.e.giving free maintenance, spare parts etc. which is against the rules?
12. How do you see the future of community managed water points? What needs to be done to make them independent and sustainable?

A5.3 Interview guide for suppliers (whole sellers/importers and local retailers) in 2013

Section 1: Respondents' identification

1. Name of the organization
2. Name and position of the contact person
3. Contact information
4. Date of the interview
5. Market actor type (whole seller/retailer/other)
6. Number of employees / laborers
7. Year of establishment

Section 2: Basic data and market information

8. What products are you selling? How did you decide to start your business? What kind of spare parts do you have for rural water supply? (Bush bearing assembly, U-seal, O-rings, Bobbin, Rod centralizer)
9. How do you purchase your spare parts? (storage, transportation) And whom do you sell your spare parts to (producers, retailers, dealers, constructor, private people, NGOs etc.)? What percentage goes to each? How are the spares distributed to the buyers?
10. How is the availability of spare parts in your shop? How long the spares stay in stock? What are the order and delivery lead times for the spares?
11. How do you obtain information on the demand? Is the demand stable?
12. How are the profit margins for rural water supply spare parts? How is the competition in the market? Is the market distorted by NGOs/governmental actors that give spare parts for free?
13. What kind of information is required from the government/end users in order to improve your business?
14. How does the centralization vs. decentralization of spare part procurement affect you?
15. What are the most important constraints affecting your business' growth and profitability (road, taxation, transport conditions, telephone service, electric supply, storage, etc.)? How do you see the future of your business?

A5.4 Interview guide for NGOs in 2013

Section 1: Respondents' identification

1. Name of the organization
2. Name and position of the contact person
3. Contact information
4. Date of the interview

Section 2: Information on the approach towards rural water supply projects

5. In which regions/zones/woredas do you have rural water supply programs? Is your implementation approach standardized?
6. What kind of contribution is required from the communities? What type of support is required from governmental actors?
7. How is the sustainability of water points in your approach? How do the communities contribute to the financial sustainability of the water points?
8. What do you think are the major problem/causes for rural water supply schemes failure?
9. What are the strategies to ensure the long term-performance of the water scheme?
10. How is the MRO of the water points addressed in your approach? What kind of capacity building do the communities receive in order to maintain the water points?

11. How is the availability and procurement of spare parts organized? What types of problems are related to the supply chains of spare parts?
12. What kind of suggestions do you have to improve the MRO of the water points?

A5.5 Interview guide for WASHCOs in 2016

- Could you first tell about your role in the WASHCO
- Could you tell me the story of the water point
- What positive aspects do you associate with the water point?
- Responsibilitization
    - Additional burden?
- State power
    - Do you feel dependent on the woreda in terms of water supply?
    - When applying for the water point, did you experience any conditionality in receiving water point?
- Civil society
    - What kind of mechanisms do you have on complaining about the malfunctioning of the water point?
    - Insufficiency of water?
- Economic power
    - Has the water point influenced the economic status of the community?
- Social power
    - Knowledge and skills
    - Surplus time
    - Value of WASHCO as a form of social organization?
    - Appropriate information
    - Confidence and capacity
- What kind of role do technologies carry in changing responsibilities within the provision of drinking water supply?

Linda Annala Tesfaye

Global Thirst for Governing Water

Technologies, innovations and drinking water governance in India and Ethiopia

This thesis examines the links between water technologies, innovations and recent reforms in water governance in India and Ethiopia. The overall aim is to understand the processes of drinking water governance and the ways in which the use and practices related to drinking water technologies and innovations are socially constructed in the studied contexts. Specific focus is on the extended participation of communities and individuals in drinking water provision through the governance discourses of co-production and co-creation; these contested discourses influence governmental, private sector actors and end users in constructing meaning systems to drinking water technologies and innovations.

The thesis comprises two empirical cases from the city of Ahmedabad in India (Article 1), the Amhara region in Ethiopia (Article 2) and a conceptual article on the hegemonic project of co-creating frugal innovations (Article 3). The study builds on interviews, focus group discussions and policy documents in the studied contexts. In Ahmedabad, interviews and focus group discussions took place with end users, governmental actors and water filter entrepreneurs. In Ethiopia, end users, members of Water, Sanitation and Hygiene committees, governmental actors, NGO representatives, spare part suppliers and artisans were interviewed. The conceptual article draws on Laclau and Mouffe's discourse theoretical approach in studying frugal innovations. By using multiple methodologies, the thesis contributes to the interdisciplinary literature on water governance and to the emerging scholarship on frugal innovations. This thesis adds to the discussions on co-producing drinking water by integrating a governmentality framework to analyse the workings of power among a wide array of co-producing actors. With regard to frugal innovations, the thesis shows how drinking water provision through co-created, frugal household water filters shapes and is shaped by societal relations and people's roles in water governance. The conceptual analysis shows how the hegemonic understanding of co-creating frugal innovations raises concerns of the heightened potential extraction, exploitation and scaling up of 'creative sustainability value' from individuals or communities. Frugal innovation as a concept has been co-opted in a hegemonic project of governing and exploiting the poor in ways conducive to 'economic development' as per elite-driven definitions.

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