

Article

## Rethinking Sustainability, Scaling Up, and Enabling Environment: A Framework for Their Implementation in Drinking Water Supply

Urooj Q. Amjad <sup>1,2,†,\*</sup>, Edema Ojomo <sup>1,†</sup>, Kristen Downs <sup>1,†</sup>, Ryan Cronk <sup>1,†</sup> and Jamie Bartram <sup>1,†</sup>

<sup>1</sup> The Water Institute, University of North Carolina at Chapel Hill, Campus Box 7431, Chapel Hill, NC 27599-7431, USA; E-Mails: ojomo@live.unc.edu (E.O.); kristen.downs@unc.edu (K.D.); rcronk@live.unc.edu (R.C.); jbartram@unc.edu (J.B.)

<sup>2</sup> Global Research Institute, University of North Carolina at Chapel Hill FedEx, Global Education Center, CB# 5145, 301 Pittsboro St Chapel Hill, NC 27599-5145, USA

† These authors contributed equally to this work.

\* Author to whom correspondence should be addressed; E-Mail: amjad@unc.edu; Tel.: +1-919-904-4320.

Academic Editor: Marc Henry

Received: 31 December 2014 / Accepted: 18 March 2015 / Published: 3 April 2015

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**Abstract:** The terms sustainability, scaling up, and enabling environment are inconsistently used in implementing water supply projects. To clarify these terms we develop a framework based on Normalization Process Theory, and apply the framework to a hypothetical water supply project in schools. The resulting framework provides guidance on how these terms could be implemented and analyzed in water supply projects. We conclude that effective use of the terms sustainability, scaling up, and enabling environment would focus on purpose, process, and perspective. This is the first known attempt to analyze the implementation of the three terms together in the context of water supply services.

**Keywords:** sustainability; scaling up; enabling environment; drinking water supply; implementation; normalization process theory

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## 1. Introduction

### 1.1. The Problem of Implementation

The purpose of this article is to clarify the use of sustainability, scaling up, and enabling environment in implementing water supply projects. Many interventions and research projects on water supply systems focus on their design or enhancement to be sustainable and scalable, by harnessing an enabling environment [1,2]. The terms “sustainable”, “scaling up”, and “enabling environment” are commonly applied in research and practice as goals to achieve or processes for achieving other goals in drinking water supply management [3–6]. When the three terms are inconsistently used, there may be less comparability and integration within and between research projects.

### 1.2. Implementing Water Supply Projects

For the purpose of examining implementation challenges of sustainability, scaling up, and enabling environment in water supply projects, we use a hypothetical example of providing safe, reliable drinking water in schools at the project level. The project’s purpose is to analyze its capacity to provide safe and financially self-sufficient drinking water to students and teachers in the long term. The project involves water dispensers installed in each of the fifteen project schools. If the water dispensers and student use were found to be sustainable, the second phase of the project would focus on scaling up dispensers on higher administrative levels, such as provincial or state levels. Analysis of the enabling environment that provides conditions for sustainability and scaling up is also part of the hypothetical project. These water dispensers provide approximately two liters of potable water to each student per day, at no cost to the students or schools. These services are made possible by a social enterprise organization that operates the dispensers and delivers safe water to the dispensers for use by students and teachers in schools.

The structure of the article is as follows. First, we discuss the problem of inconsistent definitions, and the three terms’ distinctions. Second, we review the literature for working definitions of sustainability, scaling up, and enabling environment, and introduce Normalization Process Theory (NPT) [7]. Third, we propose a framework based on NPT for implementing the hypothetical water supply project in schools. Fourth, we end with discussion and conclusions.

### 1.3. Inconsistent Definitions

Table 1 below presents a sample of definitions in the literature that contain references to the three terms sustainability, scaling up, and enabling environment. We identified literature from a cross-section of sources that includes peer reviewed and gray literature that explicitly referenced sustainability, scaling up, and enabling environment. We searched for literature that referenced water supply services. This analysis is not intended to be an exhaustive systematic review. Instead, it is a foundation for further exploration of the inconsistencies in use of these terms. The term “sustainability” refers to the function of a process over time, but does not include specifics on the process or activity, its duration, or who may be involved or responsible. We focus on sustainability of water supply projects not on the broader term of “sustainable development”, which is beyond the scope of this paper. Sustainable

development is, “development that meets the needs of current generations without compromising the ability of future generations to meet their own needs” ([8], p. 45). Sustainability to which we refer is the continued delivery of safe drinking water without resource depletion. Scaling up refers to increasing the number of units such as people, households, and communities served by a water supply project. The third term, enabling environment, refers to conditions that encourage desirable political, social, economic, and environmental outcomes.

**Table 1.** Examples of inconsistencies in definitions of sustainability, scaling-up, enabling environment.

Term	Examples of Inconsistencies in Definitions
Sustainability	<p>“[T]he ability of a [water supply and sanitation] development project to maintain or expand a flow of benefits at a specified level for a long period after project inputs have ceased. In the narrowest meaning, the project is the physical infrastructure established and maintained/operated by the participating institutions” ([9], p. 5).</p> <p>“[W]hether or not something continues to work over time” ([10], p. 5).</p> <p>“A drinking water supply is sustainable if: the water consumed is not over-exploited but naturally replenished [,] facilities are maintained in a condition which ensures a reliable and adequate potable water supply [, and] the benefits of the supply continue to be realized over a prolonged period of time” ([11], p. 6).</p> <p>A sustained water supply is “...a service that regularly and reliably provides enough water of an acceptable standard for at least domestic use. Breakdowns are rare and repairs rapid (within 48 h), and local financing covers at least the regular costs of operation, maintenance (O&amp;M) and repairs” ([12], p. vi).</p>
Scaling Up	<p>“The extent to which an intervention can be delivered on a large scale taking into account promotion activities and materials needed” ([13], p. 988).</p> <p>“The term scaling up, is used with a variety of meanings, the most common of which is simply to expand a given initiative to benefit a larger number of individuals” ([14], p. 5).</p>
Enabling Environment	<p><i>(all-encompassing)</i> “The set of interrelated conditions that impact on the capacity of...development actors... in a sustained and effective manner” [15], p.4.</p> <p><i>(narrow)</i> “The policy, institutional and financial framework that is necessary for sustaining and replicating large scale...programs” [16].</p>

#### 1.4. Distinctions and Interdependencies of Sustainability, Scaling Up, and Enabling Environment

##### Distinctions

In water supply, these three terms have different definitions depending on the purpose, dimension, measurement, and evaluation (Table 2). For a piped water supply system, sustainability may resemble long-term functioning of the system or experienced individuals in charge of the systems. In the context of water supply, a common aim is scaling up an activity or product in terms of numbers or heterogeneity of characteristics to a wider audience. Scaling up may refer to the capacity of a governance network to adopt and implement a water supply process that will achieve public health standards. The enabling environment may refer to conditions—Policies, social norms, and culture—That facilitate functioning of a water supply system. Such conditions are difficult to measure, and may include formal rules such as legislation and informal rules such as self-regulation.

**Table 2.** Sustainability, scaling up, and enabling environment definition and purpose.

Concept	Definition	Purpose	Measurement and Evaluation
Sustainability	Performance over time.	To develop long-term performance of a service, project, program or sector-wide.	Functional, achieves identified goals; efficient financing and management.
Scaling Up	Increased numbers of populations and/or geographic space.	Contextualized adoption and implementation of an activity by more than the initially intended number of geographic spaces, institutions, processes, and relationships.	Number of people reached by intervention on a geographical scale.
Enabling Environment	Conditions that encourage sustainability and/or scaling up.	The context that can “grow” a desired process and outcome. Context can include culture, social norms, <i>etc.</i>	Presence and implementation of policies and laws that designate clear roles and responsibilities; capacity and capability.

## 2. Sustainability

### 2.1. Sustainability of Water Projects and Services

Sustainability to which we refer is defined as *the continued delivery of safe drinking water and its benefits to a population without resource depletion*. Connotations of sustainability vary among people or groups of people depending on how they weigh the value of reaching various goals [9]. In order to discuss sustainability meaningfully all actors need to understand the system and output to which it refers and who or what is benefitting from such sustainability [17]. While much of the literature on drinking water sustainability [18–20] focuses on the sustainability of a water supply system and its services to consumers, others focus explicitly on project sustainability [9,21–23]. “[P]roject sustainability is defined as the capacity of a project to continue to deliver its intended benefits over a long period of time” ([21], p. 7); see Hodgkin ([9], p. 5) for similar views. Others including Harvey and Reed describe “...a paradigm shift from projects to programmes” ([23], p. xix) where programs provide ongoing implementation to ensure water services are sustainable [23]. In this article we use the terms drinking water “*project*”, “*system*”, or “*services*” interchangeably to mean a system whose sustainability we are considering.

Sustainability involves time, such as sustainability is “...whether or not something continues to work over time” [10]. However, time as a characteristic of sustainability leads to practical challenges in its measurement and conceptual confusion in its definition. When assessing the flow of benefits of a project over time, two questions emerge: (1) Has the project been sustained up to the time it is studied and (2) Is the project likely to be sustainable over its intended lifetime? [21]. To answer the first question, the benefits such as outcomes, success criteria, or dependent variables need to be measured. Due to its relative simplicity in field measurements, functionality over time has been used as a proxy for sustained benefits of water systems such as boreholes with hand pumps [24]. These water system outcomes will be similar regardless of the setting such as community, school or health facility. Outcomes related to benefits provided to the people using the water system will change based on the setting. To assess and predict the likelihood of future sustainability, studies have tried to monitor and

correlate past and current functionality, and determinants of those benefits. In the international development literature, these determinants are frequently called “sustainability factors” [22,23,25–27]. Therefore, functionality over time of a water supply system can lead to desirable outcomes.

Sustainability can also involve the notion of equity, “...equitable access amongst all members of a population to continual service at acceptable levels providing sufficient benefits, and reasonable and continual contributions and collaboration from service, consumers, and external participants” ([28], p. 21). Serving “all members of a population” is a goal, although not a necessary or sufficient condition for sustainability of a water supply project. Equitable access refers to vulnerable groups, such as lower income households, politically disadvantaged, and physically challenged populations, who may require special consideration in the design and implementation of water systems.

Sustainability definitions also include environment. Environment, roles of the end user, and the water supplier are prominent themes in defining sustainability for water resources that may eventually feed into drinking water systems. For example, sustainable water use is “...the use of water that supports the ability of human society to endure and flourish into the indefinite future without undermining the integrity of the hydrological cycle or the ecological systems that depend on it” ([29], p. 574). With regard to the two themes of water resources and project sustainability, “[a] water supply project is sustainable if the water sources are not over-exploited but naturally replenished, facilities are maintained in a condition which ensures a reliable and adequate water supply, the benefits of the supply continue to be realized by all users over a prolonged period of time, and the project process demonstrates a cost-effective use of resources that can be replicated” ([21], p. 1). These definitions recognize the distinction and inter-connectedness between the sustainability of a water resource and sustainable delivery of services. Such definitions also show how sustainability is a building block for the broader goal of sustainable development.

## 2.2. Sustainability Factors

Keeping in mind time, equity, and environment as characteristics that can make up the definition of sustainability, and how to manage these elements for long-term performance of water projects or services, we turn to *factors* of sustainability. Factors of sustainability include technical, community, social, financial, environmental, institutional, policy, durable gender equality, and empowerment [10,30]. For purpose of assessment, these factors can be separated into project-specific factors and external factors, which affect sustainability but are outside of the control of the project ([19], p. 12). Returning to this article’s example of water supply in schools, “[T]he sustainability of any project is affected by four broad groups of factors: how the project is designed and implemented; how the project is organized; external factors operating at the local, national, and international levels; and the responses of intended and actual project beneficiaries” ([31], p. 188).

## 3. Scaling Up

Derived from the review, we define scaling up *as a process of actions and ideas, enacted through relationships between participants, on the adoption of an intervention, by more and specific kinds of participants identified by characteristics such as gender, age, income, physical and mental health needs*. In the following paragraphs, scale, scalability, and scaling up are broken down and compared.

### 3.1. Scale

Scale refers to characteristics such as physical boundaries or size [32], and "...to the relationship between geographic (environmental) units and political (human) units of all sizes..." ([33], p. 2). Drawing from human geography debates about the politics of scale, the term has become "...an unwieldy concept laden with multiple, contradictory and problematic meanings" ([32], p. 203). Taking cues from identity as a category of nation and race, Moore argues that the confusion around the term "scale" and its politics relates to confusion of scale as a *category* or *practice of analysis*. In other words, scale is mislabeled and used as a social category, as a theoretical tool, in analyzing socio-spatial politics. Such dynamics and politics of scale affect governance of water supply for social categories such as users, suppliers of water services, and administrative spatial scales such as community, town, province, and the national level. Moore's final point is that scale should be conceptualized as processes and practices, not as static, pre-assumed categories. For example, following Moore, taking a water treatment intervention "to scale" would focus on the *processes* and *practices* of the people and environmental processes of neighborhoods or city, not exclusively focusing on the static category of reaching a certain number of neighborhoods and cities. In other words, taking an initiative "to scale" should focus more on the *methods* of reaching a greater scale. Moore's [32] perspective on scale is consistent with Rogers' Diffusion of Innovation theory [34] in which the adoption of an innovation, or how scale is analyzed and perceived, is a process and relationship between people and ideas or other units of adoption. Diffusion is "...a process by which an innovation is communicated through certain channels over time among the members of a social system" ([34], p. 10), and innovation is "...an idea, practice, or object that is perceived as new by an individual or other unit of adoption" ([34], p. 11).

### 3.2. Scalability

Scalability refers to the extent an intervention can be delivered on a large scale, taking into account promotion activities and materials needed ([13], p. 988). Improved understanding of the scalability of water safety and supply can be gained by examining how "...watersheds rescale environmental governance because of their status as boundary objects: that is, a common concept interpreted differently by different groups" ([35], p. 2207). The broad nature of water management, its quality and supply, fits under the umbrella of environmental governance. Cohen expresses the rescaling of environmental governance, through the watershed approach, as one that crosses different epistemic communities. Boundaries, and therefore scales, are socially constructed and political, and determine where power and influence may reside.

Lessons from Cohen that can be drawn for scaling up water services and supply interventions shift our focus away from the numbers and volume, though important, to the location and identity of those who govern water and other environmental resources. That is, scaling up water services and supply interventions would focus on dimensions of "where" such activity takes place, such as schools or workplaces, which go beyond the household. The dimension of "who" is emphasized in demographics such as age, gender, socioeconomic status, and sexual orientation will be considered in scaling up efforts. Therefore, volume and numbers are still important, but it is the disaggregated detail of where and who are those scaled-up numbers.

### 3.3. Scaling Up

We approach scaling up in water supply following Davis and Iyer ([14], p. 5): (1) Inclusion: where the majority of the target population is provided with sustainable, improved services within a reasonable timeframe; but not necessarily be equated with full coverage; and (2) Institutional processes: where a system of actors and institutions (public, private, and/or civic) are in place with the necessary capacity and resources to deliver sustainable rural water services indefinitely. Scale-up can be built-in to an overall initiative, but usually takes place after one or several pilot activities. Scaling up a water supply project to be locally relevant to its new participants, and consistent with the original initiative is a tension that must be balanced.

## 4. Enabling Environment

Derived from the literature, we define an *enabling environment for drinking water services to include a favorable culture of internal coordination and communication; policy and institutional behavior that guides behavior of water service providers with clear and enforceable service standards, and resources to provide effective water services.*

### 4.1. What is an Enabling Environment?

The enabling environment is referenced in research without defining it [36–41], creating the perception that it is a universally understood term with a common definition. One assumption about the enabling environment is that it is dependent on desired outcomes. That is, to determine if an enabling environment exists, it is imperative to ask the question, “What is the purpose of the enabling environment?”

The term “enabling environment” is used in different fields ranging from business, agriculture, education, and water supply, among others. Although there is general agreement that an “enabling environment” needs to be present to bring about positive outcomes, the idea behind the term varies within and among various fields. One of the main issues is the ambiguity in its use and definition. This vagueness has, on multiple occasions, warranted the discussion about the essentiality of the term. One example of this can be seen in a 2006 Save the Children report on creating an enabling environment for children’s participation ([42], p. 7). According to the report, “...participants suggested that ‘enabling environment’ is too vague—Despite its widespread use...” and as a result the term is put in quotation marks numerous times. James Winpenny, in his 2005 book *Managing Water as an Economic Resource* [43], also puts the term in quotes at least once.

One explanation for the ambiguity of the term is that the enabling environment can easily be viewed as having no boundaries, that is, it can encompass the presence of every positive factor and the absence of negative factors to achieve a specified goal. This makes the concept difficult to conceptualize and even harder to operationalize. As a result, there are varying degrees of inclusivity of factors in the definition of the enabling environment as different actors work to put boundaries on the concept. According to Brinkerhoff ([44], p. 3) “...definitions of the enabling environment are numerous, and range from all-encompassing to narrow.” This range can be seen in the definitions of the enabling environment used in different fields. United Nations Division for the Advancement of Women (UNDAW) broadly defines enabling environment as “...an environment that would presumably be

favorable towards women's empowerment and it would need to be described and assessed at global, national and local levels" ([45], p. 1).

#### 4.2. Outcomes

In discussing outcomes related to the enabling environment, it is important to understand its impact. Some definitions of the enabling environment state that it can include an environment that can hamper a desired outcome. In other words, the *enabling* environment is often defined so as to include a *disabling* factor. Examples of this can be seen in the UNDP's (United Nations Development Programme) definition of the enabling environment as "...the broader system within which individuals and organizations function and one that *facilitates* or *hampers* their existence and performance" ([46], p. 5). Other definitions limit the impact of the enabling environment to *positive* effects toward a business environment, such as "...the set of policies, institutions, support services and other conditions that together *create* the general business setting where enterprises can be started and *thrive*" [1,47]. Furthermore, most explorations of enabling environments constrain it to modifiable factors.

#### 4.3. Links to Sustainability and Scaling Up in Water, Sanitation, and Hygiene

Drawing from water, sanitation and hygiene (WaSH) research, enabling environment refers to conditions that encourage the sustainability and scaling up of interventions, "...the policy, institutional and financial framework that is sufficient for sustaining and replicating large scale programs" [16]. Here, sustaining refers to keeping something going for a long period of time and replicating refers to reproducing a program. EAWAG (Swiss Federal Institute of Aquatic Science and Technology) [2] adopts the definition used in a World Bank note, "...the set of interrelated conditions that impact on the potential to bring about sustained and effective change" ([15], p. 4). Examples of these conditions include favorable legislation, government support, adequate capacities, and stakeholder cooperation. Global and national WaSH monitoring by organizations, such as the African Ministerial Conference on Water (AMCOW) and the United Nations Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS), assess the enabling environment for scaling up and sustaining adequate WaSH services. Such organizations assess enabling environment factors such as policies, institutional frameworks, and national plans and strategies [3,48]. Examples of enabling environment characteristics include: (i) the enabling environment produces positive outcomes; (ii) formal rules (e.g., policies) are critical components of the enabling environment; (iii) as a result, the government plays a major role in creating the enabling environment; (iv) these rules, whether formal or informal, govern relationships at different levels; (v) the objective needs to be clearly defined to correctly determine if an enabling environment exists, and if possible, how it can be developed, should be clearly defined; and (vi) enabling environment factors are distinct from project level factors and generally external to the project making them harder to modify.

#### 4.4. A Bottom-Up Definition of the Enabling Environment for Water Supply

Review of the above definitions of the enabling environment show how the term can be tailored for application to water supply services. Starting from the basic processes that constitute effective water



supply, the needs include sufficient and consistent water sources; adequate methods for treatment, storage, distribution; infrastructure that can be financed with consistently and for the long-term for these tasks that is self-financing and affordable for consumers; and a management/operations system that can lead the water abstraction, treatment, distribution, and revenue collection processes. Such needs (*desired outputs*) are examples of what an enabling environment could contribute. Enforcement of water quality and health standards may come from service providers, however small or large, or be monitored and enforced by a government regulator (*rules and government participation*). In some cases, a non-profit organization may contribute to some of these tasks (*informal relationships*).

## 5. Framework for Implementing Sustainability, Scaling Up, and Enabling Environment

In the beginning of this article we expressed the need for implementing sustainability, scaling up, and an enabling environment with clarity and consistency for the benefit of water services, whether through projects, programs, or specific services. Because of the focus on implementation, we turned to Normalization Process Theory (NPT) which is "...concerned with the social organization of the work (implementation), of making practices routine elements of everyday life (embedding), and of sustaining embedded practices in their social contexts (integration)" ([7], p. 538). Implementation is defined by May and Finch [7] as interaction chains: socially patterned points in time and space that are connected by the flow of social processes, for formal, deliberate action. In the following section, each theme of NPT will be applied to the example of water dispensers in schools to apply NPT and adapt it toward a framework for implementing sustainability, scaling up, and enabling environment.

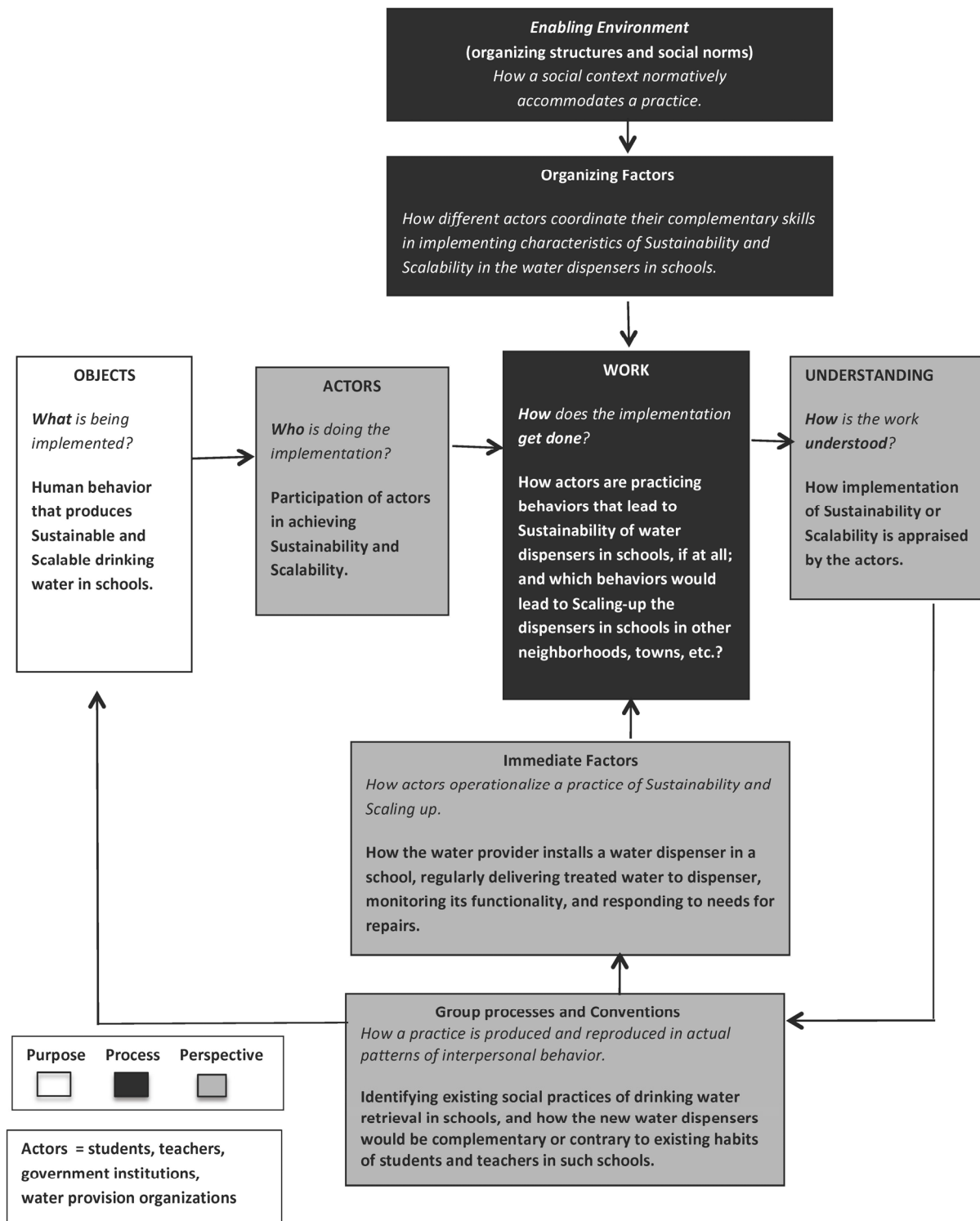
We divide the framework into three categories: purpose, process, and perspective (Figure 1). What is the *purpose* of implementing an intervention or goal of sustainability and scaling up, and the potential role of enabling environments? With regard to the hypothetical case study, the goal of sustainability and scaling up could be that more schools receive safe drinking water, or more students are using the newly installed water dispensers. Implementation of the terms sustainability, scaling up, and enabling environment is approached as *processes* that are distinct, but can be interdependent. Whether NPT is used to organize the analysis of a water supply service within the context of a project, or larger program, the same logic applies in the implementation. The main question is, "How do the actors involved in the process define and use these terms in their everyday practices?" Focusing on *perspective* of who is doing the primary implementing, who is assisting, or benefitting from the implementation to define and implement the three terms from the various points of use changes the purpose and process of implementation. Examples of perspectives in this case study include water consumers, service providers, local community organizations, governments, and researchers.

### 5.1. Objects: What Is Being Implemented?

"Objects" refer to actions that define and organize a behavior about a goal. Core questions include: how are project participants conceptualizing the production and reproduction of sustainability (or scaling up)? How do practices of sustainability (or scaling up) operate based on beliefs and behaviors that define and organize these concepts in a project?

The enabling environment of "What is being implemented?" refers to factors that encourage the mobilization of a practice such as sustainability or scaling up. That is, factors which promote a practice

as meaningful. An enabling environment question is “What are the factors that promote the mobilization of a practice of sustainability or scaling up?” Potential enablers of the implementation in the water in schools example are that concepts of sustainability will enhance safe drinking water practices because of its goal in achieving long-term performance of the water dispensers and the people involved in its management.



**Figure 1.** Implementing sustainability, scaling up and enabling environment by applying normalization process theory to a hypothetical water supply project in schools.

### 5.2. Actors: Who Is Doing the Implementation?

“Actors” refer to who participates in a practice, beliefs, and behaviors that define and organize such actors. Specific questions would include “How do participants come to engage with a practice of sustainability or scaling up?” and “How do practitioners or water consumers, government officials, researchers, and funders decide on engagement and the purposes that sustainability and scaling up serve?” In the example of water supply in schools, the actors involved are the research organization, the social enterprise organization, students, teachers, parents, the community, and local government. They are examples of who would be involved in the production and reproduction of the meaning of sustainable water services. To answer the question “How do participants come to engage with a practice of sustainability or scaling up?”, researchers would learn from the water service provider about how they define sustainability and what the provider is doing to foster a sustainable water system, such as the functioning of the water dispenser, the system’s financial self-sufficiency, and whether safe water is consistently dispensed. Examples of the *enabling environment*, that is, the factors that promote participation in sustainability or scaling up implementation may include: information, incentives, understanding, relevant policy, capacity and resources, and power relationships between actors.

### 5.3. Work: What Is the Process of Implementation?

“Work,” in this case, focuses on how the implementation processes are carried out. An example from the water in schools case is that of the water provider installing a dispenser in a school, delivering treated water to the unit, monitoring its functionality, and responding to the need for repairs. The water users are also an important part of the implementation process of sustainability (or scaling up) in that the students retrieve water from the units, and to some extent the teachers and community members. Communication, trust, and confidence between these water users to deliver on expectations of safe, financially self-sufficient water via the water dispensers are constantly negotiated between actors. The water provider in this hypothetical case study is a social enterprise that has roots in health related products, but not necessarily water service delivery, therefore less experienced but potentially open to learning about the new area of providing potable water to primary school age children in low-income communities. A second organizing condition for implementing sustainability and scaling up is the embedding of a practice within a social context. That is, the practices of sustainability (or scaling up) would be channeled into existing social practices, which require embedding, integration, and complementarity.

The enabling environment in how sustainability (or scaling up) is used has similarities to May and Finch’s factors that promote or inhibit a practice. How do participants practice sustainability or scaling up? How are actors’ activities structured or constrained? Returning to the water in schools example, the activities of the actors are structured by the water source, limitations of transporting water, electricity availability in schools, and willingness and ability of the community to pay for the dispensed water. The process of sustainability of the water dispenser is enacted by the water provider’s transporters from the purification plant to the dispenser, the students who choose, or not, to drink the water from the dispenser, and the community members who choose to gather water from the dispenser and pay for it.

#### *5.4. Understanding: How Do the Actors Understand Implementation (of Sustainability, Scaling Up, Enabling Environment)?*

With regard to the case study, “understanding” refers to how the implementation of sustainability and scaling up are understood by actors implementing and using water dispensers. In the water dispensers in schools example, formal and informal judging of the water dispensers will take place on various interlinked levels. For instance, the water provider will already be collecting information on how they understand performance of the water dispensers. From a different perspective, the sponsoring organization will be analyzing the water provider and its management from various schools in its program. Researchers would be engaging with water users on multiple levels to assess water users’ behavior. Such judgments would be a combination of individual and communal appraisals. A manager within the social enterprise that is providing water to schools may notice the consistent delivery of safe water in the majority of schools over several months. The task of the researchers in this case is to perform that communal appraisal by analyzing the functionality and financial self-sufficiency of the water dispensers in the context of providing safe water to students. Lessons from monitoring and assessing water dispensers in schools would improve their operations by repeating the successes or changing inefficiencies through some form of reconfiguration of activities.

The enabling environment or factors that promote the appraisal of sustainability or scaling up of water dispensers in the schools would need to be explored. Examples include presence of incentives or capabilities for the partners to reflexively monitor the processes of sustainability and scaling up. Activities for incorporating findings into new efforts may be ineffective, and the power relationships between water users may affect the perception of monitoring as a negative exercise that identifies failures instead of opportunities for learning and adaptation.

### **6. Applications to the Case Study: Water Provision in Schools**

#### *6.1. Sustainability*

In the hypothetical example of water provision in schools, the purpose of the project is to determine the sustainability of the water dispensers in providing safe drinking water delivery to schools, student use of water dispensers, and financial viability of the project. Students would be between the ages of five and twelve, in approximately fifteen schools.

The previous review of sustainability concepts provides a reflection on how such planning for an exploration of sustainability could be conducted. While many of the available case studies and research on sustainability for water services has focused on demand-responsive community managed water systems, consideration of the school environment will need to be examined in this project. For example, a guiding point for planning a sustainability exploration in the case of schools is determining the members of the population for the water services. Initial questions would explore whether only students and school staff will be allowed to use the water while on premises or will those outside of the school have access? Are there special considerations (e.g., receptacles provided by school instead of students) to be made so that all have access to safe water? At the outset of the project, the benefits to be sustained by the water dispenser system, the independent project-level, and external factors (technical, financial, social and community, institutional, and environmental) that may affect the

outcomes would be explored, defined, and translated into measurable indicators. Since sustainability is considered over time and the factors contributing to sustainability in this case are not known *a priori* it is important to develop a methodology that allows information and data to be gathered at a reasonable frequency for a reasonable duration of time, ideally during implementation and after the project funding has ended.

### 6.2. *Scaling Up*

The example of water provision in schools has two purposes: first to explore its sustainability as a water supply option in schools (water safety, student use, and financial viability); and second, whether and how the water dispensers could be scaled-up on state/provincial levels in other schools. Focusing on scaling up, the goal would first include defining what scaling-up means for the water dispenser provider, the current sponsor of the initial pilot of fifteen schools, local and regional government institutions, and most importantly, select future schools and their administrative offices.

Drawing from the previous review of scaling up, a way forward for this example project would be to focus on the processes and relationships between people and ideas by more and specific kinds of participants identified by gender, age, income, physical and mental health needs, *etc.* In relation to the hypothetical project, the focus of planning would be on the relationship of the water providers, specific government offices that work with schools on local and state levels, potential school administrators, teachers, students, parents and the communities. Understanding existing practices of how such actors access drinking water in schools would assist with integrating existing behavior with newer initiatives for scaling up. For example, from where are the students currently accessing drinking water while in school, what are the existing government policy and regulatory practices in that state, and how much are parents and the communities currently paying for water services, if at all?

### 6.3. *Enabling Environment*

The enabling environment for schools project refers to conditions that will favor bringing about these processes of sustainability and scaling up. Three domains determine what the enabling environment is for the drinking water in schools example. These domains include formal rules, informal rules, and capacity of actors who are not directly linked to the project. Regarding formal rules, it is necessary to assess existing policies and regulations on water and education and determine if and where they crossover. Formal rules may include government officials (national, state, and local) and their willingness to support water dispensers in schools through existing or new policies and regulations, and if necessary, diversion of funds. Informal rules may include how to enhance an enabling environment of water dispensers in schools is an assessment of relationships with and between teachers, community leaders, and students. Informal rules may also be discussions among actors to develop common goals that would aid cost sharing and willingness to see goals achieved.

Assessing the capacity of stakeholders that are external, but influential to the project, will aid in determining if certain project characteristics need to be modified to achieve the objectives. For example, are the relevant government institutions able to effectively implement regulations on water and education? These three domains—Formal rules, informal rules, and external capacity—Are not

always measurable and their impacts are not well understood, but constitute the enabling environment for enhancing the processes of scaling up and sustainability in the water supply in schools project.

## 7. Discussion and Conclusions

We propose a framework for the implementation of sustainability, scaling up, and enabling environment that could be adapted for water supply projects and proposed definitions for these three terms. We approached the task of adapting and applying such a framework by first reviewing literature on sustainability, scaling up, and enabling environment to reflect and derive practical definitions that apply to water project planning and research. From this reflection of definitions and real world processes, we developed a framework for implementing sustainability, scaling up, and enabling environment by building on an existing framework, Normalization Process Theory.

The application of NPT to integrating and clarifying the implementation of the three terms provides a way forward for water supply project planning by practitioners and researchers to determine how sustainability, scaling up, and enabling environment could be implemented and analyzed. By using the example of water dispensers in schools, we explored potential uses of these terms.

Comparing this framework with existing research on sustainability of water projects, the NPT-based framework offers an analytical process for assessing pieces of an implementation system (what is being sustained, who is doing it, how is sustainability implemented in water dispensers, and how do stakeholders understand sustainability). For example, Bamberger and Cheema ([21], p. 7) view project sustainability as the capacity of a project to continue to deliver its intended benefits over a long period of time. Their description of an end goal is still relevant, and the framework we propose complements it by providing a process that works toward the goal of sustainability. The themes of equity ([28], p. 21) and environment ([29], p. 574) as components of sustainability are implicitly built into the proposed framework in that there is an emphasis on who is implementing sustainability, and how the actors appraise sustainability (of the hypothetical water dispensers in schools project).

Regarding scaling up, the same points above also relate to previous research on scaling up concepts. A significant concept of scaling up is approaching it as a set of processes and relationships [33]. The framework we developed is a tool for analyzing a system of processes and relationships, particularly in a water supply context. In relation to Rogers [34] Diffusion of Innovations theory, our proposed framework is complementary in that they both focus on a practice (innovation in the case of Rogers) that is perceived and potentially adopted by an individual or group of individuals, spread through social networks. The added value of our proposed framework is a method for application and analysis of such practices over social networks in water supply projects.

As for the enabling environment, our proposed framework provides a guide for how it interacts with other social processes (how social norms accommodate a practice such as sustainability and scaling up; how actors coordinate in implementing practices; and how these practices are operationalized by individuals and groups. Referring specifically to the definition of enabling environment that it is “...the policy, institutional and financial framework that is sufficient for sustaining and replicating large scale programs” [16], our adapted framework integrates an enabling environment to the greater system of what is being enabled, and a way to assess implementation and carry it out.

We are indebted to May and Finch's Normalization Process Theory (NPT) [7] for the foundations of our proposed framework, and wish to reflect on our adaptation of it, how it has enhanced our understanding of sustainability, scaling up, and enabling environment, and our suggestions for its further conceptual development. The underlying assumption of the NPT is process and relationships, which is consistent with the way we have approached the three terms. Our main attraction to NPT is its focus on implementing a practice, in that our concern is how to implement the three terms in a water supply project. Our adaptation of NPT was toward simplifying it for direct application to a water supply project, so that each box in Figure 1 asked a specific question about carrying out a process of sustainability, scaling up, and enabling environment. As for future conceptual development, independent of water supply management, we have become aware of the issue of time and the sequence of events. In comparison, and complementary to NPT, Diffusion of Innovation theory is linked to time in that innovations spread over time. Without complicating or diluting NPT's original purpose and focus on process and relationships, of which we are big fans, we are curious about adding a dimension of time as processes and relationships are dynamic. For example, time or a sequence of events could be added as a sub-theme to the section of who is doing the implementing, such as when are they implementing a practice, and why. That context may also explain why a practice is adopted or not. The dimension of time will not always be necessary to make so explicit, though we learned through the hypothetical example of water in schools that we needed to specify we were focusing on the beginning of the project.

### Acknowledgments

The Conrad N. Hilton Foundation, Jack Kent Cooke Graduate Scholarship, Caroline H. and Thomas S. Royster Fellowship, and the UNC Global Research Institute supported this work. We are grateful to the anonymous reviewers for their suggestions.

### Conflicts of Interest

The authors declare no conflict of interest.

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