

YEAR

2019-2020

RESEARCH INSIGHTS  
EDUCATION

PUBLICATIONS  
KNOWLEDGE DISSEMINATION



## #GOFRUGAL BULLETIN



Centre for Frugal Innovation in Africa  
Leiden-Delft-Erasmus Universities

# CONTENTS

## INTRODUCTION

<i>Preface</i>	1
<i>Who we are</i>	2
<i>Leiden-Delft-Erasmus Universities</i>	3
<i>What is Frugal Innovation?</i>	5

## RESEARCH

### Research Projects

<i>NWO/MVI</i>	7
<i>Frugal Innovation Histories</i>	10
<i>Frugality as value and practice</i>	11

### Research Publications

<i>Handbook</i>	12
<i>Responsible innovation from MOOC to book</i>	14
<i>Water, housing and (in)formality in Kitwe, Zambia</i>	15
<i>Consumption of bottled water at the BoP</i>	16
<i>Rare Gems or Mundane Practice?</i>	17
<i>Comparing Frugality and Inclusion</i>	18
<i>Frugal Innovation in EU Research &amp; Innovation Policy</i>	19

## EDUCATION

<i>Minor FI4SGD</i>	20
<i>Student projects highlighted</i>	21
<i>Student experiences highlighted</i>	22

## KNOWLEDGE DISSEMINATION & NETWORKING

<i>Europe</i>	23
<i>Province of Zuid-Holland</i>	24
<i>South-Africa/ Kenya Hub</i>	25
<i>Highlighted networking event by Kenya Hub</i>	26

## FRUGAL PHD RESEARCHERS

<i>S. Vossenbergh, R. Howell, B. Singh, S. Chakravarty</i>	27
<i>J. Spamer, S. Al Kuntar, M. Pineda Escobar, S. Sakata</i>	1
<i>I. Abasli, A. Elias</i>	31

## CFIA

<i>CFIA Core Team</i>	32
-----------------------	----

**SAFER** CIT  
IES  
LAB



# PREFACE

---

Welcome to our first #GoFrugal Bulletin, which looks back at the 2019-2020 academic year and offers a preview of our upcoming activities.

COVID-19 has led to a dramatic and immediate crisis at a global level, while many of us were pondering about how to engage with the relatively 'slow' crisis of climate change or how to accelerate the sustainable energy transition. Frugal innovations have a role to play in addressing these crises and change processes, with or without the use of new technologies. The actual innovators can be individuals or groups of people in poor communities, NGOs, or social or commercial entrepreneurs. Our main aim is to better understand how such innovations come about, and under which conditions they are more likely to genuinely contribute to addressing some of our global and local challenges.

As you will read in this bulletin, we are involved in a range of activities related to research, teaching and knowledge utilisation. While our Centre will continue to focus on Africa, a recent development is that we will be devoting more attention to frugal innovations in countries elsewhere in the Global South, and in places closer to 'home' for the Leiden-Delft-Erasmus Universities, encompassing Europe, the Netherlands and the province of Zuid-Holland.

I really hope you will find this first bulletin inspirational, and please do send us feedback or reach out to join our network!

Peter Knorringa  
Academic Director CFIA



# WHO WE ARE

The Centre for Frugal Innovation In Africa (CFIA) is a multi-disciplinary academic research centre within the Leiden-Delft-Erasmus Universities alliance. At CFIA we investigate frugal innovation processes and their economic, social and environmental impacts.

## HOW CAN WE CONTRIBUTE TO BETTER LIVING CONDITIONS AND MORE SUSTAINABLE SOCIETIES?

We do this by exploring the role of innovations, more specifically innovations that aim to do more and better with fewer resources. Together with a global network of academics and partners we investigate whether and under what circumstances the perspective of frugal innovation can contribute to sustainable and inclusive development. We do so with attention to context, technology, entrepreneurship, and using local ideas, knowledge and resources.

Technological and research projects are used to investigate the development of scientifically sound frameworks that lead to a more effective use of frugal innovations and technologies. In addition, through teaching and consulting, knowledge on frugal innovation is exchanged.

Since its foundation in 2013, the Centre has grown into a multi-disciplinary community with members from all around the world, working together to gain a better understanding of the implications of frugal innovation.



# LEIDEN-DELFT-ERASMUS UNIVERSITIES

CFIA is part of the strategic alliance of the Leiden-Delft-Erasmus Universities (LDE). The LDE alliance is a collaboration based on a shared vision and objectives in specific areas. The three universities address complex social issues that require both multidisciplinary and interdisciplinary approaches; the quality, complementarity and physical closeness offer unique opportunities for intensive structural collaboration and a focus on Technology, Entrepreneurship and Development.



## WORKING TOGETHER FOR SCIENCE AND SOCIETY

Through innovative and outstanding teaching and research, our Centre seeks to contribute to understanding and solving the major and complex social issues of our time by connecting science and society focused on frugal innovation.

### Expertise:

- Leiden University: a broad-based research-intensive university with a significant proportion of fundamental research
- Delft University of Technology: a university of technology with a broad spectrum of engineering sciences
- Erasmus University Rotterdam: a socially-oriented research university with a focus on the fields of health, welfare, culture, and administration

### Governance:

The Executive Boards of the three universities form the steering committee for the LDE strategic alliance. The presidency rotates between the presidents of the three Executive Boards. The steering committee's role is, among other things, to inspire, coordinate and facilitate collaboration in the areas of education, research and valorisation. The Leiden-Delft-Erasmus project manager coordinates the partnership between the universities and acts as the secretary of the committee.

Each LDE Centre has its own steering group of deans. The CFIA steering group consists of the Rector of the International Institute of Social Studies at Erasmus University (Prof. Dr. Inge Hutter – chair), the Dean of Humanities at Leiden University (Prof. Dr. Mark Rutgers) and the Dean of the Faculty of Technology, Policy and Management at Delft University of Technology (Prof. Dr. Aukje Hassoldt).



The HS Green Energy Engineering project: carrying out a feasible business model based on social research and completing the optimised design of a fixed dome biogas digester



***Students of the 'Frugal Innovation for Sustainable Global Development' minor, working on frugal projects in Uganda & Kenya.***



The TAHMO project in Kenya: improving weather data through robust meteorological data sensors

# WHAT IS FRUGAL INNOVATION?

Frugal innovations aim to offer smart, simple and affordable solutions. Frugal innovation processes start from the identification of needs and bottlenecks, especially for underprivileged sections in society. Frugal innovators can be, for example, individuals or local communities engaged in grassroots innovations to solve their own immediate problems; NGOs and social enterprises developing frugal innovations like apps for refugees; and commercial firms developing frugal innovations to penetrate so-called 'Base of the Pyramid markets'.

A concrete example of frugal innovation is the use of portable cardiac cardiogram devices for (initial) scans, developed by General Electric for health workers in India. They are less than 10% of the price of the "standard" cardiac cardiogram devices and can be used in ambulances or at general practitioners. Such innovations in healthcare that make use of "frugal" designs on a large scale will contribute to better working and living conditions for patients and healthcare providers, while contributing to the future financial sustainability of healthcare and public finances.

While CFIA does not develop its own frugal innovations, we work together with frugal innovators as part of learning together about innovation processes and impacts. The challenge is to provide value sensitive innovations without sacrificing user value. Such frugal innovations need to fit local circumstances and cultures in order to be successful for both suppliers and users. Successful frugal technologies and innovations are increasingly co-produced in so-called polycentric networks of innovation that link several stakeholders to each other such as entrepreneurs, designers, financiers, manufacturers and distributors from various parts of the globe.



LOW COST AND HIGH FUNCTIONALITY



REDUCE OVER-ENGINEERING



FOCUS ON LOW INCOME HOUSEHOLDS

# RESEARCH



CFIA aims to develop analytical knowledge and thinking on frugal innovations, with the overarching research objective of investigating the conditions under which frugal innovations and technologies can be conducive to local economic transformation and development.

In addition to its continued focus on the Global South, CFIA has been working to develop a more explicit focus on how inspiring examples of frugal innovation can be used to achieve more inclusive and sustainable outcomes in marginalised areas in Europe.

## **Beyond normative and prescriptive theories**

The Centre actively focuses on how the developmental implications of frugal innovations and technologies can lead to a more balanced perspective on what frugal innovation really entails at local, national and global levels. To achieve its goals, the Centre combines the development of theoretical frameworks with projects in the field, which also involve Dutch, multi-national, and African partners, companies and stakeholders. We aim to involve many different actors in projects to learn lessons and to look for the effects of frugal services and products as widely as possible. We do this by focusing on the research domains of Health, Energy, Water and Agro-Food (HEWA).

Our projects have a dual objective: to develop functional, marketable innovations and to provide input for theories concerning frugal innovation and global development. The common element in all our projects is the ambition to contribute to developing frugal innovations and technologies that are aimed at achieving the Sustainable Development Goals (SDGs).

## HEWA



HEALTH



ENERGY



WATER



AGRO-FOOD

# Research Projects

## Frugal and responsible innovations in the healthcare and water sector in Africa

**Africa is booming. Despite the gloomy image that people often have of the continent, there are many opportunities for the introduction of new technologies. With the rapidly growing population, there is a great need for solutions in the areas of water and food, healthcare and energy. But how can products, services and system innovations be made accessible to large groups of consumers with minimal income?**

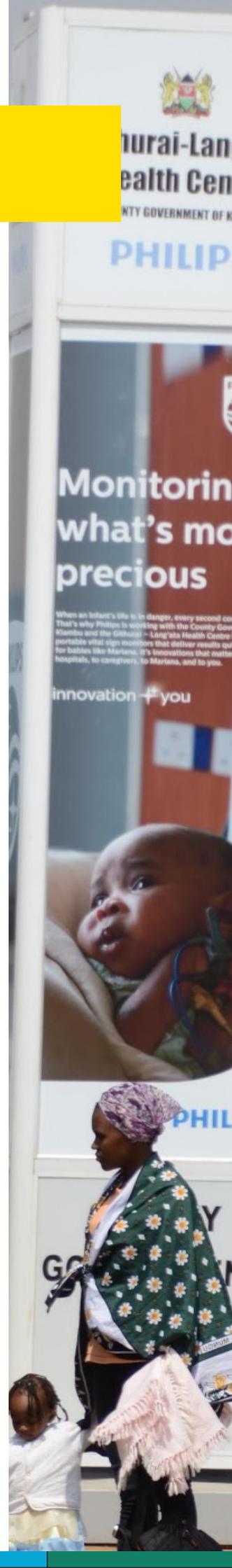
CFIA investigated this research question as part of a consortium of African entrepreneurs and top Dutch companies in the water and health sectors. The study, funded by the Dutch Research Council (NWO), focused on the development of business models that combine profitability with the creation of social value for the local population. In this bulletin we will highlight two case studies:



### Philips Community Life Center



In the region of Kiambu, near Nairobi, there is a high maternal mortality rate and almost half of the population has little or no access to care facilities. Here, Philips opened the first Community Life Center (CLC) in Africa in 2014, in close collaboration with the province and local community. A village house has been turned into a health and meeting centre. This centre received a water supply, an electrical grid connection and LED lighting, powered in part by solar panels. “Lighting is an important aspect of this project,” explains Elsie Onsongo, manager of ‘CFIA’s Kenya Hub. “Previously there was no lighting, which made many women afraid to come to the clinic in the dark.” This CLC now offers first-line healthcare at a low cost. The doctors, nurses and community health workers (volunteers who pay home visits) receive training to refresh their knowledge and to use the medical equipment from Philips. A great deal of attention is also paid to prevention and information about important health issues such as hygiene, mother and child care and infectious diseases. ►



## No single solution

By setting up the CLCs, Philips wants to contribute to the UN Sustainable Development Goals and reach 300 million people with health solutions. The concept has been rolled out elsewhere in Kenya and other African countries. While the first CLC started as a philanthropic project, Philips is now experimenting with different business models in order to arrive at a sustainable financial system. Research has shown that there is no single solution to this type of complex system innovation. There are so many factors at play: each centre is unique, as are the infrastructure, economy, politics, stakeholders, health system and cooperation with NGOs and local authorities. There is no single, 'one size fits all' business model. One has to be able to continuously adapt because the circumstances can change so rapidly.

*“Their ultrasound device and the blood pressure and heart rate monitors are typical examples of frugal innovation, as they are adapted to local conditions: more robust, easier to operate, less advanced, and often battery-based, due to the lack of power.” - Elsie Onsongo*



## Dutch Water Limited

Since 2006 the main goal of Dutch Water Limited (DWL) has been to produce clean drinking water for the population of the big cities in Kenya in the cheapest possible way. The company built a small drinking water facility near Mombasa, where 140 local employees filled up to 10,000 jerry cans per day. DWL introduced a deposit system and set up a logistics network with local grocers who sell the water and accept empty jerry cans.

DWL achieved spectacular revenue growth in its first few years. At the time, the company was the only party that sold clean drinking water for a price that was ten to twenty times lower than usual. However, at that point several competitors entered the market who did not fully comply with the water quality standards, certification requirements and the tax that the Kenyan government had started to impose on companies that sell water. ►

“Due to the tax increases, DWL’s cost price was significantly higher than that of the competition. As a result, many people switched to other providers,” says Carel Aeijselts Averink, Operations Director at Hatlenboer-Water. DWL now focuses more on the business market, and supplies larger dispenser bottles to schools, governments and companies. The approach is really trial and error, and collaboration with local partners is essential.

### Product innovation versus System innovation

In the Western market, innovation is often expensive due to over-engineering and strict regulations that increase costs. Both case studies show that it is important to start thinking about a business model from the very first moment an idea pops up. Nowadays these are often still separate trajectories. This may apply even more to developing countries than to the Netherlands. Innovation should not take place behind closed doors, but together with the most important stakeholders. In African countries, in particular, you need the local community. As we suspected, the research at Dutch Water Limited proved that it is difficult for companies to make a real impact on the poorest people with just product innovation alone, as that is merely a substitute for something that is not there. In contrast, the CLCs were more successful, as they involve much more of a system innovation. However, this requires enormous adaptability and flexibility from all parties involved to continuously move with the dynamics of a fast-growing country like Kenya. ◀



Dutch Water Limited

[Read more about this project in our online Knowledge File >](#)





## Frugal Innovation Histories

An in-depth study of small-scale frugal enterprises in Kenya.

Much of the current academic discussion on frugal innovation finds its roots in developing and emerging economies, particularly in India and Africa. However, there is a need within the frugal innovation literature for a robust empirical analysis of bottom-up innovative initiatives that take place in resource-constrained environments and of innovative entrepreneurial efforts by individuals who experience or have experienced the challenges of accessing basic services in informal settlements, peri-urban areas or rural areas. On their own turf, individuals are developing solutions to address water scarcity, food insecurity, energy access and community healthcare delivery.

In this research project we document in-depth information on product conception/invention, commercialisation, adaptation and impact.

The focus lies on collecting micro-level data of all relevant aspects of the innovation: its characteristics, the inventor/innovator, the context in which it is developed and used, innovation processes, different actors involved in the development, financing, commercialisation and use of the product, and the impacts at household and societal level. The main objective of collecting this data is to understand how frugal innovations are developed bottom-up, and how frugality drives the product development process and the market creation process. It also evaluates the role of frugality in legitimising the innovation at the household, community and societal level. ◀



*Elsie Onsongo,  
Project Leader and  
Kenya Hub Manager*

[Read more about this project in our online Knowledge File including an article on one of the enterprises that has been documented in-depth: Farming Wonder >](#)





## Frugality as Value and Practice

Examining the innovation of education in resource-constrained environments.

Frugality and innovation are not only important in the context of material innovations; they can also be a guiding value in many other practices. The research team of the Frugality as Value and Practice project, led by Dr. Georgina Gómez, Associate Professor of the ISS, studied a group of Jesuit educationalists in Latin America who have implemented this logic with the aim of providing high quality education in marginal, remote and low-income locations.

The group emerged in the 1960s as a critical education movement striving to promote comprehensive, inclusive and high-quality educational processes for and with communities in remote rural places throughout Latin America. Their mission centres on taking educational action beyond the classroom. In this spirit, their schools have developed a pedagogical project that engages local communities –including households, neighbours and other local agencies – in a participatory dialogue.

Their institutional work is widely known and has been recognised as a successful education movement in rural Latin America. However, empirical evidence that can account for the results and impact on the beneficiary population is scarce and highly focused on academic performance. This study was conducted in order to determine the impact of the movement at the level of students and graduates. Moreover, it sought to understand the tensions between conceiving innovations to educate children to transform society and the severe resource constraints of the settings in which they operate. The research project spanned six Latin American countries and was carried out by ISS alumni at each location. ◀



*Georgina Gomez,  
Associate Professor &  
Project Leader*

[Read more about this research in our Knowledge File, including three research briefs on different levels of study: the individual, community and national levels >](#)



# Handbook on Frugal Innovation

*Editors: Cees van Beers, Saradindu Bhaduri, Peter Knorringa and André Leliveld.*

Together with our research partners, CFIA will publish a handbook on frugal innovation. The handbook will be published in 2021 by Edward Elgar publishing.



Handbook editors (left to right): Cees van Beers, André Leliveld, Peter Knorringa and Saradindu Bhaduri.

Following a week-long NIAS Lorentz workshop in January 2019 whose aim was to produce cutting-edge research through open and informal discussions and stimulating collaboration, CFIA's frugal innovation research group and community have been working on their chapters for the handbook.

## **The first Handbook on Frugal Innovation**

Over the past few years, attention for frugal innovation has really gained momentum in diverse fields of academic interest; today, its potential to contribute to sustainable global development is widely discussed in academic and policy circles. However, what has become clear from the academic publications so far is that further exchange and debate is needed regarding what frugal innovation is and how it relates to issues of sustainable global development. As such, frugal innovation research is still in its infancy and is not yet a widely accepted discourse within innovation or development studies, for example. In this respect, one might conclude that it is premature to work on a Handbook for Frugal Innovation, but CFIA took up the challenge when it was approached to compile and edit such a handbook.

## **Capturing Frugal Innovation**

We see the handbook as an opportunity to explore a recent and exciting idea about innovation. More specifically, in a fast-growing body of literature, frugal innovation is presented as an alternative perspective that can profoundly change the idea of what innovation entails or could be, including the technologies, sources of knowledge and business models, the role of various actors and coalitions involved in innovation practices, the governance, institutional and policy environment, and the societal relevance and outcomes of innovation in different regional contexts.

But how valid are these claims? Before we can answer this question, we think it best to gain a much better analytical understanding of frugal innovation – to ‘capture’ frugal innovation, so to speak. This means that we need to thoroughly examine what the concept encompasses in its entirety, and to explore whether it can change our ideas and understandings of what innovation is, and what its purpose should be. We think such an undertaking requires a multi-disciplinary approach and that is exactly what will be done with the handbook.

The authors of this book represent a variety of disciplines, including innovation studies, classic history, economics, development studies, anthropology, industrial design and technology studies, and philosophy and ethics. The chapters constitute a collection of current issues and debates related to frugal innovation. However, this collection is not necessarily representative, as we gave preference to critical analytical contributions that bring in new ideas and perspectives over prescriptive articles offering reviews or overviews.

Innovation studies still tend to be biased towards a Western (or Global North) perspective. In this handbook we have aimed to include perspectives from other parts of the world as well, while at the same time recognising that more is still needed when it comes to the topic of frugal innovation. We hope that the juxtaposition of chapters in this handbook will lead to a debate and dialogue between scholars, both inside and outside the field of frugal innovation studies, and both within and between the Global North and the Global South.

The editors are in the process of finalising the manuscript and the handbook is planned to be published in 2021. We will keep you updated regarding the publication date and official launch.



# Research Publications

## Book chapter

### Responsible innovation from MOOC to book

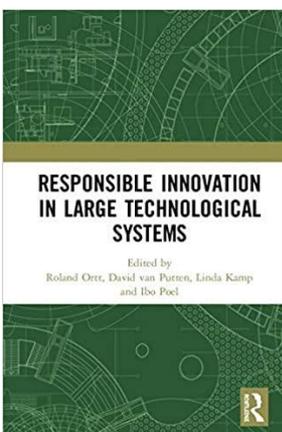


*Authors: Cees van Beers, Peter Knorringa and André Leliveld.*

Book: Responsible Innovation in Large Technological Systems

In recent years CFIA has participated in several activities related to responsible innovation. Examples of these activities include the 'Frugal Innovations as Responsible Innovations' module of the Massive Open Online Course (MOOC) entitled 'Responsible Innovation: Ethics, Safety and Technology' and an NWO-MVI research project entitled 'Frugal Innovation and Responsible Innovations in Africa'. In March 2020, we published a new book called 'Responsible Innovation in Large Technological Systems'.

The book investigates large technological systems, such as seaports, nuclear power stations, wind farms and natural gas extraction, which all provide vital functions for society. And yet these large technological systems have an impact on different stakeholder groups in both positive and negative ways. Chapter 6 of the book deals with the question of whether frugal innovation can also be responsible innovation.



[read more](#)

**'Can frugal innovation be responsible innovation?'**

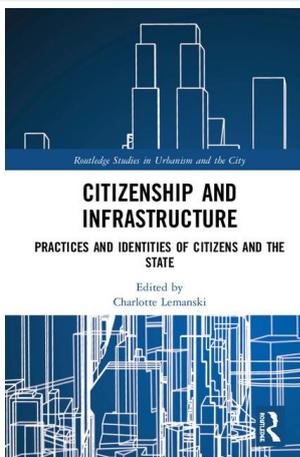
### Water, housing and (in)formality in Kitwe, Zambia: infrastructure, citizenship and urban belonging



*Author: Iva Pesa*

Book: *Citizenship and Infrastructure Practices and Identities of Citizens and the State*

Wusakile is one of the oldest and most prominent mining neighbourhoods in Kitwe, in the Zambian Copperbelt. Since the 1930s, mining companies have provided water and housing to their employees in Wusakile. Dr. Iva Pesa explored the variegated dynamics between water, housing and citizenship in Kitwe in a chapter of the book *Citizenship and infrastructure: Practices and identities of citizens and the state* (Routledge, 2019). Pesa's chapter highlights the ways in which citizens' access to water infrastructure is embedded in historical processes. It explores scholarly debates on water infrastructure, the role of the state and how the market of water provision influences citizenship. Given its social, economic, political and cultural significance, in addition to its importance to public health, water infrastructure plays a pivotal role in urban life. Nkana Water and Sewerage Company is a commercial utility which started operations in 2000. In informal settlements public water services were not provided and residents were expected to supply themselves, thus resorting to shallow wells, illegal connections or the Kafue River.



[read more](#)

**Water, housing and (in)formality in Kitwe, Zambia: infrastructure, citizenship and urban belonging**  
**Chapter 6 in 'Citizenship and Infrastructure'**

## Consumption of Bottled Water at the Bottom of the Pyramid: Who Purchases First?



*Authors: Rachel Howell, Kinsuk Mani Sinha, Natascha Wagner, Neelke Doorn and Cees van Beers*  
Journal of Macromarketing

While consumer and marketing research in developed markets is an established field, consumer research in a Bottom of the Pyramid (BoP) setting is less established and mostly conceptual or qualitative. This paper examines the individual heterogeneity and the local context of BoP consumers with an empirical study on the consumption of low cost bottled water on the Kenyan coast and the capitals of Uganda and Rwanda. The empirical analysis builds on existing research exploring consumer behaviour, and it looks at a database of 713 bottled water consumers in Kenya, Uganda and Rwanda. The study highlights the importance of supply-driven consumption in the BoP market. Furthermore, the results suggest that the two water companies may not be reaching their intended target group of low-income consumers but rather middle class consumers. As such, the research contributes to the larger BoP debate by presenting evidence that consumers in a BoP setting may purchase more based on the supply of a product rather than other socio-demographic factors such as income.



[read more](#)

### **Consumption of Bottled Water at the Bottom of the Pyramid: Who Purchases First?**

### Rare Gems or Mundane Practice? Resource Constraints as drivers of Frugal Innovation



*Authors: Matthias Ploeg, Joris Knobben, Patrick Vermeulen and Cees van Beers*  
Journal Innovation: Organization & Management

Frugal innovation and related concepts have been the subject of increasingly greater scholarly attention. While recent progress in the conceptualisation of frugal innovation as a phenomenon has been considerable, insights into the antecedents of frugal innovation remain relatively poor. This article, published in the Journal Innovation: Organization & Management, adds to this literature by systematically conceptualising, theorising and empirically testing the relationship between resource constraints and the propensity of firms to produce frugal innovations, drawing on concepts of problemistic search and opportunity recognition. The article distinguishes between two levels of resource constraints (firm-level and firm environment-level) and two types of frugal innovation (internally oriented and customer-oriented), while using managerial experience as a moderating internal factor. The authors found that firm-level resource constraints have a strong effect on the propensity of firms to engage in internally-oriented frugal innovation, although this is only the case for firms with experienced managers. This effect is lower when these firms operate in an environment that also faces high constraints. Resource constraints were found to have no effect on customer-oriented frugal innovations, while, surprisingly, managerial experience was found to have a negative moderating effect. The article discusses the theoretical and policy implications of these findings for the literature on both frugal innovation and innovation in a broader sense. This study is the first large-scale empirical investigation of frugal innovation that estimates its prevalence.



[read more](#)

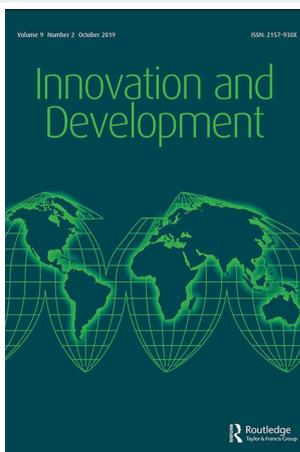
### Rare Gems or Mundana Practice? Resource Constraints as drivers of Frugal Innovation

## Comparing Frugality and Inclusion in Innovation for Development: Logic, Process and Outcome



*Authors: Dr. Elsie Onsongo and Prof. Peter Knorringa*  
Journal Innovation and Management

Frugal innovation and Inclusive innovation are often combined when classifying or characterising innovative endeavours in a developing context. In this article Elsie Onsongo and Peter Knorringa argue that frugality and inclusion are fundamentally different by virtue of their philosophical orientations, and that this difference is reflected within their respective innovation processes and outcomes. Based on an in-depth literature review, they developed a typology outlining these differences. It shows that an inclusive innovation lens accentuates the participation of marginalised actors and poverty reduction, while a frugal innovation lens highlights product design processes, business model innovation and resource use. Conceptual clarity on these differences has implications for how we characterise innovation in developing contexts in the academic, practitioner and policy spheres.



[read more](#)

### **Comparing Frugality and Inclusion in Innovation for Development: Logic, Process and Outcome**

## Frugal Innovation in EU Research & Innovation Policy



*Authors: Prof. Saradindu Bhaduri and Prof. Peter Knorringa*

Written for the DG for Research and Innovation, European Commission

In recent years, frugal innovation has caught the attention of European companies, citizens, policy makers, and NGOs. Professors Peter Knorringa and Saradindu Bhaduri published a working paper at the request of the Directorate General (DG) for Research and Innovation, in which they propose building blocks and make suggestions as to where and how frugal innovation could be integrated into EU policy. The working paper focuses on possible connections with the 'Mission-Oriented Research & Innovation' programme (Horizon Europe) that has been designed by the DG for Research and Innovation. The paper builds on the 2017 EU scoping study on frugal innovation and the reengineering of traditional techniques. It introduces three key types of frugal innovation processes: innovations driven by firms, NGOs and local communities. It also shows how these three distinct processes link up with different parts of the EU policy agenda. The paper furthermore explores how a frugal innovation angle could enrich some of the main EU policy instruments and also raises the idea that a more fundamental rethinking of future innovation trajectories might be needed to effectively address global challenges.



[read more](#)

**Frugal Innovation in EU Research & Innovation Policy,**  
**CFIA Working Paper Series Nr.6**



## LDE Minor: Frugal Innovation for Sustainable Global Development

**Each year CFIA organizes a unique education programme for third-year bachelor students from Leiden University, TU Delft and Erasmus University Rotterdam – the Frugal Innovation for Sustainable Global Development minor (FI4SGD). In this programme, participating students have the opportunity to work with students from other universities and disciplines, allowing them to step outside of their mono-disciplinary frame of reference.**

This education programme is set up and coordinated by the CFIA, and is made possible in collaboration with the [African Studies Centre \(ASCL\)](#). Lectures from the TU Delft Faculty of Technology, Policy and Management ([TBM](#)), the Rotterdam School of Management ([RSM](#)), and the ISS and other knowledge partner institutes contribute expertise from their respective disciplines. The minor combines theory, practice and societal engagement. Apart from gaining theoretical knowledge during academic modules, students have the unique opportunity to conduct a 12-week field work assignment in the Netherlands or abroad. This enables the student teams to reproduce and interpret knowledge about frugal innovation from a technological, entrepreneurial and developmental perspective.

Participants in our program will learn from other disciplines, and relate this knowledge to, and integrate it into, their own disciplinary background, and from there, make a constructive contribution to the debate on frugal innovation and sustainable global development.

The academic coordinator of this minor is Dr. André Leliveld of the African Studies Centre of Leiden University and co-director of CFIA. The student coordinator is Madi Ditmars.

*“I have an enormous drive to put innovation in developing countries on the map. Especially when you look at innovation in the informal sector. By that I mean sole proprietors who try to get ahead with all kinds of inventive solutions. Ones that are also economical: developing smart and affordable products, services and processes with which people can escape from the worst poverty. One thing is clear: poverty is terrible and it is not without reason that the United Nations has labelled it ‘the most important challenge of our time’. In the FI4SGD minor I want to show students both sides: the potential and the necessity.” - André Leliveld*



## Student Projects Highlighted



### The low-field MRI scanner for paediatric hydrocephalus

The students in this project worked at the Mbarara University of Science and Technology to assist in the process of adapting Leiden University Medical 'Centre's MRI scanner to a resource-constrained environment. The students conducted a qualitative study into the need of the scanner in healthcare systems in Uganda, patient response to such device, and understanding financial and production possibilities in Uganda in order to develop an adequate business model. The project also identified potential local manufacturing partners as well as improvements to the design of the MRI device.

[read more](#)



### Green Frugal Energy, Uganda

The main objectives of the field work were to build a successful digester at the premises of HS Green Energy and help with the design of a digester at a monastery in Kijongo, near the border of Tanzania. There, the team aimed to tie together the three aspects of their research: the social, business, and technological perspectives on biogas in Uganda.

[read more](#)



All student projects can be found on our [website](#) >





## Student Experiences Highlighted

### Momo Powis - TWIGA Student Alumni 2019-2020, TU Delft

Helena Momoko Powis studies Aerospace Engineering at TU Delft and participated in the Frugal innovation for Sustainable Global Development minor this year. She did an internship project at a company called TWIGA. TWIGA is a meteorological company that works to improve the weather data for Sub-Saharan Africa. "My job was to test a code which predicts diffuse radiation. I placed sensors in different parts of Kenya and collected my own data to prove that it works effectively and accurately. I chose this internship as I wanted to use my technical background to help in an active project where I felt like my work could contribute to something bigger."



[read more](#)



### Dylan Clementia - Ukulima Tech Student Alumni 2019-2020, Leiden University

Dylan Clementia studies International Relations and Organizations (Political Science) at Leiden University in The Hague and as part of his bachelor he decided to enrol in the FI4SGD minor. "For my internship/field assignment I was lucky enough to get my first choice project, which is working with Ukulima Tech, a social start-up company in Kenya which is trying to combat food insecurity in Nairobi. As a political science student, I mainly used my research skills to study the social impact of their innovation that they are promoting to combat food scarcity - Vertical Gardens. Moreover, I also managed the social media accounts, focused on marketing, and worked together with my team to help the company grow. I personally enjoyed working with Ukulima Tech because frugal innovation to me means achieving inclusive innovation while taking the environment into account. Therefore, I believe that working with Ukulima Tech gave me a chance to put the theory that I have learned throughout the minor into practice."



[read more](#)





Through its hubs and domains CFIA has enlarged its outreach to both academic and non-academic stakeholders through research projects and seminars, and by attracting more individuals from inside and outside academia to collaborate with CFIA. These activities have laid a strong foundation for a global frugal innovation network.

CFIA aims to further strengthen, diversify and expand this network. Through our projects and engagement activities, we work together with students, policy makers, businesses and NGOs to increasingly incorporate frugal innovation into their daily operations and longer-term strategies. Below, we will give some examples of our recent engagement activities in Europe, the Global South and the Province of South Holland.

## Europe

Research and innovation lie at the core of Europe's economy and are vital to a sustainable society. Europe is renowned for its excellent scientific and technological research, which has consistently been one of the EU's top priorities. However, after decades of historically unprecedented stability, prosperity and comfort, Europe has had to face two major disruptions in a short period of time: the financial crisis and the Covid-19 pandemic. CFIA argues that Europe is in need of an approach to innovation that focuses on delivering affordable, fit-for-purpose and easy-to-use innovations and technologies to broad sections of the population. Frugal innovation can offer solutions to the challenges that emerge and CFIA is actively trying to anchor the concept in the EU's future research and innovation landscape.

In the past year, CFIA has actively participated in EU sessions and initiated several activities to put frugal innovation on the EU agenda. Below are some examples of these activities and views on how frugal innovation could benefit the EU.

- [Affordable Tech session at the R&I Days](#) - Brussels, November 2019
- [How to Anchor Frugal Innovation](#) in the new Research and Innovation Agenda Library talk and workshop - Brussels, February 2020
- Peter Knorringa and Saradindu Bhaduri published a [policy paper](#), which proposes building blocks and makes suggestions as to where and how frugal innovation could be integrated into EU policy



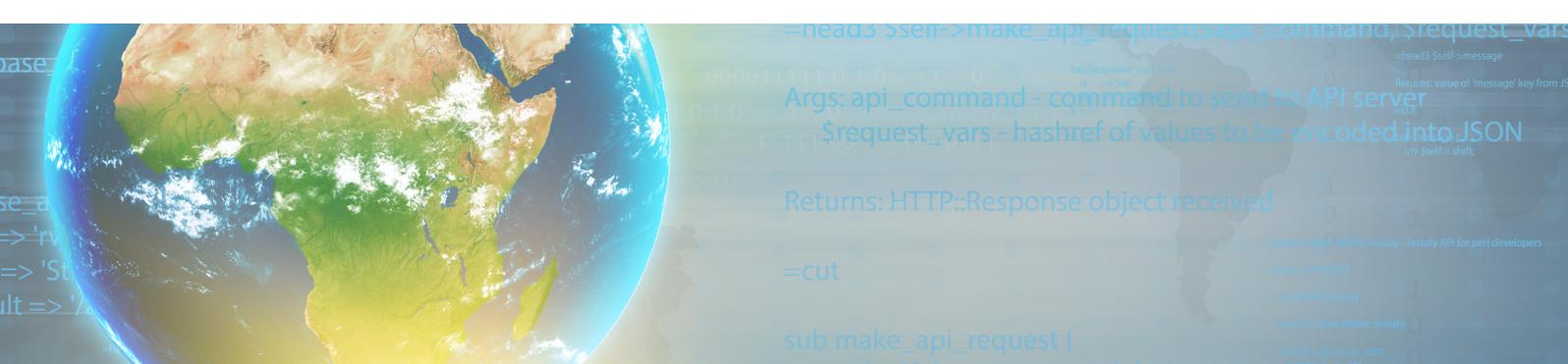


## Knowledge dissemination & networking

### Province of Zuid-Holland

While our primary focus remains on frugal innovations in Africa, we have more recently also become more involved in disseminating our knowledge closer to home, in the Province of Zuid-Holland. Many frugal innovations developed in Africa, or Asia or Latin America can also be applied in the European setting, with some tailor-made adjustments. For example, small- and medium-sized entrepreneurs in Zuid-Holland can learn from the experiences of entrepreneurs in Africa, for whom crisis management is the normal state of affairs. Moreover, many new digital technologies are being used already more intensively outside of Europe, and in some cases entrepreneurs in Zuid-Holland can benefit from these experiences. In collaboration with the [Erasmus Centre for Entrepreneurship](#), a first pilot programme on how to apply some of the lessons from frugal innovation is being developed for small and medium-sized enterprises (SMEs) in Zuid-Holland,. More information about this programme will become available in the fall of 2020.

We are also involving our minor students in 'closer to home' assignments such as the 'Revitalise Urban Space Challenge', evolving around the Middellandstraat in Rotterdam. This multicultural shopping street no longer meets today's consumer demands. Most entrepreneurs and shop owners do not have the means to invest in solutions that could help them to propel their business further and they make little use of modern technology. During a one-day in-field workshop, students created a portfolio of ideas that could contribute to revitalising the shopping street. The ideas and solutions needed to be guided by the idea of frugality: be profitable/affordable to both the entrepreneur and the customer, use functional and easy technologies, build upon what is already in place and co-create. For more information on this challenge: [Revitalize urban space Rotterdam](#). ◀



## South-Africa

Is there interest for research and education on frugal innovation in South Africa? That's one question CFIA delegates Cees van Beers and André Leliveld explored in November 2019 whilst meeting with researchers, policy makers and social entrepreneurs in Stellenbosch, Cape Town and Durban. The mission was prepared in close collaboration with Robert Tijssen, who is professor at both Leiden University and Stellenbosch University and has been affiliated with CFIA since its launch.

The visits and discussion among stakeholders made it clear that the major discourses in South Africa when it comes to innovations for disadvantaged or low-income people and resource constrained contexts revolve around the concepts of inclusive and social innovation. At the same time, however, there was a lot of interest in the concept of frugal innovation, which owes itself on the one hand to the explicit role of technology in the frugal innovation concept, and on the other hand to its clear focus on resource-constrained environments which can also include areas in the Global North. In this respect, the notion of reverse innovation (What can Europe learn from Africa?) also appealed to our counterparts. In addition, frugal innovation was found to be a concept that could be more instrumental and clearer than inclusive or social innovation when it comes to measuring innovation in the informal sector.

[Read more highlights and examples from the mission.](#)

## Kenya Hub

CFIA Kenya performs locally embedded research that addresses knowledge gaps and policy evidence gaps in Africa. CFIA Kenya adopts a multi-disciplinary perspective to develop analytical knowledge and thinking on innovation in resource-constrained environments. CFIA Kenya is currently working on a research project called [Frugal Innovation Histories](#), which is a broadly scoped field study that looks at how new 'frugal' innovations are developed bottom-up, and how frugality drives the product development process and the market creation process. It also evaluates the role of frugality in legitimising the innovation at the household, community and societal level.

Another ongoing project concerns the investigation of [business incubator and accelerator business models](#) and their effectiveness in supporting start-ups and growing businesses in Kenya.

In 2019 the Kenya Hub coordinated and supervised [several students' internships](#) for the FI4SGD minor in Kenya.

Other examples of activities: [The Role of Frugal Innovation in Sustainable Development in Africa](#) ◀



## Highlighted networking event from the Kenya Hub

**CREATIVE  
CITIES  
ARE SAFER  
CITIES**

### Addressing Urban Safety in African Cities during the World Urban Forum 2020

Together with the Institute of Housing Studies (IHS) and What Design Can do, the Creative Cities are Safer Cities initiative organised a networking event during the World Urban Forum (WUF10) to explore what gaps creativity can fill in order to create and sustain safer cities in Africa. With a focus on frugal innovation, this event explored how design can reframe the safety problem and contribute fresh, effective insight to existing urban safety initiatives. It also explored how an Urban Living Lab can play a role in this.

#### How can creative cities contribute to safer cities?

By studying a number of concrete cases, the research team behind this initiative - which includes specialists in urban safety, living labs, creativity and frugal innovation - promotes the research that investigates how creative cities can contribute to safer cities and aims to set up a Living Lab in collaboration with urban authorities and (impact) investors that enable local creatives to create and develop (frugal) solutions that will enhance safety and security in Durban, South Africa and Nairobi, Kenya.

The initiative is based on the idea that, besides good urban governance, management and planning, creativity is vital in the effort to make cities safer, in particular the creativity that can be found among creatives like designers, innovators, and entrepreneurs who in many cases work and live in the informal sector in unsafe and insecure neighbourhoods.

By collaborating with local creatives we aim to arrive at frugal solutions that improve safety and security. By frugal solutions we mean solutions that suit the resource-constrained environment of the neighbourhoods in which many (low income) people in megacities in the Global South live. It does not matter whether the creators are from the neighbourhood or city itself, as long as they aim to design solutions that are locally applicable and acceptable ◀

*“Creativity is not only about designing technologically innovative products which physically or digitally improve safety. It is also about social design, whereby innovative social actors, institutions and network arrangements ensure that the (frugal) solutions are accepted, appropriated and applied in the environments for which they have been designed and developed.” - Andre Leliveld*



Read more: [Creative Cities are Safer Cities](#)

# Frugal PhD Researchers

The PhD community is a primary source of new thinking and dynamism for CFIA. PhD candidates are exploring various sub-fields within the frugal innovation domain and links with adjacent and partly overlapping fields like circular economy, women entrepreneurship, sustainability, knowledge and learning, and new technologies. Meet our PhD community below, and remember that new ideas for PhD projects on frugal innovation are always welcome!

## Saskia Vossenbergh

On Thursday 4 June 2020, Saskia Vossenbergh defended her thesis titled: '*Gendered Institutions Matter: A middle ground between feminist and gender-blind perspectives on enterprise development*'.

In her thesis, Saskia examined the interactions between informal gendered institutions, women's entrepreneurial logics and the emancipatory effects of market innovations on women's enterprise development in Malawi.

Publications:

Thesis '[Gendered Institutions Matter: A middle ground between feminist and gender-blind perspectives on enterprise development](#)'.

[Frugal Innovation through a Gender Lens: Towards an Analytical Framework](#)



## Rachel Howell



Rachel worked as a PhD candidate within the [Frugal Innovations and Responsible Entrepreneurship: Case Studies in the Water and Health Sectors in East Africa project](#), which was funded by the NWO-Responsible Innovation programme. She has a bachelor's degree in Mechanical Engineering from the United States and a Master of Science in Engineering and Policy Analysis from the Delft University of Technology (TU Delft).

In her PhD research she investigated how business models for frugal innovation can achieve a balance between firm profits and development impact. The research took place primarily in Kenya, with cross-country comparison done in Rwanda and Uganda. Prior to her PhD, Howell conducted an economic impact evaluation of rural electrification efforts in Uganda on behalf of her master's thesis.

# Frugal PhD Researchers

## Birendra Singh



Birendra had his initial training as a genetic engineer, and subsequent exposure to Science Technology and Society (STS) studies inspired him to reimagine frugal innovation from an 'alternative perspective'. He holds a Master of Technology (M.Tech) and a research Master (M.Phil) in the area of science policy. At CFIA, his PhD project focuses on the case study of rainwater harvesting based irrigation practices in central India. His empirical fieldwork is aspiring to conceptualise knowledge and learning dynamics of the bottom-up frugal innovations. More specifically, his research deals with twin objectives: first, what are the learning and knowledge(s) integration strategies used by the grassroots in an uncertain and resource-constrained environment, and, secondly, what are the learning and knowledge dynamics of the bottom-up frugal innovations below the gravity of social institutions, local knowledge and available resources. Knowledge creation, social learning and adaptive thinking theories are the theoretical 'hook' of his research.

## Sanghamitra Chakravarty

Sanghamitra focuses on the important area of frugal innovation in medical devices designed and manufactured by small and medium-sized firms in developing countries and how they relate to healthcare delivery. Through fieldwork in South Africa, she analyses the innovative characteristics of firms that possess a unique combination of technological capabilities and a deep appreciation of context, plus the ability to innovate under constraint. Sanghamitra aims to understand how public policy can more effectively address healthcare needs while simultaneously enabling economic growth by supporting local firms with home-grown technologies. She has been a visiting PhD researcher at the Human Sciences Research Council (HSRC) and University of Johannesburg (SA). Sanghamitra holds a Bachelor's & Master's degree in Chemical Engineering from India. She has also completed the ISS Diploma programme on Sustainable Local Economic Development. Prior to her PhD, she worked in multi-stakeholder government science, technology and innovation programmes in India and Oman for 12 years.





# Frugal PhD Researchers

## Johan Spamer



Johan Spamer holds a 'Master's degree in Transport Economics, an MBA (cum laude) for his research dissertation and a postgraduate diploma in Development Finance.

Johan's research interests include inclusive innovation and development, specifically within the Blue Economy (ocean economy) sectors, a topic on which he wrote a paper entitled Riding the African Blue Economy Wave: A South African Perspective. The paper drew worldwide attention to this new phenomenon as well as to ways of fostering sustainability within the ocean economy sectors through multi-stakeholder initiatives and innovation in the context of the Sustainable Business Model Innovation in the Blue Economy project.

## Saba Al Kuntar

Saba Al Kuntar's research is entitled: *'Ways to Survive, Hurdles to Cross: Refugee Entrepreneurship and Networking in Precarity'*.

Saba focuses on refugee entrepreneurship through the case study of Syrian entrepreneurs in Lebanon. The research explores the experience of refugee entrepreneurs in setting up businesses amid uncertain conditions. The project includes topics such as refugee urban economy, social networks, self-reliance approach.

Saba is part of a research programme called: Vital Cities and Citizens, which is an Erasmus Initiative. Her supervisors are Dorothea Hilhorst and Peter Knorringa



# Frugal PhD Researchers

## Maria Pineda Escobar



Maria Pineda Escobar's PhD research aims to gain a better understanding of the pending question of the connection between frugal innovation and sustainability. In doing so she aims to specifically study small and medium-sized local enterprises, which correspond to a sub-group of frugal innovation actors that has been largely overlooked by frugal innovation research. She is specialised in issues related to innovation, inclusive business and sustainability in Base of the Pyramid markets, with a particular focus on developing and emerging countries.

Maria has been a visiting scholar at various universities around the world. Most recently she was awarded the prestigious Fulbright visiting researcher scholarship to conduct a research stay at the Frugal Innovation Hub of Santa Clara University.

## Shozo Sakata

Shozo Sakata's PhD research focuses on frugal innovation in the agricultural sector in Vietnam. He has a special interest in how Vietnamese farmers and artisans re-furbish second-hand machinery imported from Japan, and on whether Vietnamese farmers benefit from new digital technologies. He has a Master's degree from LSE and works at the Bangkok office of the Institute of Developing Economies (IDE), part of the Japan External Trade Organization (JETRO).





# Frugal PhD Researchers

## Ilaha Abasli



Ilaha holds a Master's degree in International Development and Emerging Economies from King's College London. She is also engaged in international development and sustainability consultancy work with Food and Agriculture Organization of the United Nations, the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and local NGOs. Ilaha's research interests include circular economy and inclusive development, especially in the context of developing economies; ways of scaling up frugal and local innovation/solutions to the policy level; and fostering sustainability within the emerging economies through data/science-driven and participatory policies.

## Anna Elias

Anna's research focuses on understanding how organisations structured as cooperatives use frugal innovation to scale their operations, markets and impact while effectively engaging with multiple stakeholders. Specifically, she seeks to study the potential of digital platform cooperatives in creating sustainable and resilient livelihoods in the Indian informal economy. Before engaging with ISS, Anna was professionally involved in areas that overlap public sector, business, and innovation. She consulted various public and private sector stakeholders in the Middle East and North African region on approaches towards diversifying away from oil dependence to emerging sectors including FinTech, blockchain, and renewable energy. She also worked with small-holder farmers in Africa, predominantly Zambia, to understand the need and scope of sustainable innovation through locally relevant agro solutions. Anna holds a Master in Development Studies from the Indian Institute of Technology Guwahati, with a specialisation in development economics.



# CFIA CORE TEAM



**Prof. dr. Peter Knorringa**  
CFIA Director | ISS, Erasmus University Rotterdam  
Contact: knorringa@iss.nl

**Prof. dr. Cees van Beers**  
CFIA Co-director | Delft University of Technology  
Contact: c.p.vanbeers@tudelft.nl



**Dr. André Leliveld**  
CFIA Co-director | Leiden University  
Contact: leliveld@ascleiden.nl

**David Wubs-Mrozewicz**  
Executive Manager  
Contact: wubs@iss.nl



**Prof. dr. Saradindu Bhaduri**  
Associate Professor / India Cluster  
Contact: saradindu@jnu.ac.in

**Dr. Elsie Onsongo**  
Hub Manager Kenya  
Contact: eonsongo@cfia.network



**Dr. Greetje Schouten**  
Domain Program Developer Agro-food  
Contact: schouten@rsm.nl

# CFIA CORE TEAM



**Dr. Ir. Ralph Lindeboom**  
Domain Program Developer Water/Energy  
Contact: r.e.f.lindeboom@tudelft.nl



**Jasmin Hofman**  
Communications Officer  
Contact: hofman@iss.nl



**Merel Molenaar**  
Organisation and operational communication Officer  
Contact: molenaar@iss.nl



**Rosebella Nuymba**  
Junior research assistant, Kenya Hub  
Contact: rnyumba@cfia.network



**Bernard Kang'ethe Njorah**  
Junior research assistant, Kenya Hub  
Contact: bnjorah@cfia.network



**Erwin van Tuijl**  
Researcher  
Contact: erwin.van.tuijl@gmail.com



**Madi Ditmars**  
Student coordinator minor FI4SGD  
Contact: m.d.ditmars@asc.leidenuniv.nl

# Frugal Innovation: Do better With fewer resources For more people

CFIA stands for:

- Cutting edge research
- Knowledge exchange
- International network
- Local projects, local partners

## JOIN OUR NETWORK!



Subscribe to [CFIA newsletter](#)



Follow us on [Twitter](#)



Connect with us on [LinkedIn](#)



Like us on [Facebook](#)



Text and design:  
J. Hofman & M. Molenaar  
2020, CFIA - [info@cfia.nl](mailto:info@cfia.nl)

Address: Kortenaerkade 12  
2518 AX, The Hague

## Centre for Frugal Innovation in Africa

Leiden-Delft-Erasmus Universities