

The Role of Non-Profit Organizations in Accelerating Frugal Innovation

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Abstract

“Doing more with less for more,” the central premise of frugal innovation, seeks simpler and better solutions for often underserved customers while minimizing the use of resources. To meet the needs of various stakeholders and source ideas from the largest pool possible, frugal innovators often engage in intersectoral collaboration. By focusing on non-profit organizations (NPOs) as alliance partners for Western social enterprises, this thesis reveals roles and levers that NPOs can use to accelerate this type of innovation. Looking at synergy-sensitive resources of NPOs, the thesis develops an initial framework based on the literature on business-to-NPO partnerships in emerging markets. The research then employs a series of expert and case interviews to validate and adapt this framework to the case of frugal innovation. It categorizes these resources into underlying assets and executable capabilities of the partner NPO to find six assets and 13 capabilities through which NPOs can accelerate frugal innovation, broken down into 14 sub-assets and 30 sub-capabilities.

The research further employs multiple-case studies of four frugal innovations in the assistive technology market, spanning mobility and visual aids. Based on this case knowledge, the thesis introduces seven roles in which NPO partners can support the development and implementation of frugal innovations—Introducer, Co-Developer, Implementer, Multiplier, Advisor, Promoter, and Funder. Each role relies on a specific set of assets and capabilities and is of special relevance in one or multiple phases of the innovation process.

Keywords: Frugal Innovation, Affordable Innovation, Innovation for Emerging Markets, Non-Profit Organizations, B2N Partnerships, Intersectoral Collaboration, Social Entrepreneurship, Assistive Technology, Relational View

Abstract

"Mit weniger mehr erreichen", die zentrale Prämisse von frugaler Innovation, sucht nach einfacheren und besseren Lösungen für Kunden in unterversorgten Regionen, die gleichzeitig auch den Ressourcenverbrauch minimieren. Um den Bedürfnissen verschiedener Interessensgruppen gerecht zu werden und Ideen aus einem möglichst grossen Pool zu schöpfen, arbeiten frugale Innovatoren häufig über Sektorengrenzen hinweg. Diese Arbeit fokussiert sich auf Non-Profit-Organisationen (NPOs) als Kooperationspartner für westliche Sozialunternehmen und zeigt Rollen und Hebel auf, durch die NPOs frugale Innovation fördern können. Basierend auf der Literatur zu Business-to-NPO-Partnerschaften in Entwicklungsmärkten entwickelt diese Arbeit ein initiales Modell an synergiebringenden Ressourcen von NPOs. Dieses Modell wird anschliessend durch eine Reihe von Experten- und Fallinterviews validiert und an den spezifischen Fall von frugaler Innovation angepasst. Das Modell unterteilt diese Ressourcen in Assets, die das NPO unabhängig von der Partnerschaft besitzt, und Capabilities, die es spezifisch für den Partner ausführt. Insgesamt definiert diese Arbeit sechs Assets und 13 Capabilities, mit denen NPOs frugale Innovationen fördern können, unterteilt in 14 Sub-Assets und 30 Sub-Capabilities.

Mit Hilfe dieses Modells analysiert die Arbeit Fallstudien von frugalen Innovationen im Bereich von Unterstützungstechnologien, die vier Mobilitäts- und Sehhilfen umfassen. Basierend auf diesem Fallwissen stellt die Arbeit sieben prototypische Rollen vor, in denen NPO-Partner die Entwicklung und Implementierung frugaler Innovationen unterstützen können – als Introducer, Co-Developer, Implementer, Multiplier, Advisor, Promoter, und Funder. Jede Rolle basiert auf einem bestimmten Set an Assets und Capabilities und ist in einer oder mehreren Phasen des Innovationsprozesses relevant.

Schlüsselwörter: Frugale Innovation, Kostengünstige Innovation, Innovation für Entwicklungsmärkte, Non-Profit-Organisationen, B2N-Partnerschaften, Intersektorale Zusammenarbeit, Sozialunternehmertum, Unterstützungstechnologie, Beziehungsorientierung

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List of Abbreviations

ATIA	Assistive Technology Industry Association
AT	Assistive technology
B2B	Business-to-business
B2N	Business-to-non-profit-organization
BOP	Base of the pyramid / bottom of the pyramid
BRICS	Brazil, Russia, India, China, and South Africa
COVID	Coronavirus disease
EMDE	Emerging market and developing economy
EPFL	École Polytechnique Fédérale de Lausanne
epN	empowering people.Network
e.V.	Eingetragener Verein [<i>Registered voluntary association under German law</i>]
FDA	Food and Drug Administration
FTSE	Financial Times Stock Exchange
GATE	Global Cooperation on Assistive Technology
GDP	Gross domestic product
GE	General Electric
GIZ	Gesellschaft für Internationale Zusammenarbeit [<i>Association for international cooperation</i>]
GNI	Gross national income
HI Bolivia	Hostelling International Bolivia
IFC	International Finance Corporation
IMF	International Monetary Fund
IPL	International poverty line
LMI	Lower middle-income
MNC / MNE	Multinational company / multinational enterprise
MSCI	Morgan Stanley Capital International

NGO	Non-governmental organization
NPO	Non-profit organization
ODG	OneDollarGlasses
OECD	Organisation for Economic Co-operation and Development
PPP	Purchasing power parity
QCA	Qualitative content analysis
R&D	Research & development
RBV	Resource-based view
RCI	Resource-constrained innovation
SDG	Sustainable Development Goal
SMEs	Small and medium-sized enterprises
TCCO	Tanzania Clubfoot Care Organization
UK	United Kingdom
UMI	Upper middle-income
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNSDG	United Nations Sustainable Development Group
USD /US\$	US dollar
VAT	Value added tax
WEF	World Economic Forum
WHA	World Health Assembly
WRI	World Resources Institute
ZCfB	Zimbabwe Council for the Blind

1 Introduction

“Doing more with less for more” (Prabhu, 2017, p. 1), the central promise of frugal innovation, not only addresses global challenges ranging from poverty to unsustainable resource depletion, but also does so in an economically profitable way. Unsurprisingly, the concept has received growing attention from practitioners and academics alike but remains confined to isolated instances in practice. By focusing on the role of non-profit organizations (NPOs), the present dissertation aims to reveal levers for accelerating this type of innovation to fully realize the social, environmental, and economic potential of frugal solutions.

This introductory chapter lays the foundation for the research, starting with an outline of the *Research Problem* (1.1) that emphasizes the dissertation’s practical relevance. After examining the relevant literature, the thesis identifies a *Research Gap* (1.2) impeding the successful remedy of the research problem, representing this study’s theoretical relevance. By stating a clear *Research Question* (1.3), the chapter outlines how this research helps to close this gap. The chapter concludes with an explanation of the *Contribution of the Thesis* (1.4), before highlighting the *Structure of the Thesis* (1.5), outlining the remaining chapters.

1.1 Research Problem

“Leaving no-one behind” is the transformative promise of the UN Sustainable Development Goals (SDGs) to be delivered by its member states by 2030 (United Nations Sustainable Development Group, n.d.). Despite these ambitious targets and the increase in sustainability management among major companies, global challenges remain prevalent and severe, ranging from poverty to the depletion of non-renewable resources (Dyllick & Muff, 2016, p. 157). The World Bank (n.d.-b) estimates that over 2 billion people continue to live below the poverty line. In parallel, the past decades have witnessed a “Great Acceleration”¹ in various socio-economic and ecological indicators, strongly suggesting that the economic activity of the past 70 years has been a crucial contributor to the unprecedented deterioration in natural resources

¹ The term “Great Acceleration” was coined by the International Geosphere-Biosphere Programme. It describes a duality in the increase of twelve socio-economic and twelve ecological, or “earth system,” drivers since the beginning of the Industrial Revolution in the 1750s (Steffen, Broadgate, Deutsch, Gaffney, & Ludwig, 2015).

during that time (Steffen, Broadgate, Deutsch, Gaffney, & Ludwig, 2015, p. 3). The Global Footprint Network (n.d.) notes that it is the most economically advanced countries that exhibit ecological footprints far exceeding the planet's resources, thus running an "ecological deficit." Smaller footprints are found more commonly in less-developed countries, which, however, are predicted to experience considerable population and economic growth that will increase their future footprint in the coming decades.

With the intensification of the conflict between required and available resources, the importance placed on innovative entrepreneurial solutions has increased in both the private and the public sector. On the one hand, a strong surge in impact-driven entrepreneurial ventures has been witnessed in recent decades; on the other hand, many development programs have incorporated a more entrepreneurial theory of change. The United Nations Development Programme, for instance, launched a global network of 60 Accelerator Labs in 2019 to "test and scale new solutions to global challenges like climate change and soaring inequality" (United Nations Development Programme, 2019).

Another fundamental global development centers around the rising presence of emerging markets. The World Bank (2020) projects the 2020 economic growth rate of the emerging market and developing economies (EMDEs) to be 5%, considerably over the world's average of 1.5%, while other studies project that the global middle-class will skyrocket from 3.7 billion people in 2020 to 5.4 billion by 2030 (Kharas, 2017, p. 2). With growing economic activity in these countries, many people are experiencing considerable increases in income, with some even entering global markets for the first time (Prahalad & Hart, 2002, p. 1).

Paul Polman, former CEO of Unilever, pointed out that with these drastic changes, the world was becoming more volatile, uncertain, complex, and ambiguous (Radjou & Prabhu, 2015a). These trends increasingly challenge the centralized and structured innovation approach dominant in the West, which often lacks flexibility and accessibility for nonaffluent consumers (Prahalad & Mashelkar, 2010, p. 133). Consequently, the focus and locus of innovation has shifted towards emerging markets as both the originators and recipients of innovation (Simula, Hossain, & Halme, 2015, p. 1567).

Influenced by these developments, frugal innovation—low-priced, simple, and resource-spare solutions that are adapted to local contexts—has gained increasing attention from both practitioners and academics (see Appendix 1). By developing "appropriate, adaptable, affordable,

and accessible solutions” that consider the needs of consumers in resource-constrained environments, frugal innovation addresses “societal, environmental, and economic needs across the globe” (Basu, Banerjee, & Sweeny, 2013, p. 63), while simultaneously being a viable corporate growth strategy (Radjou & Prabhu, 2015b). While the thrust of frugal innovation has a strong origin in Indian markets and mindsets, its benefits have also long attracted the interest of Western businesses. This promising potential is reflected in a Roland Berger study on frugal products that estimated mid- and low-end technologies to be growing above the technology market average (Knapp, Böhler, & Zollenkop, 2013). Success stories of frugal innovation range from multinational companies (MNCs) and their local subsidiaries to grassroots-level entrepreneurs. Examples at either end of the spectrum include the global giant General Electric’s (GE) affordable and easy-to-use electrocardiogram device and ultrasound machine—with the former originally developed for rural India, the latter for rural China (Immelt, Govindarajan, & Trimble, 2009)—and local grassroots innovator Jayaashree Industries’ award-winning simple machinery producing high-quality, low-cost sanitary pads, targeted at women in rural India (National Innovation Foundation India, n.d.).

Despite its potential, the success of frugal innovation “has been less than spectacular” (Tiwari & Herstatt, 2012b, p. 246), as especially in advanced economies, the “application of frugal innovation in most companies still remains far from reality” (Hyypiä & Khan, 2018, p. 38). Aggravating this hesitation, certain frugal innovations highly praised by the academic literature have proven not economically viable in practice, such as the “people’s car” Tata Nano (The Economic Times, 2020) or the \$25 Firefox smartphone (Shankland, 2015).

Apart from these individual market failures, this thesis identifies a range of barriers that hinder the success of frugal innovation (see Section 3.2.4), with especially high hurdles for enterprises not rooted in the target market. The literature discussing these barriers remains sparse, but one fundamental barrier remains the lack of market access to customers and partners, who are often rural, decentralized, difficult to reach, and operating in (partially) informal markets (Kroll et al., 2017, p. 33). Hence, Western businesses developing frugal innovations often lack deep customer and market knowledge, local contacts, and access to networks. These assets are particularly important in the context of frugal innovation, given the crucial role of a deep and holistic understanding of customer needs to develop products that consider those customers’ manifold constraints.

To overcome this market-access barrier, many Western businesses have turned to intersectoral and international partnerships, particularly with local NPOs. These NPOs, with resources complementary to those of businesses, are indispensable integrators that facilitate connections and exchanges between companies and local market actors (Drayton & Budinich, 2010). One frequently mentioned frugal innovation exploiting these NPO benefits is Grameen Danone Foods, an alliance between Danone and the NPO Grameen Group. To fight malnutrition, the partners joined forces to develop a nutrient-enriched, affordable yoghurt for rural India (Danone, 2020).

Nevertheless, while the number of business-to-NPO (B2N) partnerships is increasing steadily (Granqvist, 2016, p. 17), few specifically target the acceleration of frugal innovation (Báez Morales, 16 July 2020), which is a relatively new concept for businesses. Hence, neither a clear understanding nor well-known best practices exist for how NPO partners can best contribute to such partnerships. Establishing this groundwork is crucial to exploit the full potential of frugal innovation.

Practical Relevance

Given these hurdles, practitioners can greatly benefit from a clearer and more nuanced understanding of the role that NPOs can play in granting market access to Western businesses, thus accelerating frugal innovations. On the one hand, NPOs, which are often characterized by their limited financial resources, acquire a better understanding of how to employ those resources most effectively to get the most out of their corporate partnerships. Since their membership in such partnerships is voluntary, the value created usually aligns with the social or ecological goals of the NPO, so the increased effectiveness and higher success rates of partnerships ultimately also benefit the NPO's beneficiaries. On the other hand, businesses partnering with NPOs benefit from the enhanced facilitation services of the latter, as successful frugal innovations result in market expansion, increase revenues, and improve the business' public image by demonstrating its engagement in social and environmental issues. Furthermore, when businesses have a clear framework showing the array of NPO contributions to the innovation development process, they can more clearly define and articulate their needs and requirements to a potential partner NPO, thereby improving the selection process.

1.2 Research Gap

The research problem touches upon two strands of literature: frugal innovation and B2N partnerships situated in emerging and base-of-the-pyramid (BOP) markets (see Section 3.1). The literature review details both literature streams (Sections 3.2 and 3.3), each providing valuable perspectives on the problem. However, each only partially covers the issue, and no research has bridged these streams so far. The resulting gaps are briefly outlined below.

Literature on Frugal Innovation

As a relatively young academic field, the literature on frugal innovation centers on its conceptualization and definition (Hossain, 2018; Zeschky, Winterhalter, & Gassmann, 2014a), alongside its differentiation from other types of resource-constrained innovation (RCI; Agarwal, Grottke, Mishra, & Brem, 2017; Brem & Wolfram, 2014). Nonetheless, the academic discourse has also engendered discussion regarding the resource-sensitive design (Basu et al., 2013; Prahalad, 2012), development (Lehner, Koldewey, & Gausemeier, 2018), and business models (Winterhalter, Zeschky, Neumann, & Gassmann, 2017) of frugal innovations. By sector, the literature on frugal innovation concentrates on healthcare (Mani, Annadurai, & Danasekaran, 2014; Ramdorai & Herstatt, 2015; World Health Organization [WHO], 2018e), electronics (Immelt et al., 2009), and transportation (Sharmelly & Ray, 2018). While there is a strong current of frugal innovation from India (Herstatt & Tiwari, 2017) and, to a lesser extent, other emerging markets such as China (Corsi, DiMinin, & Piccaluga, 2014), interest in frugal innovation is also increasing among Western businesses and markets (Neumann, Winterhalter, Widenmayer, Wecht, & Gassmann, 2017; Tiwari, Buse, Kalogerakis, & Scheitza, 2018).

While the literature often considers the concept's social and environmental benefits (Brem & Ivens, 2013; Khan, 2016; Rosca, Reedy, & Bendul, 2018), few studies have discussed the barriers that explain the still rather stunted spread of frugal innovation (Hyypiä & Khan, 2018). The literature materializes again to discuss overcoming these (implicit) barriers, with substantial literature highlighting the benefits of intersectoral and international partnerships and their combinations of complementary skills, resources, and experiences. However, it focuses almost exclusively on the general need for such partnerships (Agnihotri, 2015; Arnold, 2018; Kroll et al., 2017; Tiwari & Herstatt, 2012b), the range of partners to involve and their respective

benefits (Basu, Pronovost, Molello, Syed, & Wu, 2017; Bhatti, Ramaswami Basu, Barron, & Ventresca, 2018), and the varied support schemes for frugal innovation (Granqvist, 2016).

Given this focus, surprisingly little literature identifies the roles and contributions of B2N partners in accelerating frugal innovation. While this oversight applies to both businesses and NPOs, NPO partners receive even less attention, since most literature on frugal innovation development is written from a company perspective, with NPOs mostly viewed as external stakeholders to be integrated (Altmann & Engberg, 2016; Neumann, Böhm, & Wecht, 2018; Tiwari & Herstatt, 2012a). Consequently, a gap exists in the frugal-innovation literature that must be addressed with a deep, qualitative understanding of the roles and contributions of NPOs required to accelerate the development of frugal innovation in partnership with businesses.

Literature on Business–NPO Partnerships

There is extensive literature covering partnerships between businesses and NPOs, with some authors focusing specifically on such partnerships in the realm of innovation in emerging and BOP markets. However, authors have tended to concentrate on areas that differ slightly from the focus of this thesis.

While the present study is interested in the contributions of NPO partners specifically, many authors study B2N partnerships as a whole, thus changing the relevant unit of analysis. Such literature includes the mental models that facilitate such cross-sector partnerships (Calton, Werhane, Hartman, & Bevan, 2013), and their conceptualization (Nahi, 2016), success strategies (Jamali & Keshishian, 2009; London, Anupindi, & Sheth, 2010), business models (Chesbrough, Ahern, Finn, & Guerraz, 2006), structures (Rivera-Santos, Rufin, & Kolk, 2012), and partner selection (Rondinelli & London, 2003). Furthermore, when investigating such partnerships, authors often take the perspective of the business, viewing the NPO as the external partner. These studies include works considering company practices to build BOP capabilities (Vermeulen, Bertisen, & Geurts, 2008), corporate internationalization efforts (Van den waeyenberg & Hens, 2012), transaction costs for corporates (Vachani, Doh, & Teegen, 2009), and the role of MNCs in international development (Oetzel & Doh, 2009).

Closer to the research area of this thesis, certain other research looks more specifically at cross-sector partnerships between businesses and NPOs to develop (social) innovation in emerging

or BOP markets (Dahan, Doh, Oetzel, & Yaziji, 2010; Grimm & Gilbert, 2019; Hahn & Gold, 2014; Sánchez & Schmid, 2013). There is, however, no explicit reference to frugal innovation in this stream of literature, and these studies are instead positioned in a more general context of social innovation. However, as a specific innovation type, frugal innovation possesses its own characteristics and distinctive barriers. Hence, the literature does not answer the questions of whether and to what extent the existing research on B2N partnerships applies in the context of frugal innovation and where and how it may deviate from its general form. This thesis seeks to close this dual research gap by combining the two research streams and refining them to consider the specific role of NPO partners in the context of frugal innovation.

Theoretical Relevance

There is a strong call from the literature to close this gap and clarify the contributions of NPOs in accelerating frugal innovation. According to Webb, Kistruck, Ireland, and Ketchen (2010, p. 556), “alliance formation as an entry mode into BOP markets remains understudied,” and Grimm and Gilbert (2019, p. 177) note that “mechanisms that contribute to the constitution of successful collaborations with non-profit partners at the BOP [...] are only poorly understood.” In the same vein, Schuster and Holtbrügge (2014, p. 200) demand more clarity about the resources supporting a business’s responsiveness in low-income markets, while Vermeulen et al. (2008, p. 383) call for in-depth qualitative research to uncover the role of non-traditional stakeholders in the development of such capabilities.

At a theoretical level, the relational view is often applied to evaluate the organization of collaborations, and this theoretical lens is also applied in this thesis. Its application to emerging and BOP markets, however, has been rather anecdotal (Hahn & Gold, 2014, p. 1322), with the literature calling for more empirical research to strengthen the existing results (Grimm & Gilbert, 2019, p. 199). Furthermore, its application to inter-organizational (rather than inter-firm) relations extends the theory, such that this thesis’s application of it also carries considerable theoretical relevance.

1.3 Research Question

To close this research gap, this dissertation addresses the following research question:

How can non-profit organizations deploy their resources to provide market access to Western social enterprise partners developing frugal innovations for emerging markets and developing economies?

This research question is clarified in the following section along three angles. More comprehensive definitions derived from the literature can be found in the related sections of the literature review in Chapter 3.

A) Type of Business Partners

Type: Because frugal innovation emphasizes the combination of social impact with economic viability, this thesis focuses on social enterprises as business partners. Social enterprises are organizations generating both financial revenue and social and/or environmental benefits, and which can be operated as either a non-profit organization or a for-profit company (BC Centre for Social Enterprise, n.d.) (see Section 3.3.2). Following this definition, this thesis uses entrepreneurial mechanisms for social impact generation as the defining criteria for social enterprises, which is a more relevant criteria for this research than specific legal forms and which aligns with frequently used definitions in the field of frugal innovation.

Scope and Origin: This thesis focuses on small to medium-sized social enterprises from Western high-income countries targeting EMDEs. Such social enterprises have an increased need for NPO partnerships, as their international reach is often limited, they lack the channels to access far-flung EMDEs, and their origins in Western high-income markets entail greater institutional distance from such markets.

Industry: For the general part of this thesis, namely the theoretical understanding and the expert interviews, the research has no specific industry focus. The thesis considers so-called essential sectors (e.g., healthcare, energy access, agriculture, or water, sanitation, and hygiene), which is in line with the scope of most NPOs active within frugal innovation. As the theoretical understanding and the expert interviews focus on the scope and nature of NPO contributions, partnerships across different industries are seen as sufficiently homogenous for comparison.

The case studies, however, are situated within a more homogeneous market to allow for a more direct comparison across cases; all cases are embedded in the assistive technology (AT) market (see Section 6.1), which includes products such as spectacles, hearing aids, wheelchairs, prostheses, and communication aids. This market was chosen due to the pronounced difference between demand and insufficient supply in EMDEs, the relatively high reliance on technical products, and the consequently large potential for frugal innovations. In addition, the AT market, as well as the overarching healthcare sector, is characterized by a strong impact on the recipients' quality of life. In the absence of appropriate solutions, affected people are often excluded from society and income opportunities, thereby perpetuating patterns of poverty. Consequently, the AT market shows a high degree of involvement from NPOs, making it a suitable context for the case studies.

Product: The thesis considers social enterprises whose offerings (partially) consist of manufactured goods (as opposed to service-based offers) to increase the comparability of the innovation process. As the development of physical products offers more touchpoints with the local market, focusing on this type of product increases the relevance of the market access barrier.

B) Type of Non-Profit Organizations (NPOs)

Type: NPOs are entities that are not profit-oriented, and include private non-governmental organizations (NGOs), development and aid agencies, and public development organizations. They create value for other parties through operational or advocacy work (see Section 3.3.2).

This thesis considers private NGOs and (supra-)governmental development agencies to be NPOs. The resulting variety in the type of NPOs is acceptable, as more relevance is given to the homogeneity of the criteria relating to the type of innovation and partnership. A focus on one specific NPO type was deemed too limiting, given the small number of frugal innovations developed through B2N partnerships. The thesis thereby focuses on NPOs that create social value for external parties (rather than for their own members) through operational (rather than advocacy) activities, as both characteristics are deemed necessary to enter innovation partnerships with businesses.

C) Type of Innovation and Partnership

Type of Partnership: The study focuses on intersectoral partnerships between social enterprises and NPOs. To qualify as a partnership, the level of interaction between parties must exceed isolated services along the value chain and include the mutual investment of resources and the adaptation of internal processes to achieve the parties' common goal (see Section 3.3.2).

Successful Instances: The study considers only partnerships delivering sufficient economic and social value. The first is estimated by considering the ongoing operations of the venture, the latter by the NPO's continued membership in the partnership (London et al., 2010, p. 590).

Goal of Partnership: This study considers partnerships aimed at providing market access to develop and implement frugal innovations (see Section 3.2.2). As these innovations explicitly satisfy social, ecological, and economic needs, they must be designed to eventually become viable businesses. This approach contrasts with the bulk of literature concerned with B2N partnerships focusing on philanthropic and non-profit corporate social responsibility projects.

Target Market: Given the importance of resource constraints, the thesis focuses on frugal innovations being launched in emerging markets or developing economies (see Section 3.1.3). The thesis refrains from a narrower geographical focus due to the similarities between EMDEs regarding the level of social and economic development and due to the diversity of EMDEs in which certain frugal innovations are distributed in simultaneously.

Phases of Partnership: Analyzing B2N partnerships through a dynamic lens, the thesis defines the innovation development process as comprising the following phases: conceptualization, implementation, and growth (later adapted to discovery, development, and implementation). These elements constitute the core steps and are similarly echoed in the frugal innovation and B2N literature. They exclude the preceding stage of partner selection and the subsequent phase-out into loose collaboration after the product is successfully launched (see Section 2.2).

Location of Innovation Development Process: The study looks at alliances in which most of the innovation development or implementation occurs in the target market rather than occurring in selective interactions on site, the latter of which support mostly home-based product development paths. In local processes, the gaps that businesses must overcome gain importance, such that NPO partnerships are deemed more relevant to such processes than they are to home-based ones.

1.4 Contribution of the Thesis

While the topic of emerging market segments is a common theme in the literature on frugal innovation and has received considerable interest from the B2N partnership literature, no substantial literature exists on the role of B2N partnerships in the specific realm of frugal innovation. By focusing on the role of NPOs in providing market access to social enterprises launching frugal innovations in EMDEs, the present study helps to close this gap (outlined in more detail in Section 1.2).

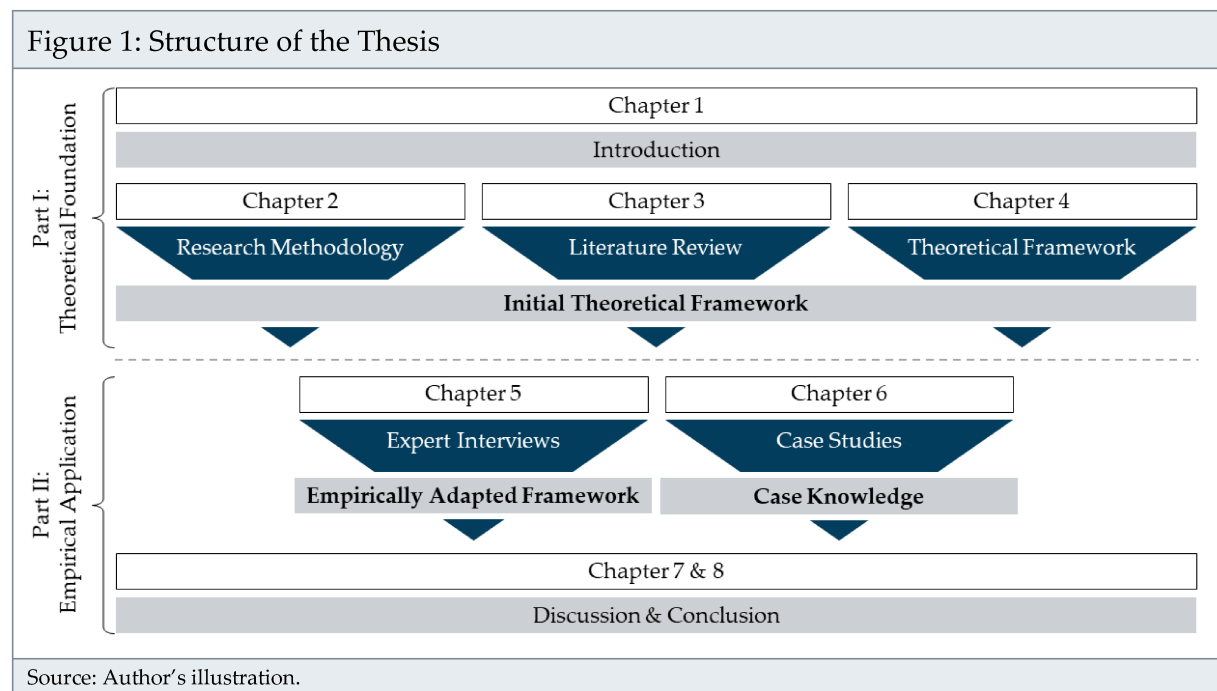
By bridging these streams of literature, the thesis contributes both to theory and to practice. Theoretically, the study enlarges the bodies of literature on frugal innovation and B2N partnerships. On the one hand, the frugal-innovation literature is complemented by the thesis's discussion of the role and contributions of NPOs in the development and diffusion of such innovations. The literature on B2N partnerships, on the other hand, is further developed by examining the specific requirements and characteristics that frugal innovation objectives imply for such intersectoral alliances. Additionally, by taking an empirical, yet theoretically grounded research approach, the thesis builds on the hitherto anecdotal references in the literature. By applying the general rationale of the relational view (see Section 4.1) to inter-organizational B2N partnerships, the thesis extends the theory beyond its traditional inter-business context and thus provides the opportunity to extend the theory.

At the same time, practitioners from both sides benefit from a deeper understanding of how NPOs can enhance market access to EMDEs to propel the frugal innovations of Western social enterprises. On the one hand, NPOs acquire knowledge about the levers they can use to accelerate frugal innovations, helping them to decide how to employ their limited resources most effectively. As these innovations usually align with their social mandate, successful launches of frugal innovations align with the needs of their beneficiaries. On the other hand, social enterprises benefit from a deeper understanding of how to best leverage NPO partnerships to successfully develop, launch, and implement frugal innovations in EMDEs. This understanding not only enhances their chances of successful market entrances and sustained revenue generation, but also helps them to achieve their impact-driven mission. Furthermore, this thesis's framework, summarizing how NPOs can contribute to frugal innovations, serves both alliance partners as a frame of reference to define and articulate their expectations about the partnership, facilitating the partner selection process.

1.5 Structure of the Thesis

As an *Introduction* to the dissertation, Chapter 1 presents its motivation, its guiding research question, and its contribution. The thesis then divides into a theoretical foundation and an empirical application. Chapter 2, the *Research Methodology*, details the applied research strategy, design, and method. Chapter 3 provides an extensive *Literature Review* on emerging market segments, frugal innovation, and B2N partnerships. Concluding the theoretical part, Chapter 4 presents this work's *Theoretical Framework*, drawing on mechanisms of the relational view. Combined, these chapters culminate in the *Initial Theoretical Framework*, outlined in Section 4.2, guiding the empirical portion of this work.

To complement this framework with an empirical perspective, the initial theoretical framework is adapted based on empirical insights derived from the *Expert Interviews* in Chapter 5. The resulting *Empirically Adapted Framework*, outlined in Section 5.3, guides the subsequent *Case Studies* presented in Chapter 6, which populate the framework with substantive case knowledge. Finally, the thesis's findings are analyzed in the *Discussion* in Chapter 7, before the *Conclusion* in Chapter 8 provides managerial and theoretical implications while highlighting the thesis's limitations and providing suggestions for future research.



2 Research Methodology

After outlining the research question addressed in this dissertation, this chapter provides a clear methodological structure. Building the foundation for the research design applied in this thesis, the chapter starts with a declaration of the underlying *Philosophical Considerations and Research Strategy* (2.1). Subsequently, the chapter turns to the *Research Design* (2.2) that results from these considerations and outlines the plan for addressing the research challenge. The *Research Method* (2.3) describes how this plan was implemented.

2.1 Philosophical Considerations and Research Strategy

As all research is grounded in specific philosophical foundations and paradigms (Creswell & Plano Clark, 2018, p. 35), it is important to reveal the underlying assumptions of the research methodology. This section highlights the ontological and epistemological assumptions in which this research is rooted, then sheds light on the thesis's connections between theory and research, as well as the chosen research strategy. Many authors have highlighted the interdependence of these concepts and, therefore, the need for their alignment (Eriksson & Kovalainen, 2015, pp. 13-14). By explicitly addressing each relevant concept, this study ensures their congruence and compatibility in addressing the research question.

Ontology

Ontology can be summarized as “the study of being” (Crotty, 1998, p. 10), defined as a “concept concerned with the existence of, and relationship between different aspects of society” (Barron, 2006). As such, ontological considerations question “whether social entities can and should be considered objective entities that have a reality external to social actors, or whether they can and should be considered social constructions built up from the perceptions and actions of social actors” (Bryman, 2012, p. 32).

This dissertation follows a *constructivist* position, understanding observed reality as the output of social and cognitive processes, assuming that “social actors produce social reality through social interaction” (Eriksson & Kovalainen, 2015, p. 15). The partnerships analyzed in the thesis are understood to be constructed by the performed and perceived actions and interactions of the alliance partners, resulting in individual versions of social reality. The subsequent research

is thus designed with a focus on *understanding* the broad variety of these constructed realities, rather than measuring their occurrence. This position is demonstrated in the broad variety of perspectives considered in the interviewee selection (see Section 5.1).

Epistemology

Epistemology questions “what is (or should be) regarded as acceptable knowledge in a discipline” (Bryman, 2012, p. 27) as it considers the “sources and limits of knowledge” (Eriksson & Kovalainen, 2015, p. 15). A central epistemological concern is, thus, “whether the social world can and should be studied according to the same principles, procedures, and ethos as the natural sciences” (Bryman, 2012, p. 27).

This dissertation takes an *interpretivist* position, focusing on the multiple subjective states of individuals that is, the individual perspectives. This position implies that the derived insights are—and ought to be—time, context, and even value bound (Johnson & Onwuegbuzie, 2004, p. 14). This interpretivist stance accords with the constructivist ontological worldview mentioned above and weaves through the subsequent research strategy.

Theoretical Foundation

A theory is defined as a “general explanation of what the researcher expects to find in a study” (Creswell & Plano Clark, 2018, p. 43). Given the novelty of the topic, and hence the limited amount of research conducted in this field, this dissertation follows an *inductive* research approach. It focuses on theory-building, or rather theory-extending: the research builds on an existing theory—the mechanisms of the relational view—but iteratively interweaves and expands it with empirical data throughout the research process. Accordingly, even the inductive approach involves a “modicum of deduction” (Bryman, 2012, p. 26), as the research often draws from a preliminary framework derived from the literature. In the same vein, the present research opens with an initial theoretical framework (see Section 4.2) derived from preliminary insights from the literature and theory.

Research Strategy

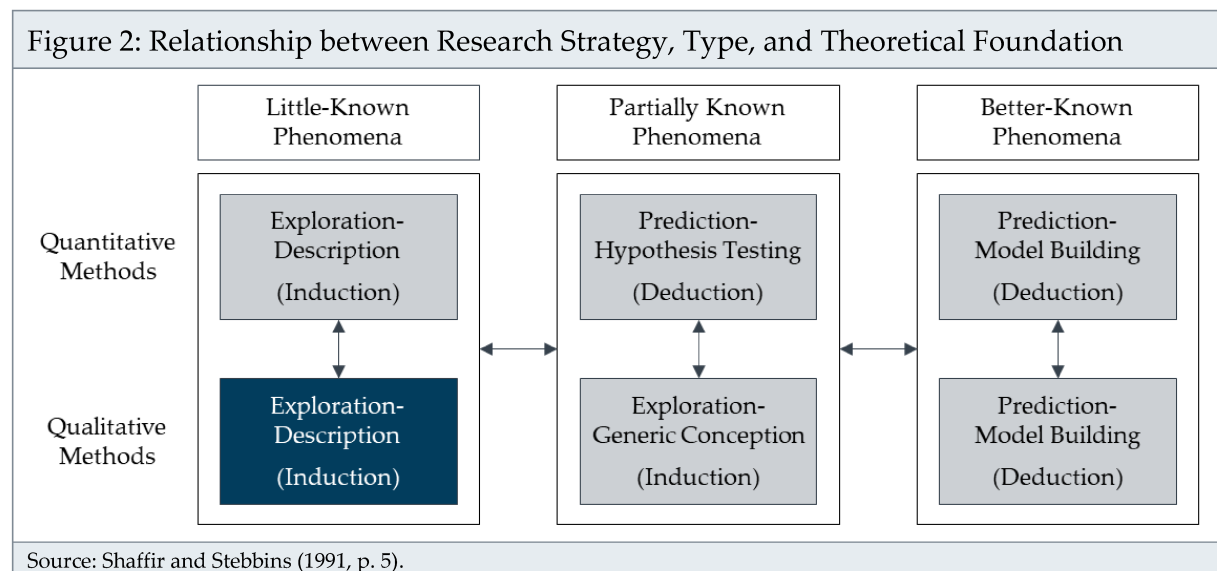
The research strategy is linked closely to the distinction between deductive and inductive application of theory, divided into quantitative and qualitative approaches. Bryman (2012, p. 36)

distinguishes qualitative from quantitative research as a strategy that “usually emphasizes words rather than quantification in the collection and analysis of data.” Given the considerations outlined above, the present dissertation applies a *qualitative* research strategy. This is thought to better fit the thesis’s purpose of developing a deep understanding of the hitherto under-researched question of how NPOs can accelerate frugal innovations.

Research Purpose

The research purpose is “concerned with the types of knowledge a researcher wants to produce” (Blaikie, 2009, p. 69). Most prominent in the literature are three research goals: exploring, describing, and explaining. Each is advantageous at a specific maturity level of a certain research area. Given the under-researched status of the present research topic (as outlined in Section 1.2), this dissertation follows an *exploratory* research purpose, striving to generate and build on the existing theory.

Although many authors stress that these different research perspectives do not automatically define each other, the chosen research strategy parallels the common combination of qualitative research strategy, inductive use of theory, and exploratory research purpose for novel research phenomena (see Figure 2).



2.2 Research Design

With the thesis situated within the broader realm of research, this section positions it in terms of empirical and theoretical research. While the former draws from problems rooted in practice, the latter grounds them in theory (Ulrich, 1985). As the present research problem is deeply rooted in an empirical context, and as this work's goal is to generate empirical insights, this thesis represents *empirical* research. As noted by Yin (2014, p. 28), "[e]very type of empirical research study has an implicit, if not explicit, research design," defined as the "logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions."

Case Study Research Design

A research design can be categorized as being experimental, cross-sectional, or longitudinal, or as applying a case study method or comparative design (Bryman, 2012, p. 50), with the possibility of combining features of more than one design (p. 69). The present study employs a *multiple-case study design*, defined by Bryman (p. 75) as a combination of the case study and the comparative design, while Yin (2014, p. 9) states that "single- and multiple-case studies are in reality but two variants of case study designs."

Yin (2014) proceeds to provide a twofold definition of a case study, covering its scope and its features. The first part defines a case study as "an empirical inquiry that investigates a contemporary phenomenon (the 'case') in depth and within its real-world context" (p. 16), especially when the phenomenon cannot be clearly differentiated from its context. The features of a case study are defined as having the following methodological characteristics (p. 17): coping with situations with more variables than data points, triangulating data from multiple sources of evidence, and benefiting from the prior development of theoretical propositions.

The case study design was chosen due to its suitability for the present research goal. On the one hand, following an interpretivist view, case studies can capture different parties' perspectives and the differences in their meaning (see range of considered perspectives in Table 1 in Section 2.3). On the other hand, Yin points out, case studies are considered particularly suitable for exploratory research (p. 7).

Unit of Analysis and Case Selection

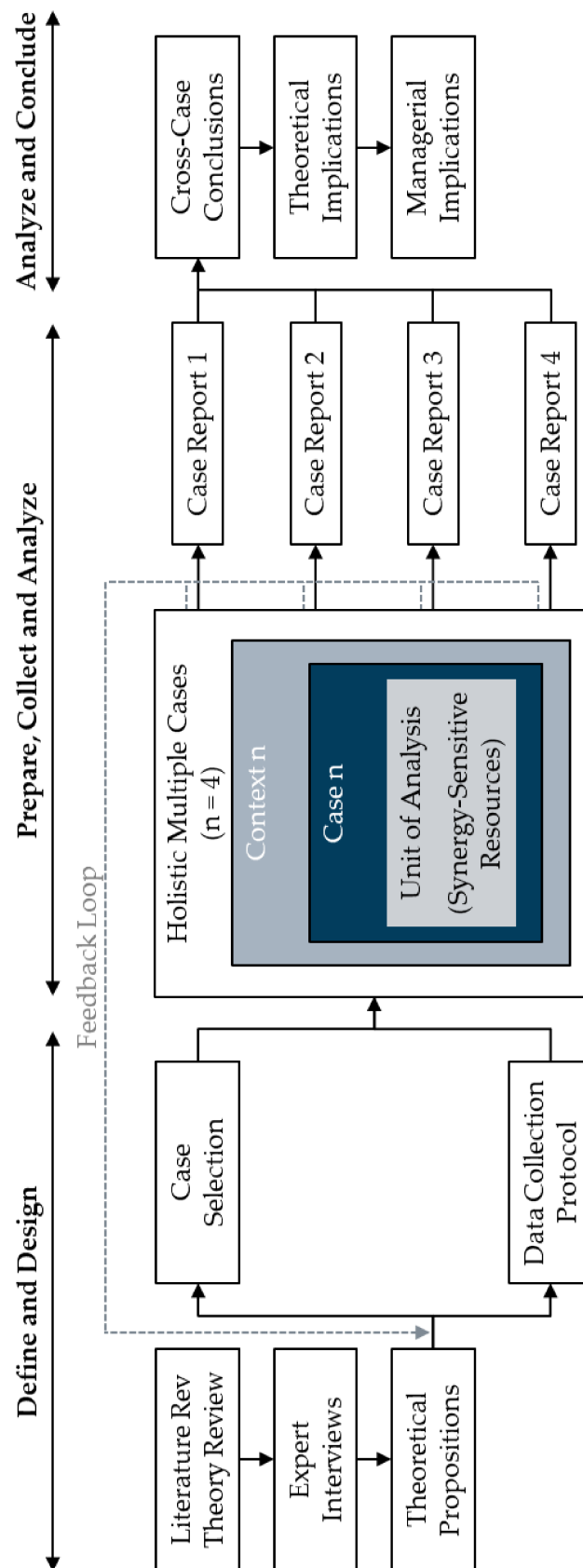
An important component of a case study research design is the study's unit of analysis, that is, the "'case' to be studied" (Yin, p. 31). Yin distinguishes holistic (single-unit) from embedded (multiple-unit) designs, where the latter also considers subunits of analysis (p. 53). The present thesis applies a *holistic design*, focusing on the unit of analysis of *synergy-sensitive resources* as a lever for NPOs to facilitate frugal innovations in B2N partnerships. According to seminal work on the nature of resources (e.g. Barney, 1991), "resources" are understood, broadly, as comprising both an organization's tangible and intangible assets (Wernerfelt, 1984, p. 172) and its capabilities to utilize those assets (Olavarrieta & Ellinger, 1997, p. 563). The interrelation of resources, assets, and capabilities is also reflected in the applied framework of the relational view (see Section 4.1). "Synergy sensitivity" refers to the synergistic potential of resources when used in conjunction with the complementary assets and capabilities of the alliance partner, enabling greater generation of collective value (Dyer & Singh, 1998, pp. 666-667). This definition thus excludes NPO resources irrelevant to the partnership either because they are unrelated or because they are sufficiently present in both parties.

Once the unit is established, Yin recommends, "bounding the case" (2014, p. 33): differentiating data about the phenomenon from contextual data to adjust the scope of the data collection. In this study, the unit is bounded in two ways. First, resources relating solely to the business side of the partnership are deemed out of scope. Second, alliances are investigated during the time of their active partnership, excluding the stage of searching for and contracting an alliance partner and the stage of loose follow-up interaction after a successful implementation of an innovation (see Section 3.3.2 on the definition of active partnerships).

Yin views multiple-case studies as a variant of the general case study methodology and believes they are "often considered more compelling" (2014, p. 57). Similarly, Eisenhardt and Graebner (2007, p. 27) state that "theory building from multiple cases typically yields more robust, generalizable, and testable theory than single-case research." To select suitable cases, Eisenhardt and Graebner suggest *theoretical sampling*, in which "cases are selected because they are particularly suitable for illuminating and extending relationships and logic among constructs" (2007, p. 27). In line with this suggestion, the cases for this research are chosen based on a set of selection criteria (see Section 5.1).

This multiple-case study research design is summarized and depicted in Figure 3.

Figure 3: Multiple-Case Study Procedure



Source: Author's illustration, based on Yin (2014, p. 50 & 60).

2.3 Research Method

To put the research design into practice, a research method is required as a “technique for collecting data” (Bryman, 2012, p. 45). This section explains the specific methods and instruments applied in the collection and analysis of data for each part of the research process.

To explore how NPOs can accelerate frugal innovation from Western social enterprises for EMDEs, the thesis applies a qualitative, multimethod research design consisting of expert interviews and multiple in-depth case studies. This research design was chosen to combine a holistic view, gathered from a broad range of expert interviews, with in-depth case knowledge, gained from the case studies. This methodology allowed the author to explore the under-researched area of B2N partnerships for frugal innovation in greater detail, while avoiding being confined to a small sample size, as is common in pure case-study research. Given the absence of preexisting theoretical frameworks, the initial research provided an indispensable understanding of relevant causal conditions needed to conduct the subsequent case analysis. The individual research phases are outlined below.

Foundation: Theoretical Framework

To build on existing knowledge, the applied research design starts with an extensive literature review (see Chapter 3). The literature rarely directly addresses the role of NPOs in accelerating frugal innovation in EMDEs. To achieve the best understanding of this context, the author combined three different strands of the literature: emerging market segments, frugal innovation, and the role of B2N partnerships in emerging and BOP markets. This tripartite literature review allows for a theoretical understanding of the focal subject. Combining the resulting insights with the theoretical perspective of the relational view (see Section 4.1), the thesis presents an initial theoretical framework (see Section 4.2) that focuses on the role of the synergy-sensitive resources of NPOs, a central pillar derived from the relational view. This framework marks the conclusion of the theoretical part of the thesis and serves as a guiding reference for the subsequent, empirical part.

Part 1: Expert Interviews

To build on the initial framework derived from adjacent theory, the empirical research incorporated a diverse series of expert interviews, consisting of scholars and practitioners. These interviews enriched the initial framework with more directly related insights into the role of NPOs in supporting social enterprises developing frugal innovations for EMDEs, further refining it into an empirically adapted framework. This format permits the combination of the hitherto-separated fields of frugal innovation and B2N partnerships.

Data Collection: The interviews consisted of 33 semi-structured interviews, with 35 experts from theory and practice. These interviews were undertaken using a questionnaire rooted in the initial theoretical framework to connect the theoretical foundation with the data collection. The interviewees were experts in the spheres of frugal innovation or B2N partnerships, or, preferably, both. The circle of interviewees was drawn from national and international NPOs, businesses of various sizes, and external experts from research and academia (see selection in Section 5.1), allowing for an integration of different perspectives. To capture a broad yet relevant range of insights, interviewees were selected based on criterion sampling (see criteria in Section 5.1). The questionnaire included closed questions (to test the framework) but focused on open questions (to build on the framework). To conclude the process, the interviews were transcribed, and their results were sent to the interviewees for verification.

Data Analysis: The interview transcripts were analyzed using qualitative content analysis (QCA), defined by Mayring (2000, p. 2) “as an approach of empirical, methodological controlled analysis of texts within their context of communication, following content analytical rules and step by step models.” Within this approach, the theoretical framework guides the data collection and highlights which aspects of the interviews to consider. The interview material was then coded into preliminary analytic categories and continually revised and adapted using feedback loops of newly generated insights (Mayring, 2000, p. 4). These categories focused on the synergy-sensitive resources employed by NPOs, further detailed into sub-categories for a more nuanced understanding. Based on these empirical insights, the initial theoretical framework was refined into the empirically adapted framework, which guided the subsequent case study analysis.

Part 2: Multiple-Case Study

The second phase of empirical research consisted of multiple in-depth case studies, guided by the empirically adapted framework. The focus of this phase was on successful instances of frugal innovations developed or implemented through B2N partnerships in EMDEs in the assistive technology market. A detailed study of these examples yielded knowledge of contribution patterns to illustrate how NPOs can support Western social enterprises developing frugal innovations.

Data Collection: The case study research analyzed four cases of B2N partnerships consisting of eleven case interviews. While these interviews already informed the expert interview phase, the multiple-case study phase analyzed them on a case-by-case basis to derive illustrative examples of how the framework can be configured. The interviewees included representatives from the NPO and the social enterprise, positioned on site as well as at the NPO's or social enterprise's headquarters. The interview insights were triangulated with internal and public documentation on the respective alliances and resulting frugal innovations.

To increase the homogeneity of external factors and, thus, comparability across cases, all case studies were selected from the AT market (for market overview and case selection, see Section 6.1). This market was selected based on *theoretical sampling* from insights derived from the expert interviews, once data analysis of the first empirical research had provided a deeper understanding of different cases' potential for theory development. Multiple experts flagged the AT market as suitable due to its insufficient supply in EMDEs, the relatively high reliance on technical products, and, consequently, the high potential for frugal innovation. In addition, being part of the healthcare sector, the market is characterized both by a strong impact on the recipients' quality of life and a high degree of involvement from NPOs, making it a suitable context for this research.

Both the cases within this market and the specific interviewees were selected based on *criterion sampling*, according to the selection criteria laid out in Section 5.1. This sampling strategy was complemented by *snowball sampling*, in which a small group of initial interviewees was used to recruit more respondents from within the focal organizations. The questionnaire commenced with generic questions, covering information about the alliance and its respective partners. The case studies then focused on the role of synergy-sensitive resources applied by the NPO, their specific implementation, and possible interdependencies.

Table 1: Categorization and Range of Interview Perspectives			
	A) NPO Perspective	B) Business Perspective	C) External Perspective
1) Experts: Frugal Innovation Focus	NPO experienced in frugal innovation development	Business experienced in frugal innovation development	External expert on frugal innovation
2) Experts: B2N Partnership Focus	NPO experienced in B2N alliances	Business experienced in B2N alliances	External expert on B2N alliances
3) Case Representatives: Combined Focus	NPO experienced in frugal innovation development with a business partner	Business experienced in frugal innovation development with an NPO partner	
Source: Author's illustration.			

Data Analysis: The case studies were individually analyzed in depth, again using QCA, which highlighted the facilitation activities that the NPO employed in each case. Subsequently, specific configurations were compared across cases to reveal overarching patterns or discrepancies. Doing so made it possible to draw conclusions about the employment of individual resources and the role that the NPOs played in each of the analyzed cases. Insights from the single- and cross-case analyses were then used to provide answers to the research question and to derive theoretical and managerial implications, conceptualizing the role of NPOs in supporting frugal innovations from Western social enterprises.

The fact that the case-study interviews informed both the framework building of the expert interviews and the framework application of the multiple-case study warrants some explanation and reflection upon the research approach. This twofold usage of interviews of the case representatives stemmed from an organic selection process of the case studies informed by insights from the expert-interviews, resulting in a partial overlap of these two phases.

To limit possible confirmation bias, the case-study interviews were conducted according to the same questionnaire used in the other expert interviews. Interviewees were blinded to the framework for the framework-building part of the interview, before being presented the framework in the framework-testing and -application part. This format, identical to that of the expert interviews, thus allowed for both unbiased and framework-specific insights. Nonetheless, there remains some risk of subjectivity regarding the formulation and subject area of the questions posed in these interviews, which is hereby declared, and the reader made aware of.

Table 2: Methods of the Applied Research Design			
Research Part	Foundation: Theoretical Framework	Part 1: Expert Interviews	Part 2: Multiple-Case Study
Goal	Develop a theoretical understanding based on literature and theory	Include an empirical perspective and bridge the relevant fields	Gain in-depth case knowledge
Method	Literature review	Semi-structured interviews (35 experts)	Case studies (11 representatives from 4 cases)
Sampling	Related streams of literature	Experts in frugal innovation and/or B2N partnerships	Illustrative examples of frugal innovations developed in B2N alliances
Sampling Strategy	Not applicable	Criterion sampling	Theoretical sampling (market) Criterion and snowball sampling (cases and interviewees)
Data Collection	Structured literature review and selection of theoretical perspective	One semi-structured interview per expert, with open and closed questions	One semi-structured interview per case representative Secondary research
Data Analysis	Coding of literature using QCA: Preliminary definition of categories	Coding of answers using QCA: Revision and complementation of categories	Categorization using empirically adapted framework for single- and cross-case analysis
Results	Initial theoretical framework Questionnaire for empirical part	Empirically adapted framework Guidance for case study research	Substantive case knowledge to illustrate the empirically adapted framework
Source: Author's illustration.			

3 Literature Review

This dissertation is built on an extensive literature review, as its topic touches upon different streams of literature. The review starts with an overview of *Emerging Market Segments* (3.1), split into the emerging global middle class and the so-called base of the pyramid. *Frugal Innovation* (3.2) is introduced as the second stream of literature, and this section introduces barriers to frugal innovation and the benefits of partnerships in overcoming them. To elaborate on such partnerships, the chapter concludes with a review of the third strand of literature, *Partnerships between Businesses and Non-Profit Organizations* (3.3). Each part concludes with a summary that positions this thesis within that stream of literature. While encompassing various topics, the review highlights certain key papers to elucidate the state of the research in different streams.

3.1 Emerging Market Segments

To understand the context of and need for frugal innovation, the literature review first considers its customer segments. The market delimitation for frugal innovation is multi-layered, since any low- or middle-income country has some wealthy people and as virtually all advanced countries have groups of resource-constrained consumers. Different markets exist within one country, while similar market segments can be found across national borders. This thesis thus follows an approach based on similarities in customer characteristics, dividing the market for frugal innovation into two segments: first, the *Emerging Global Middle Class* (3.1.1)—a global consumer group with a (often recently increased) middle income, especially prominent in emerging markets; and second, the *Base of the Pyramid*² (3.1.2)—the socio-demographic group of people living below the relative poverty line. A third customer segment prominent in the frugal-innovation literature is the value-seeking customer in advanced markets; however, given this research's focus on EMDEs, this segment is deemed out of scope. This section ends with a brief *Literature Summary* (3.1.3).

² This thesis uses “base” and “bottom” interchangeably, employing “base” to avoid negatively connotated terminology but using “bottom” for direct citations.

3.1.1 The Emerging Global Middle Class

Many authors emphasize the importance of the emerging global middle class as a viable customer segment for frugal innovation, given their need for affordable quality solutions.

There exists no clear definition of the global middle class. At the country level, the World Bank (n.d.-c) sets the gross national income (GNI) per capita for lower middle-income (LMI) markets at US\$1,036–US\$4,045 and at US\$4,046–US\$12,535 for upper middle-income (UMI) markets. The latter range is closely connected to the concept of emerging markets, a term coined by van Agtmael in 1981 as a stigma-free alternative to the Third World terminology (IFC, n.d.). Emerging markets are often characterized by above-average economic growth, as their gross domestic product (GDP) growth rate outpaces those of advanced economies (International Monetary Fund, 2019). In parallel, these markets are often shaped by volatility, as they have a “transitional character, with transitions occurring in economic, political, social and demographic dimensions” (Mody, 2004, p. 4).

The International Monetary Fund (IMF) (2019) considers 18 countries from four different continents as emerging markets and developing economies (EMDE). FTSE Russell (where FTSE indicates the Financial Times Stock Exchange) distinguishes between ten “advanced emerging” and 14 “secondary emerging” countries (FTSE Russell, 2018). Morgan Stanley Capital International (MSCI, 2019) classifies 26 countries as emerging markets, while the United Nations Conference on Trade and Development (UNCTAD) is even more inclusive, including 38 countries in its list of emerging markets³ (UNCTADstat, n.d.). While there is a large overlap between these different categorizations (see overview in Appendix 2), the methodology of the different institutions differs slightly, so the categorizations are not congruent.

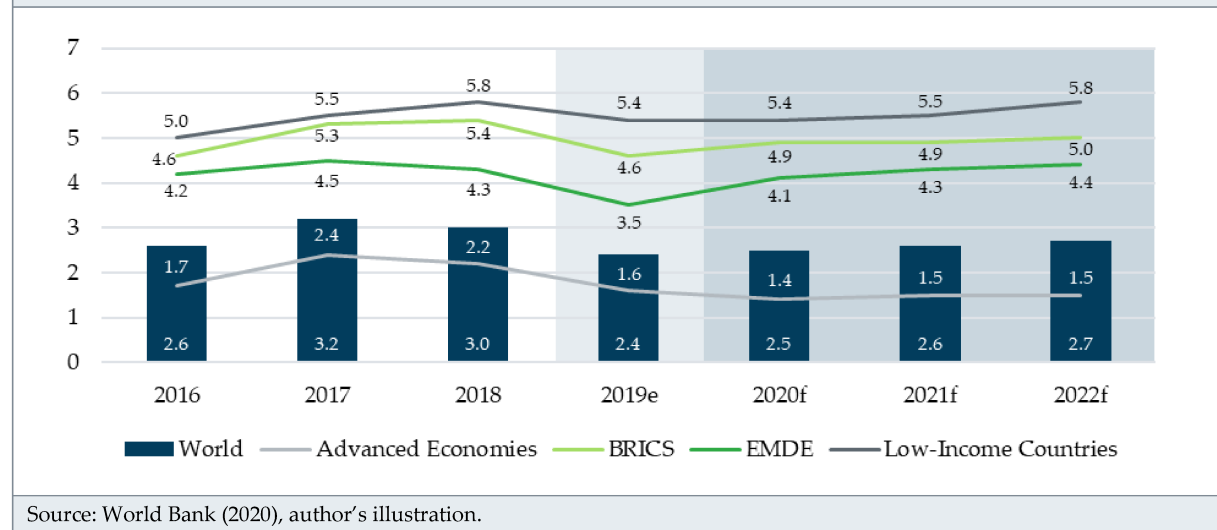
Often used in conjunction with emerging countries is the term BRICS (before 2010, “BRIC”), an abbreviation for Brazil, Russia, India, China, and South Africa as the five major emerging markets. The term was coined in 2001 by Goldman Sachs’s then-chairman, Jim O’Neill (p. 1), raising awareness of these countries’ increasing economic and political might.

³ The list was updated to reflect only current national states.

Outlook for Emerging Markets

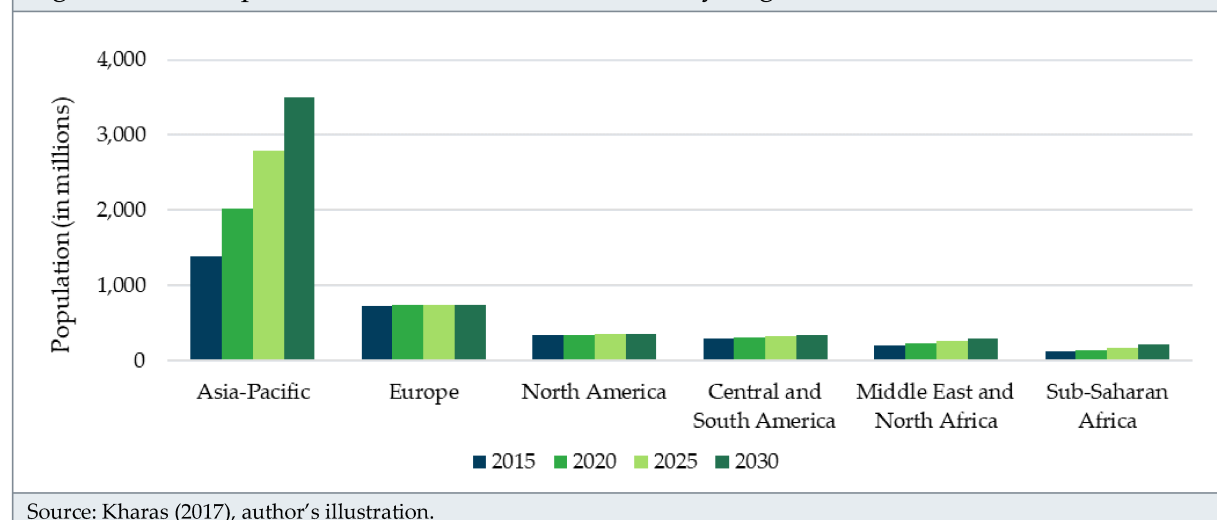
The World Bank's *Global Economic Prospects* (2020) projects that in the coming years the economic growth of the EMDEs will be considerably above the world's average (see Figure 4). This tendency is all the more evident considering the growth rates of the BRICS countries alone, which are above the EMDE's average.

Figure 4: Real GDP Growth (in %)



Longer-term perspectives project the regional development of the global middle class until 2030. According to Kharas' calculations, the global middle-class will increase from 3 billion in 2015, to 3.7 billion in 2020, and to 5.4 billion people by 2030, of which an "overwhelming majority of new entrants into the middle class [...] will live in Asia" (2017, p. 2).

Figure 5: Development of the Global Middle Class by Region



Size and Characteristics of the Global Middle Class

Zeschky et al. (2014a, p. 20) observe that the economic rise of these markets, lifting millions of people out of severe poverty at the BOP, has created a new mid-market segment. Different definitions exist as to what constitutes this segment. A study by the World Resources Institute (WRI) and the International Finance Corporation (IFC) from 2007 defines the “wealthier mid-market population segment” as the “1.4 billion people with per capita incomes between \$3,000 and \$20,000,” amounting to a “\$12.5 trillion market globally” (Hammond, Kramer, Katz, Tran, & Walker, 2007, p. 3). In a working paper by the Organisation for Economic Co-operation and Development (OECD), Kharas defines the global middle class as “those households with daily expenditures between USD10 and USD100 per person in purchasing power parity [PPP] terms” (2010, p. 12). He quantifies it as a \$35-trillion market in 2015 (in 2011 PPP terms), “accounting for one-third of the global economy” (Kharas, 2017, p. 2). Kharas’s initial definition was later updated to daily expenditures between US\$11 and US\$110 per capita (in 2011 PPP) (Kharas & Hamel, 2018). According to this evaluation, a global tipping point was reached in 2018 as “just over 50 percent of the world’s population, or some 3.8 billion people, live in households with enough discretionary expenditure to be considered ‘middle class’ or ‘rich’” (Kharas & Hamel, 2018). Looking ahead, Kharas and Hamel (2018) estimate that “the middle-class markets in China and India in 2030 will account for \$14.1 trillion and \$12.3 trillion.”

Compared to the BOP (see Section 3.1.2), these middle-class consumers have marginally more excess income. As they have entered the consuming class only recently, many of them are still very value conscious (Williamson & Zeng, 2009, p. 68). They are thus often characterized in the literature as “acutely price- and value-for-money-conscious consumers” (Williamson, 2010, p. 348) who “remain cost aware and favour the idea that products do not need to be state of the art, but merely sufficient to meet basic needs” (Simula et al., 2015, p. 1571). As these consumers are looking for “high value at affordable costs,” Zeschky, Winterhalter, and Gassmann (2014b, p. 3). However, the middle class has made tremendous progress, with technological advances changing “the way people live, work and spend their leisure time” (Simula et al., 2015, p. 1571). As opposed to the BOP, its majority is “largely urban, already relatively well served, and extremely competitive” (Hammond et al., 2007, p. 3).

3.1.2 The Base of the Pyramid

The term “bottom of the pyramid” was first used by the U.S. President, Franklin D. Roosevelt, in 1932 in his radio address *The Forgotten Man*, calling for “plans that rest upon the forgotten, the unorganized but the indispensable units of economic power [...] that put their faith once more in the forgotten man at the bottom of the economic pyramid” (Roosevelt, 1938). Since then, researchers have also taken up the concept, spearheaded by C.K. Prahalad’s book *The Fortune at the Bottom of the Pyramid – Eradicating Poverty through Profits* (2005).

Despite the increased interest in the BOP, incongruent definitions exist, which must be considered at their real [not nominal] value at the time they were introduced. Throughout his work, Prahalad defines the BOP as the 4 billion people who live on less than \$2 per day (Prahalad, 2005, p. 4; 2012, p. 6). Simultaneously and inconsistently, as pointed out by Subhan and Khattak (2017, p. 2), Prahalad defines the BOP as the 4 billion people with an annual per capita income of, or of less than, \$1,500 (Prahalad, 2005, p. 4; Prahalad & Hart, 2002, p. 2). In turn, in his work published with Hammond the same year, Prahalad defines these same 4 billion people as earning less than \$2,000 per year (Prahalad & Hart, 2002). A more consistent definition is given in the report *The Next 4 Billion*, composed by the WRI in collaboration with the IFC, defining the BOP as the 4 billion people with incomes below \$3,000 in local purchasing power (Hammond et al., 2007, p. 3), which is in line with the definition by the World Economic Forum (WEF), specifying it as the share of the population earning US\$8 per day or less (2009, p. 5).

Prahalad’s suggested boundary of \$2 per day thus resembles stricter, more precarious poverty lines, with the World Bank’s most recent 2015 estimates defining extreme poverty as living on less than US\$1.90 a day (World Bank, n.d.-a). Thus, as noted by Subhan and Khattak (2017, p. 4), Prahalad’s BOP cap of \$2 per day has been criticized by various authors, as it is “almost impossible for a big company to engage in profitable business with people earning less than \$2 per day.” This is echoed in Prahalad’s examples themselves, which are virtually all targeted at consumers earning above his BOP border of \$2 per day. Some authors thus suggest that the BOP segment be defined more clearly, to not “create the erroneous impression that a very large, untapped market segment with significant purchasing power is ready to generate substantial profit for companies and reduce poverty” (George, 2010).

Sub-Divisions of the BOP

Hammond et al. (2007, p. 6) thus suggest differentiating between the very poor and the poor: while the former are perceived to be “unable to help themselves and thus need charity or public assistance,” the latter are suitable for a market-based approach that can “frame the debate on poverty reduction more in terms of enabling opportunity and less in terms of aid.” As opposed to traditional approaches, the market-based approach “focuses on people as consumers and producers and on solutions that can make markets more efficient, competitive, and inclusive—so that the BOP can benefit from them.” Other authors suggest three-level segmentations: George divides the BOP by its discretionary income, with the top having sufficient, the middle having some, and the bottom—“truly in the BoP”—having no capacity to purchase goods beyond bare essentials (2010). While George sets the tipping points at daily incomes of \$2 and \$8, respectively, the WEF suggests another three-part categorization, with the lowest BOP level between \$0 and \$1, the middle between \$1 and \$2, and the top between \$2 and \$5 (World Economic Forum, 2009, p. 5). While the top segment is the “easiest to engage with, since they have surplus incomes and already spend on discretionary items, [...] engaging the lower-income ranges of the BOP is also feasible and important” (p. 11).

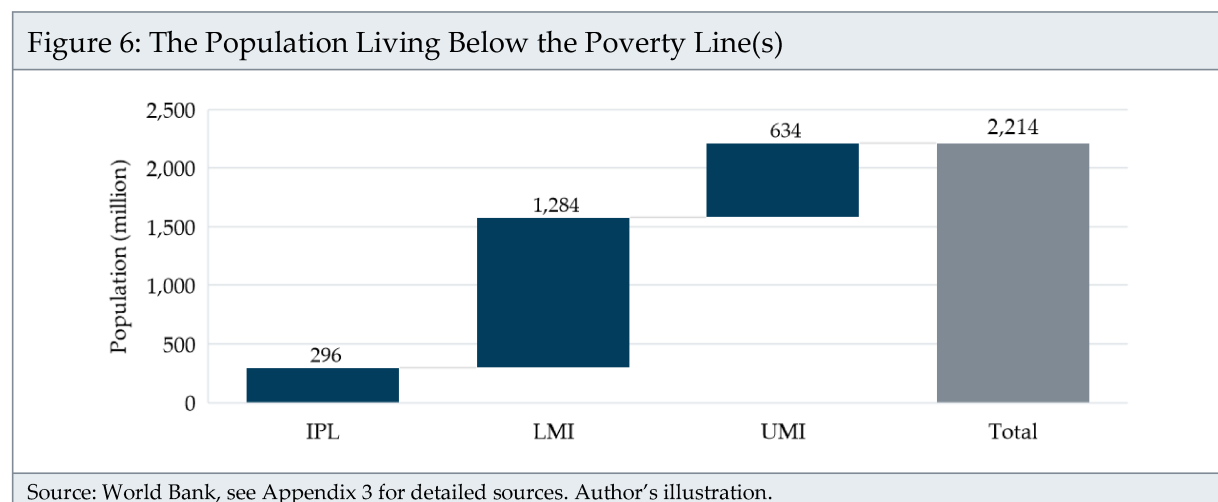
Developments at the BOP

These viewpoints and specific thresholds must be considered in the context of the time when they were written. On the one hand, since the first publications at the turn of the century, inflation has decreased the real value of the U.S. dollar, meaning that the nominal threshold levels expressed by different authors over these two decades are not directly comparable (Statista, 2020a). On the other hand, tremendous efforts have been made to reduce poverty throughout the world, leading to a shift in the population distribution across the different income levels. The first of the Millennium Development Goals, signed by all member states of the United Nations, was to “eradicate extreme poverty and hunger” (United Nations, 2015); its first sub-target, namely to “halve, between 1990 and 2015, the proportion of people living on less than \$1.25 a day,” has been over-achieved, and the poverty rate plummeted by 70% to a rate of 14% in 2015 (MDG Monitor, 2017). Similarly, the World Bank calculated that in 2015, “[n]early 1.1 billion fewer people are living in extreme poverty than in 1990” (n.d.-a).

With respect to these viewpoints and their data being the most recent at the time of writing, this dissertation follows the World Bank's (n.d.-a) definition. It sets an absolute threshold, the international poverty line (IPL) of US\$1.90, mostly applicable to low-income countries. In addition, it defines two relative poverty lines, one at US\$3.20, for LMI countries, and one at US\$5.50, for UMI countries (no data is collected for the third poverty line for high-income countries, set at US\$21.70). These thresholds yield the following results for people living in poverty (see Appendix 3):

Table 3: Poverty Distribution Over Income Levels (in Millions and Percentage)			
Income Groups (2015 standard)	Poverty Headcount Thresholds (per day)* Results in % of Population and Million People (2015)		
	<\$1.90/day	<\$3.20/day	<\$5.50/day
High-income countries: [GNI per capita: > \$12,475]	0.8%	0.9%	2.1%
	n.a.	n.a.	n.a.
Upper middle-income countries: [GNI per capita: \$4,036–\$12,475]	1.7%	7.5%	24.4%
	44.6	194.1	633.7
Lower middle-income countries: [GNI per capita: \$1,026–\$4,035]	14.2%	44.3%	74.8%
	411.4	1,284.2	2,166.9
Low-income countries (IPL): [GNI per capita: < \$1,025]	45.6%	72.9%	90.1%
	296.1	474.0	585.6
Source: World Bank. *) All thresholds correspond to the US\$ amount in local purchasing power, at the 2011 value.			

Based on this data, this thesis defines the BOP as the 2.2 billion people living below their respective poverty line. This definition is a stricter definition of the BOP market, bearing in mind that the resulting market segment is significantly less suited to RCI's market-based character than are the rest of low-income markets (see Section 3.1.3).



Characteristics of the BOP

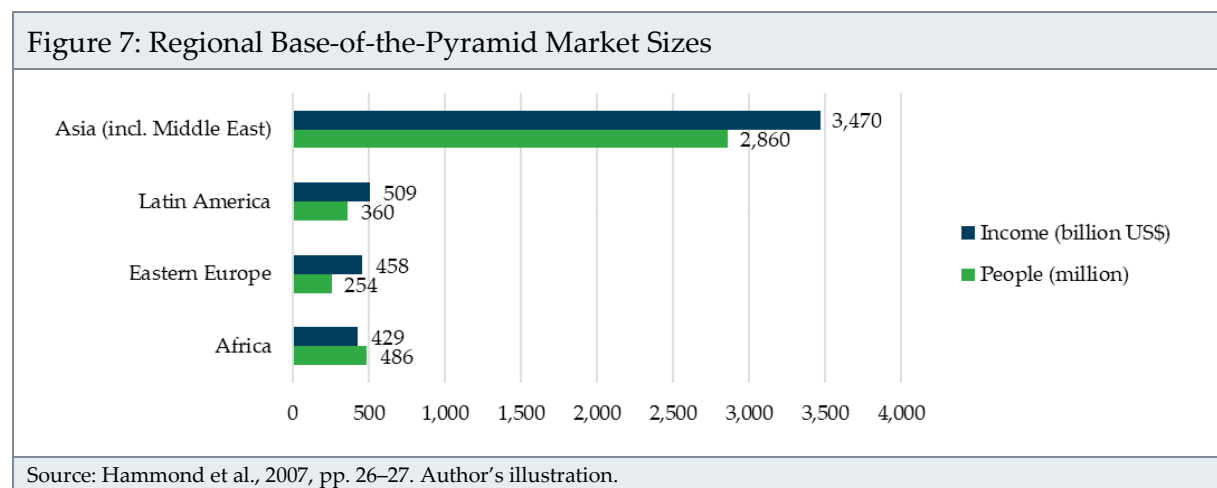
While income has crystallized as the most common BOP measurement, authors such as Subhan and Khattak (2017, p. 7) note that the “BOP cannot be measured solely by income,” as socio-cultural and political factors also “provide boundaries of any typical BOP.” Before considering these factors in detail, it is important to remember that the “people who make up the BOP are not a monolith” (Prahalad, 2012, p. 6), but differ in culture, ethnicity, religion, capability, and need (Praceus & Herstatt, 2017, p. 98).

As the WEF, states, people at the BOP “can be found all over the world” (2009, p. 11) with roughly 70% living in rural areas (Prahalad, 2012, p. 6). Despite geographical differences, people at the BOP share certain salient characteristics. The WEF (2009, pp. 11-13) characterizes those in the BOP as people who “manage low and fluctuating incomes,” “cope with domestic constraints and difficult living conditions,” “are smart shoppers and investors,” “are unfamiliar with many products, technologies and procedures,” “look for trusted advice,” and “demand respect.” Hammond et al. (2007, pp. 4-5) add, as distinctive features, “significant unmet needs” and “dependence on informal or subsistence livelihoods.” Subhan and Khattak (2017, p. 7) define the BOP as a market that has “access to basic knowledge and skills,” is “ready to buy innovative products and services to raise living standard[s],” “communicate[s] and transact[s] in both formal and informal market economy,” and is “ready to use innovative technology and possess adaptability.”

While being value buyers, people at the BOP are also “brand oriented” (Subhan & Khattak, 2017, p. 7), as their aspiration for a better quality of life makes “aspirational brands [...] critical for BOP consumers” (Prahalad, 2005, p. 14). Another widely discussed topic is the access to technology for those at the BOP. During the rise of BOP literature, most rural areas were still “media dark” (Prahalad, 2005, p. 13) and in “information poverty” (Prahalad & Hart, 2002). However, even then, authors such as Prahalad emphasized the high rate of acceptance of advanced technology for those at the BOP, “exploiting the benefits of information networks” (2005, p. 14) as much as possible. While much remains to be done, tremendous efforts have been made to connect those at the BOP, with a WEF report stating that 107 out of 138 countries evaluated have a population share of 95% or higher covered by a mobile network signal (Baller, Dutta, & Lanvin, 2016, p. 223).

Market Potential of the BOP

Although individual incomes are low, the aggregated BOP market is large. Reported sizes differ substantially between authors and over time. In 2005, Prahalad claimed that the BOP economy was “more than \$13 trillion PPP” (p. 21), highlighting that the “task of converting the poor into consumers is one of market development” (p. 16). This statement has been called out for “grossly over-estim[ing] the BOP market size” by Karnani (2007, p. 5), who estimated a “BOP market size of \$1.2 trillion, at PPP in 2002.” In 2007, the BOP was quantified as a “\$5 trillion global consumer market” (Hammond et al., 2007, p. 3) (see below), while the WEF estimated it to be “slightly more than US\$ 2.3 trillion” in 2008 (2009, p. 10).



To cater to those at the BOP, businesses need to overcome economic, political, logistical, and cultural hurdles. According to the WEF, “most companies view them as risky, costly and unprofitable to serve” so those at the BOP “remain beneath the radar of most conventional business models” (2009, p. 8). Subhan and Khattak (2017, p. 2) ask whether the BOP’s low earners “have the capability to become consumers and a profitable segment for the companies,” noting that many companies have failed when entering this market—and even more have abstained from trying. For example, the far-flung distribution of BOP markets does not lend itself to the economies of scale achieved in developed markets by employing large, centralized factories (World Economic Forum, 2009, p. 19). Nevertheless, the WEF states that for companies mastering these hurdles, the BOP offers a “meeting ground where corporate economic benefit and social impact can come together,” from satisfying their basic needs to triggering “economic multipliers, easing social tensions and reducing inequality” (2009, p. 8).

3.1.3 Literature Summary

This section illuminates the importance of, and variations between, emerging market segments for frugal innovation. While there is broad consensus in the literature concerning these two market segments—the emerging global middle class and the BOP—no universally accepted definition or threshold currently exists. Furthermore, fast-paced economic development leads to the rapid outdateding of thresholds set only a few years ago. With this in mind, and based on the most recently available data from highly respected organizations, this thesis defines these market segments as follows (due to the relative definition of the BOP, these thresholds are not perfectly complementary):

- **The Emerging Global Middle Class:** Using an inflation-adjusted version of the IFC and WRI reports (see the calculations in Appendix 4), this thesis defines the global middle class as the segment with daily incomes of US\$12–US\$80.
- **The Base of the Pyramid:** Following the World Bank’s definition of poverty, the BOP is defined as the 2.2 billion people living on a daily income below the absolute international poverty line of US\$1.90, or below the relative poverty lines of US\$3.20 for LMI countries and US\$5.50 for UMI countries.

While both market segments (together with value-seeking customers in advanced markets) are mentioned in the frugal-innovation literature, this dissertation narrows its focus to the emerging global middle class and the gap between its lower end and the upper end of the BOP (the residual group earning between US\$5.50 and US\$12), henceforth subsumed under the term *Emerging Markets and Developing Economies (EMDEs)*. This narrowed scope accords with the thesis’s thematic focus on frugal innovation, which is to say, those RCIs that can be scaled and commercialized (see Section 3.2.2) and thus require consumers to have a basic level of disposable income. This focus is supported by Kroll et al. (2017, p. 111), who see the highest potential for international frugal innovators not in BOP segments, but in “those emerging (or declining) middle classes whose threshold of affordability is slightly higher.” As those at the BOP and value-seeking consumers in advanced markets are more closely linked to other types of RCI (jugaad and reverse innovation, respectively, see Section 3.2.1), they are of subordinate importance. With the exception of the literature on B2N partnerships focusing specifically on the (more widely defined) BOP market, these two segments are thus not considered further.

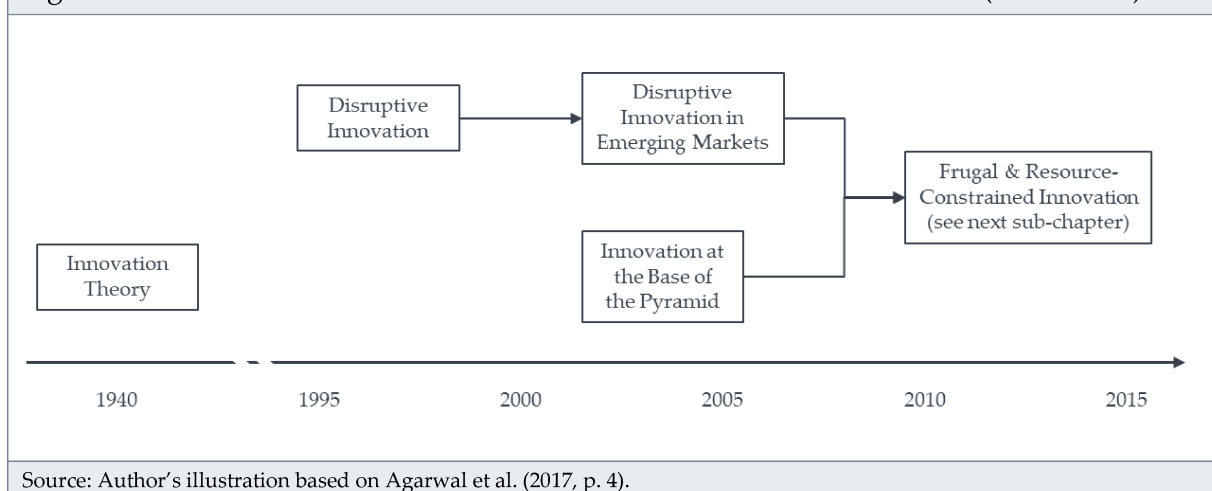
3.2 Frugal Innovation

This section examines frugal innovation in more detail. To set the scene, the review considers the *Antecedent Innovation Literature* (3.2.1), illuminating the important steppingstones of frugal innovation as an academic field. Next, the *Definition of Frugal Innovation* (3.2.2) is examined, and the *Importance of Frugal Innovation* (3.2.3) for social, environmental, and economic goals is elaborated. Then, the *Barriers to Frugal Innovation* (3.2.4) are analyzed that impede its more wide-spread application. This section closes with a *Literature Summary* (3.2.5).

3.2.1 Antecedent Innovation Literature

Before turning to frugal innovation, this section explains the broader innovation context by highlighting selected antecedent literature streams. As with any type of innovation, frugal innovation's first academic roots are in general *Innovation Theory*. Focusing on more closely related strands, the thesis reviews the literature on *Disruptive Innovation*, *Innovation in Emerging Markets*, and *Innovation at the Base of the Pyramid*. All three streams influenced the emergence of the literature on *Resource-Constrained Innovation* (RCI), an umbrella term for types of innovation conceived in resource-constrained environments. To resolve any terminological confusion, the section ends with a clear definition of different RCI sub-types, in preparation for a consideration of its most prominent sub-type, frugal innovation, in more detail in the following chapter.

Figure 8: Evolution of the Literature on Resource-Constrained Innovation (illustrative)



Innovation Theory and its Limitations

In the academic context, innovation theory was pioneered by Schumpeter's *Theory of Economic Development* (1934), which presents innovation as the fundamental driver of economic development. Later, Schumpeter coined the term "creative destruction," defining innovation as a "process of industrial mutation" that "incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one" (1942, p. 83). Drucker (1985a, 1985b), another innovation pioneer, understands change as an opportunity for value creation and innovation as a systemic approach applicable by businesses. The OECD (2018, p. 20) provides a more contemporary definition in their Oslo Manual, which defines innovation as "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)."

According to the RCI literature, contemporary innovation builds on the "assumptions of affluence and abundance" along the mantra of "[t]he more, the better" (Prahalad & Mashelkar, 2010, p. 133). Apart from its narrow focus on affluent customers, the traditional approach has also fallen prey to what Radjou, Prabhu, and Ahuja (2012, p. 8): corporations, especially from the West, started to "institutionalize their innovation capabilities, creating dedicated research and development (R&D) departments and standardizing the business processes needed to take their ideas to market" (Radjou et al., 2012, p. 8).

While admitting the significant success of the traditional innovation approach in the second half of the 20th century, Radjou et al. (2012) see three limitations to this structured innovation approach for today's environment: it is "too expensive and resource consuming" (p. 8); it "lacks flexibility" (p. 10), as standardized processes have been implemented to allegedly reduce risks; and it is said to be "elitist and insular" (p. 11), as innovation has become the privilege of highly educated scientists working in expensive R&D facilities, shielded from the rest of society. Radjou et al. thus conclude that "the processes, systems, and mindsets that underpin the structured approach to innovation are now failing." They thus appeal to corporations to change their—previously successful—approaches, which were designed for a "stable, slower, and predictable world of abundance," to an approach that is fit to deal with "[t]oday's highly complex and turbulent business environment" (2012, pp. 12-13).

Disruptive Innovation

The idea of *disruptive innovation* was introduced as a first alternative to the traditional view (see the definitions in Appendix 5), with the term coined by Bower and Christensen in 1995. Disruptive innovation explains the dynamic between incumbents and new market entrants competing at the lower end of a market with new and often inferior technology. It predicts that established companies often fall victim to their own success, as their proximity to existing customers inhibits them from spearheading the development of technologies that appeal only to marginalized market segments. These technologies usually exhibit two important characteristics: first, their performance attributes are not valued by existing customers; second, these attributes improve at such a rapid rate that the new technology can eventually also enter those established market segments (Bower & Christensen, 1995, pp. 43-44). Often, disruptive technologies perform far worse along the dimensions hitherto valued by customers but can enable the emergence of new markets (Bower & Christensen, 1995, p. 45).

Concluding that existing mainstream markets were the wrong environment for new growth waves, Hart and Christensen (2002) see emerging markets as the ideal context for disruptive innovation. On the one hand, business models developed for low-income markets can usually also be profitably adapted to markets higher on the socio-economic pyramid. On the other hand, disruptive innovations in emerging markets often compete against non-consumption. In developed markets, however, technologies compete against widely entrenched systems, sunk costs, and widespread customer habits, even if the existing solutions are inefficient. Thus, taking a “great leap downward” to the pyramid’s base holds much greater potential for company growth and economic development (Hart & Christensen, 2002, pp. 53-54).

Building on the potential of disruptive innovation for economic development, a group of authors around Christensen coined the term *catalytic innovation*. While disruptive innovations have also had major impacts on industry structures, the implications for social change have simply been a by-product of the business rationale. In contrast, catalytic innovations are a subset of disruptive innovations and explicitly defined with social change as their primary objective. They are characterized by simpler and less costly products perceived as good enough by their market and, thus, meeting needs that have either been overserved with complex solutions or have not been served at all (Christensen, Baumann, Ruggles, & Sadtler, 2006, p. 96).

Innovation in Emerging Markets

Conventional wisdom has long held that “innovation is the strength of the West and that what gets developed in the West is modified and transferred to ‘the Rest’” (Petrick & Juntiwassarakij, 2011, p. 24), often with toned-down versions of the original product (Brem & Wolfram, 2014, p. 1). However, the authors acknowledge that the “innovation landscape is shifting” (p. 29) as more innovations are coming from emerging markets, and more companies are looking to these markets to sustain their growth. This growing interest is also reflected in a steep increase in literature on innovation in, for, and from emerging markets (Brem & Wolfram, 2014, p. 2).

At the same time, emerging markets have tried to copy the formal innovation systems employed in the West, focusing on the “creation of formal institutional setups, including research and educational institutions, funds for promoting research and development, and innovation clusters” (Soni & Krishnan, 2014, p. 30). However, while formal R&D centers remain scarce, Pansera notes that “innovation in the developing world is taking place in a big variety of forms that are often neglected by the mainstream literature” (2013, p. 470).

However, recent years have witnessed a shift towards emerging markets in the “innovation loci and foci” (Simula et al., 2015, p. 1567), demanding a reconception of innovation theories. As stated by Hossain, Simula, and Halme (2016, p. 133), but have become origins of innovations themselves. Similarly, Petrick and Juntiwassarakij note that “emerging markets are becoming hotbeds of innovation” (2011, p. 24) in a range of areas. They note the advantages of these markets, above all the “massive consumer base” (p. 28), as “the great majority of the world’s population lives in developing countries” (Pansera, 2013, p. 469). However, these regions offer much more, including a talent pool familiar with local conditions (Petrick & Juntiwassarakij, 2011, p. 28) and a new way to deal with resource scarcity, an essential skill for the “future of global environmental sustainability” (Pansera, 2013, p. 469). At the same time, emerging markets enable Western companies to balance the “downturn of revenues in their higher-end markets,” while preparing for competition from emerging markets entering their markets with “affordable products and services with superior value at lower cost” (Hossain et al., 2016, p. 133).

Innovation at the Base of the Pyramid

This development is taken even further by the idea of *innovation at the base of the pyramid* (see the definitions in Appendix 6), foregrounded by Prahalad and Hart (2002). When emerging countries opened their markets in the 1990s, companies focused on the aspiring middle class, a market the authors claim to have been “wildly oversold.” Instead, the “real source of market promise is [...] the billions of *aspiring poor* who are joining the market economy for the first time” (2002, p. 1). At the time of writing, the four billion people at the BOP make up a vast market, untapped or served inefficiently by the “unorganized sector” (Prahalad, 2012, p. 6). Prahalad thus pleads to “stop thinking of the poor as victims or as a burden and start recognizing them as [...] value-conscious consumers.” Given this market potential, Prahalad argues that the “case for growth opportunity in the BOP markets is easy to make” (2005, p. 21). As people at the BOP lack the “burden of legacy systems and ‘legacy mindsets’,” many companies use these markets as a “laboratory for innovation not only for the BOP markets but also for the established country markets” (Prahalad, 2012, p. 11). Prahalad and Hart further see the BOP market as the ideal breeding ground to leapfrog sustainable solutions: By introducing them directly without passing through damaging intermediate stages, companies avoid “repeat[ing] the environmental mistakes of developed countries” (2002, p. 4). Apart from company advantages, they mention the wider benefits of innovation at the BOP: it “means lifting billions of people out of poverty and desperation, averting the social decay, political chaos, terrorism, and environmental meltdown that is certain to continue if the gap between rich and poor countries continues to widen” (Prahalad & Hart, 2002, p. 2).

Prahalad (2005) summarizes twelve principles by which to design for the BOP market, ranging from a strong focus on price performance to an imperative to understand the required product functionality (pp. 25-27). In 2006, he introduced the “innovation sandbox” to help companies “cultivating constraints” (p. 1), as innovation at the BOP requires working within strict constraints. He calls this the innovation sandbox because it “involves fairly complex, free-form exploration and even playful experimentation (the sand, with its flowing, shifting boundaries) within extremely fixed specified constraints (the walls, straight and rigid, that box in the sand)” (p. 3). In 2012, Prahalad refined the “4As” framework, stating the importance of “awareness,” “access,” “affordability,” and “availability” (p. 7) when designing for the BOP.

Resource-Constrained Innovation

The term *resource-constrained innovation* emerged from this bedrock (see definitions in Appendix 7). In harmony with the proverb “necessity is the mother of invention,” the core mechanism of RCI is defined as “approaching scarcity rather than avoiding it” (Cunha, Rego, Oliveira, Rosado, & Habib, 2014, p. 202). According to Prahalad and Mashelkar, it is this “potent combination of constraints and ambitions” that has “ignited a new genre of innovation” (2010, p. 134). While innovation in resource-poor environments is “as old as creativity itself” (Cunha et al., 2014, p. 203), it constitutes an emerging and still-immature academic field, with different authors employing different terms to describe innovation under resource scarcity.

Despite differences in terminology, there is a general understanding of the common denominator of RCIs. von Zedtwitz, Corsi, Søberg, and Frega (2015, p. 23), while Ray and Ray note that they are all shaped by their “socio-economic, institutional and environmental” context (2011, p. 217). The latter thus highlight the importance of the “unique characteristics of the emerging market environments and the appropriateness of product offerings” (2010, p. 144). Such environments can be challenging due to a lack of good infrastructure, weak institutional arrangements, and missing central services. One major constraint is local consumers having “little excess income” (Zeschky et al., 2014a). As noted by Radjou and Prabhu, companies thus face “growing pressure from cost-conscious and eco-aware customers, employees and governments, who are demanding affordable, sustainable and high-quality products” (2015a, p. xv).

With these emerging markets as a starting point, Weyrauch and Herstatt define the idea of RCI (they use “frugal innovation” as an umbrella term) as developing “products and services that fit these markets’ special needs and requirements and that [are] cheap enough to give non-affluent customers opportunities for consumption” (2016, p. 1). This definition is echoed by Zeschky et al., characterizing RCIs as “[promising] high customer benefit at very low costs, thereby making respective products attractive or even affordable for resource-constrained customers for the first time” (2014b, p. 4). To achieve this goal, Agnihotri (2015, p. 403) notes the need to focus on “[eliminating] and [reducing] aspects of a product, so that cost can be reduced to the minimum,” and to concentrate on “‘good enough’ rather than over engineering.”

The relative recency of RCI’s study has resulted in large parts of its terminology not yet being universally agreed upon. Having different authors using different terms or defining them in

different ways has thus “resulted in a terminology jungle and increased confusion” (Agarwal et al., 2017, p. 4). Cunha et al. mention the consequences of this “lack of academic maturity,” to the extent that “the name of this stream is, itself, being debated” (2014, p. 206), while von Zedtwitz et al. state that the different innovation concepts “have overlapping characteristics and create terminology confusion” (2015, p. 23). Apart from ambiguous definitions, no shared understanding of their level of abstraction exists. While “resource-constrained innovations” (Ray & Ray, 2010, p. 144; von Zedtwitz et al., 2015, p. 14) or “constraint-based innovations” (Agarwal et al., 2017, p. 3) usually denote umbrella terms, others use more specific terms, such as “low-cost innovation” (Agnihotri, 2015, p. 402) or even “frugal innovation” (Simula et al., 2015, p. 1568), as overarching terms for different sub-types.

This fuzzy terminology has been the subject of many studies, with authors using different classification systems to make sense of the different concepts. Some include output-related criteria such as “sophistication, sustainability, and emerging market orientation” (Brem & Wolfram, 2014, p. 12), “frugality, flexibility, and inclusivity” (Prabhu & Jain, 2015, p. 856), or “market and technical novelty” (Zeschky et al., 2014a, p. 21). Other classifications focus on the subject of innovation, distinguishing between innovation as a “mindset,” “process,” or “outcome” (Soni & Krishnan, 2014, pp. 31-32). Still others concentrate on the origin and direction of innovations, distinguishing between developing countries, industrialized countries, and global markets (Rosca, Arnold, & Bendul, 2017), or on the locus of innovation, differentiating between grassroots enterprise, domestic enterprise, or MNC subsidiary-level innovators (Soni & Krishnan, 2014). Pansera and Sarkar (2016, p. 2) include the innovation’s target group as a distinctive feature, distinguishing between the “poor framed as consumers, poor framed as coproducers, and poor framed as entrepreneurs/innovators.” While all classifications provide an insightful angle, no framework has yet established itself as a standard.

While the systematic taxonomy of RCI sub-types is not the central focus of this thesis, a clear understanding of the terms is imperative. Thus, the thesis refers to existing definitions provided by other authors to define the various types of RCI. These are outlined in Table 4, which distinguishes more frequent sub-types from more distantly related terms.

Table 4: Selected Definitions of Resource-Constrained Innovations		
Type	Definition	Source (Thought Leaders) ⁴
<i>RCI</i>		
Resource-Constrained Innovation	"Innovation developed in emerging economies in a context characterized by lower power of purchase, lower understanding of technology, and lower investment resources."	von Zedtwitz et al. (2015, p. 14)
<i>Main RCI Sub-Types</i>		
Cost Innovation	"Cost innovations are low-cost alternatives to Western products, with cost reductions realized through process innovations and cost advantages in emerging markets."	Zeschky et al. (2014a, p. 24)
Good-Enough Innovation	"Good-enough innovations are also cost innovations, but in addition, the products are tailored to the resource-constrained market, with non-value-adding functions eliminated and specific functions designed to meet the specific requirements of resource-constrained customers."	Zeschky et al. (2014a, p. 24)
Frugal Innovation	"Frugal innovations build on good-enough innovations but feature new applications developed specifically for resource-constrained environments, generating an entirely new value proposition."	Zeschky et al. (2014a, p. 24) (Thought Leader: Radjou & Prabhu, 2015a)
Jugaad Innovation	"An improvisational approach to solving one's own or others' problems in a creative way, at a low cost, in a short amount of time, and without serious taxonomy or discipline applied by people at the BoP as a result of poverty and exigency."	Brem and Wolfram (2014, p. 19) (Thought Leader: Radjou et al., 2012)
Reverse Innovation	"[A]ny type of global innovation that, at some stage during the innovation process, is characterized by a reversal of the flow of innovation from a developing country to an advanced country, and that is eventually introduced to an advanced country's market."	von Zedtwitz et al. (2015, p. 17) (Thought Leader: Govindarajan & Trimble, 2012)
<i>Secondary RCI Sub-Types</i>		
Blowback Innovation	"Innovations developed and adopted first in emerging markets."	von Zedtwitz et al. (2015, p. 14)
Bricolage	"Product innovation when material resources are scarce: Under bricolage, scarcity is seen as opportunity, but only for those who can enact the potentiality 'contained' in surrounding dormant resources."	Cunha et al. (2014, p. 203)

Catalytic Innovation	"Catalytic innovations are a subset of disruptive innovations, distinguished by their primary focus on social change, often on a national scale."	Christensen et al. (2006, p. 96)
Empathetic Innovation	"The innovations that common people evolve to solve the problems sometimes faced by them, but many times faced by others reflect this deep connection across boundaries of beliefs, sectors, spaces, social segments, etc."	Gupta (2010, p. 3)
Frugal Engineering	"[A] process-oriented approach to adapt existing technologies to local challenges by dint of the integration of the local society in order to reduce inherent development costs and time."	Brem and Wolfram (2014, p. 19)
Gandhian Innovation	"Innovations developed for the Indian market that respond to two Gandhian tenets: affordability and sustainability."	von Zedtwitz et al. (2015, p. 14) (Thought Leader: Prahalad & Mashelkar, 2010)
Grassroots Innovation	"[A] bottom-up development approach that includes social integrity and local civilians as inventors by connecting people through social or technical networks in order to develop ecologically and socially acceptable products and services."	Brem and Wolfram (2014, p. 19) (Thought Leader: Gupta, 2016)
Improvisation	"Product innovation when time is scarce [...] Improvisational innovation occurs when there is time pressure, in the sense that planning and execution cannot be separated."	Cunha et al. (2014, p. 204)
Inclusive Innovation	"[...] the development and implementation of new ideas which aspire to create opportunities that enhance social and economic wellbeing for disenfranchised members of society."	George, McGahan, and Prabhu (2012, p. 663)
Indigenous Innovation	"[A] process of making use of technologies transferred from the advanced economies to develop superior technologies at home."	Lazonick (2004, p. 273)
Trickle-up Innovation	"Innovations developed for the bottom of the pyramid that subsequently trickle up to the developed world."	von Zedtwitz et al. (2015, p. 14)

Source: Various authors.

⁴ The definitions chosen in this thesis are mostly based on the works of authors from the Global North, while most thought leaders for different RCI sub-types are from countries in the Global South. This selection is due to the priority given to definitions written in peer-reviewed academic journals over other sources, such as articles or books. To nonetheless honor these seminal contributions, these authors from the Global South are indicated as "Thought Leaders," where deemed appropriate.

3.2.2 Definition of Frugal Innovation

Among the different RCI sub-types, *frugal innovation* is the most frequently used, both in the literature and in practice.

The word “frugal” comes from the mid-16th century Latin word *frugalis*, meaning “economical, thrifty,” and the Oxford Dictionary on Lexico defines it as “sparing or economical with regard to money or food” (Lexico, 2019). While literature around frugal innovation remains nascent, the phenomenon dates back to the “ancient world when economic resources were deficient” (Soni & Krishnan, 2014, p. 31).

Radjou and Prabhu, who have spearheaded the idea of frugal innovation, define it as the “ability to ‘do more with less’ —that is, to create significantly more business and social value while minimising the use of diminishing resources such as energy, capital and time” (2015a, p. xv). That being said, the authors add that frugal innovation is “not just about ‘doing more with less’ but about ‘doing better with less’” (2015a, p. 12), to find simpler and better solutions. Either way, the authors mention that it is “more than a strategy. It denotes a new frame of mind: one that sees resource constraints not as a liability but as an opportunity” (2015a, p. xv).

A major role is given to constraints, as many definitions of frugal innovation are grounded in this concept. Zeschky et al. define frugal innovation as “not re-engineered solutions but products or services developed for very specific applications in resource-constrained environments” (2014a, p. 23), while Agnihotri defines it as “innovative products and services which are developed under conditions of resource constraints” (2015, p. 401). According to Hossain et al., these “resource scarce solution[s]” are designed despite “financial, technological, material or other resource constraints” (2016, p. 133). Broadening the concept of scarcity to customers, Cunha et al. define frugal innovation as “product innovation when affluent customers are scarce” (2014, p. 206), as opposed to innovation in which material resources or time are scarce.

The focus on managing with scarce resources lends itself very well to the topic of sustainability. As Rao states, by “economizing the usage of resource-use and aiming for simple products and services, albeit sometimes using cutting edge technology, frugal-innovations have a lot to offer for sustainable-development” (2013, p. 66). This connection will be further investigated in Section 3.2.3 of this literature review.

Characteristics and Development of Frugal Innovation

Debate is ongoing concerning what exactly characterizes frugal innovation. Weyrauch and Herstatt suggest three constituting criteria: “substantial cost reduction, concentration on core functionalities, and optimised performance level” (2016, p. 2). This suggestion aligns with the definition by Zeschky et al., who characterize frugal innovation as “cost cutting,” “feature optimization,” and “application innovation” (2014a, p. 25). They underline these features with the example of careHPV, a screening test for human papillomavirus developed for limited-resource settings that includes “an easy-to-use interface, a simple color-coded system for indicating test results, high robustness for rough use conditions, and portability” and that “tolerates changes in the temperature of blood samples [...] and is so simple to use that non-medical staff can be trained to use it in just a few hours” (2014a, p. 23). Alternatively, Hossain et al. suggest a broader definition of frugal innovation, including products that are “affordable, sustainable, easy-to-use, and have been innovated under [] resource scarcity” (2016, p. 132). Highlighting the characteristics of sustainability, Simula et al. summarize frugal innovation as “resource scarcity, simplification, environmentally sustainable and lean practices” (2015, p. 1568). While these theoretical criteria may partially overlap, Weyrauch and Herstatt suggest that the way they “manifest in real products and services strongly depends on the user environment and context” (2016, p. 7). There is, however, dispute on the question of whether emerging market settings constitute a necessary criterion for frugal innovation. While many authors define emerging market environments as one of its core characteristics, some believe “frugal innovation should be universal and should be independent from the question whether or not it is discussed in the context of emerging or developed markets” (Weyrauch & Herstatt, 2016, p. 4). A selection of definitions is summarized in Appendix 8.

The literature has also defined how frugal innovation can be achieved. Radjou and Prabhu (2015a, pp. xvi-xviii) use the following six principles: engage and iterate, flex your assets, create sustainable solutions, shape customer behavior, co-create value with prosumers, and make innovative friends. On a more granular level, Zeschky et al. define the following traits of frugal innovation: “application-engineered emerging market solution[s]” (2014a, p. 25), cost-effective raw materials, local sourcing, local production, standard components and commodities, reduced size, new applications, and tailored for environments with poor infrastructure.

Levels of Frugal Innovation

Despite the partial agreement on its characteristics, illustrated above, the “meaning of frugal innovation is fuzzy” (Weyrauch & Herstatt, 2016, p. 1), and different authors define the term to different extents. Soni and Krishnan (2014, pp. 31-32) propose a typological view of the phenomenon, differentiating between frugal innovation as a “mindset,” a “process,” or an “outcome.” They further differentiate between frugal innovators operating at the levels of “grass-roots,” “domestic-enterprises,” and “MNC-subsidiaries,” to consider the “various levels at which frugal innovation happens and the various agents involved in it” (2014, p. 35). Adding another locus-based differentiation framework, Simula et al. (2015, p. 1569) differentiate between “grassroots,” “commercial,” and “societal” frugal innovation, emphasizing that the demand for frugality applies “not only for innovative products, but also for innovative business models” (2015, p. 1571) to reach underserved markets. Hossain et al. echo this differentiation, stating that frugal innovation can be a “product, service, process, or business model” (2016, p. 133).

Differentiation from other RCIs

Zeschky et al. suggest that, compared to the other RCI sub-types, frugal innovations “build on good-enough innovations but feature new applications developed specifically for resource-constrained environments, generating an entirely new value proposition” (2014a, p. 24). Thus, in contrast to cost innovation and good-enough innovation, frugal innovations are “fairly novel from both the technology and market perspectives” (2014a, p. 23), as they employ existing technology in a fundamentally new manner. The authors therefore define cost innovation as an “application innovation” that enables formerly underserved customers to be reached (Zeschky et al., 2014b, p. 13). Similarly, Simula et al. claim that “stripping down existing products is not going to be the answer” (2015, p. 1567) for companies, as their “cost structure will still be too high,” thus resulting in “unaffordable price tags for customers in low-income emerging markets” (2015, p. 1571). In the same vein, Weyrauch and Herstatt note that for frugal innovations it is “not sufficient to focus only on core functionalities”; instead, a “serious examination of which levels of performance and quality are in fact required” (2016, p. 9) is needed to design the product.

3.2.3 Importance of Frugal Innovation

A large body of literature focuses on the benefits of RCI and frugal innovation responding to “societal, environmental, and economic needs across the globe” (Basu et al., 2013, p. 63). The authors thereby focus on the benefits of different sub-types of RCI. While the benefits of different innovation types may vary in extent, they are considered similar enough in content to include them in this section.

A common theme is the holistic nature of RCI, addressing “immediate needs while integrating a long-term outlook” (Basu et al., 2013, p. 66), creating “win-win scenarios” that ensure the active engagement of resource-constrained customers in parallel with corporate profitability (Prahalad, 2005, p. 3), as well as addressing “all stakeholders of business, including the end consumers, the environment, and future generations” (Basu et al., 2013, p. 66). While some authors focus on the potential for companies to “generate growth and satisfy social and environmental stakeholders” (Hart & Christensen, 2002, p. 51) and to use “corporate R&D to put sustainable development into practice” (Brem & Wolfram, 2014, p. 17), Basu et al. also mention the “potential for far-reaching, positive domino effects” for macroeconomic development (2013, p. 66). These multifaceted benefits can be categorized as social, ecological, and economic, as outlined below. However, Simula et al. also note that RCI does not provide “‘a silver bullet’ solution for global problems” but can also create “controversial situations in which benefits to different stakeholders negatively overlap” (2015, p. 1571).

Social Potential

RCI, especially at the BOP, is “designed to include those who have been excluded from the benefit of economic growth” (Pansera, 2013, p. 473) and who have not been the “focus of innovative energies” (Basu et al., 2013, p. 64). As Prahalad emphasizes, RCI that effectively helps the poor involves “partnering with them” (2005, p. 3) and converting them into consumers by offering access to products previously unavailable to them. This first-time consumption raises the “living standards of society at large” (Rao, 2013, p. 70) by “making available cheap, high-quality products” (Hart & Christensen, 2002, p. 52). Apart from creating “opportunities for the poor by offering them choices” (Prahalad, 2005, p. 5), RCI builds their self-esteem by giving

them the “dignity of attention” (p. 20). Basu et al. see the potential for scaled RCIs even to aid “efforts to end global poverty, world hunger, and social injustice” (2013, p. 66).

Ecological Potential

Given the much larger scale of emerging markets, solutions “cannot be based on the same patterns of resource use that we expect to use in developed countries” but must be “sustainable and ecologically friendly” (Prahalad, 2005, p. 33). Prahalad thus predicts that the “BOP will force us to come to terms with the use of resources,” be it the “use of fossil fuels for energy and transportation, water for personal cleanliness, or packaging for safety and aesthetics” (2005, p. 34). According to Rao (2013, p. 70), the “no frills aspect of frugal innovations lends itself to the needs of sustainability for tackling the planetary crises,” as fewer resources are consumed without the “factor-of-safety” of traditional products. In accordance with their mantra of *doing more with less*, RCIs are often “simpler in nature” (Agnihotri, 2015, p. 404). They enable companies to “optimize the use of scarce financial and natural resources”: the complete opposite of the West’s “bigger is better” approach (Radjou et al., 2012, p. 21).

Economic Potential

As Hart and Christensen (2002, p. 52) state, the BOP is “completely unsaturated,” providing enormous untapped market potential. Such markets must thus become “part of the firms’ core businesses” and cannot be left “to the realm of corporate social responsibility” (Prahalad, 2005, p. 6). While being attractive on their own, these markets can also give access to other emerging or developed markets, thus “creating a global opportunity” (Prahalad, 2005, p. 48). Furthermore, the BOP has frequently been called a “fertile ground to test and experiment” (Pansera, 2013, p. 472), where emerging technologies can develop without competing against the technological lock-in of established systems (Hart & Christensen, 2002, p. 52). Zeschky et al. (2014b, p. 13) give another reason for RCI’s economic potential: they enable companies from established markets to become “global all-rounders” and “keep up with low-cost competitors,” should that competition ever arrive “at home shores.”

3.2.4 Barriers to Frugal Innovation

Despite its many benefits, the success of frugal innovation has been limited. Authors such as Tiwari and Herstatt state that the “economic success of many a BOP venture in terms of market penetration and customer acceptance has been less than spectacular” (2012b, p. 246), with Bardiya (2016) even stating that the “actual success has been underwhelming.” Other authors note that “[d]espite the extent of the markets and the volume of the hype, few multinational firms have built sizable businesses serving people who survive on just a few dollars a day” (Karamchandani, Kubzansky, & Lalwani, 2011). This claim is reflected in the market failures of previously highly acclaimed frugal innovations: the production of the Tata Nano, the “world’s cheapest car,” stopped in 2018, while the MittiKool, a clay-based, low-cost refrigerator, has “not scaled up beyond few tens of thousands of units over several years” (Bardiya, 2016). When it comes to Western businesses, Simula et al. (2015, p. 1567) state that only a small portion of businesses is currently developing frugal innovation in emerging markets. This claim is echoed by Hyypiä and Khan (2018, p. 38), who assess that in advanced markets, the “application of frugal innovation in most companies still remains far from reality.”

Despite these findings, Hyypiä and Khan (2018, p. 38) note that barriers to frugal innovation have received little academic attention. This chapter, summarizing the barriers to frugal innovation mentioned across different works, has thus been verified and complemented by expert interviews conducted prior to the empirical phase (see “List of Interviews,” p. 197).

Lack of Awareness

While innovation in developing markets is gaining traction, “its nature and origins are still obscure and misunderstood” (Pansera, 2013, p. 469). In the same vein, Granqvist (2016, pp. 23, 32) states that one of the main reasons for the limited number of successful frugal innovations, especially among Western businesses, is the lack of awareness of it and its opportunities. Given the ambiguity around its exact definition (see Section 3.2.1), experts have pointed out that many frugal innovations are not labeled as such (Gandikota, 14 July 2020), thus reinforcing the barrier through a lack of publicly known frugal-innovation success stories (Niola, 13 July 2020). Moreover, one expert mentioned the lack of a clear, unique selling position distinguishing frugal from other innovation types, which hinders its large-scale spread and funding (Báez

Morales, 16 July 2020). However, even businesses aware of frugal innovation often hesitate to pursue it. This hesitation has been explained by Govindarajan and Trimble (2012, pp. 40-41) as being caused by three “dramatically overstated” fears: that margins are insufficient to operate at a profit, that premium brands are at risk of their sales being cannibalized, and that their technological leadership is incompatible with ultra-low-cost offerings. Similarly, Prahalad and Hammond (2002) list a range of emerging market misconceptions prevalent in Western companies, including the assumption that there is no demand for non-essential goods, false beliefs about the price levels of goods and cost levels of delivery services, the misconception that such markets have no use for high-tech solutions, or the fear that doing business with the poor contributes to their exploitation (pp. 5-6).

Lack of a Frugal Mindset

Beyond the lack of awareness, Western companies often lack a frugal mindset, as they are used to having a plethora of resources (Niola, 13 July 2020). Since business leaders from advanced economies “have grown up in, worked in, and are steeped in the traditions of rich countries,” Govindarajan and Trimble (2012, p. 14) appeal to them to first “let go of the dominant logic that has served [them] well in rich countries.” Thus, Radjou and Prabhu (2013, p. 2) strongly suggest that “frugal innovation is not just a drastically different way of innovating or even a radical new way of running a business—it is about fundamentally shifting the corporate mindset.” According to Kroll et al. (2016, p. 13), individuals with such a frugal mindset “‘foresee’ problems that others do not see,” “consider problems an opportunity to respond with creative solutions,” and have a “different perception of resources, meaning that they can conceive of resource scarcity as a driver rather than a restriction of creativity.” Organizationally, Radjou et al. (2012) claim, “structured business processes and methods are unfit to deliver the agility and differentiation that enterprises need.” However, one interviewed expert claimed that currently no clear framework or well-defined process exists to guide innovators on how to innovate frugally and develop the required mindset, as is the case with comparable concepts such as Design Thinking (a human-centered approach to innovation; Báez Morales, 16 July 2020).

Lack of Local Market Access

Once companies build the required awareness and mindset, they often face another barrier: lack of market access, comprising a lack of market knowledge and a lack of connections to it.

Frugal innovations are characterized by extreme customer-centricity, as products must be designed according to customer needs and constraints (Radjou & Prabhu, 2015a) and must meet—but not exceed—the required levels of quality and performance (Weyrauch & Herstatt, 2016, p. 9). When adapting products to resource-constrained markets, Zeschky et al. thus highlight the challenge of distinguishing between value-adding and non-value-adding functions, which requires in-depth customer knowledge (2014a, p. 24). Similarly, Neumann et al. (2018, p. 418).

This extensive level of required local knowledge can hinder businesses from entering EMDEs. Kroll et al. (2017, p. 24) state that while “access to unknown markets is in general difficult,” it remains a fundamental barrier to frugal innovations in particular, as they “require an in-depth understanding of local governance and business practices” (p. 94). In the same vein, Neumann et al. see the transfer of market knowledge as one of the “first and most crucial obstacles” when organizing for frugal innovation (2018, p. 417).

Apart from local knowledge, barriers can result from a lack of connections to and networks within the target market. Kroll et al. (2017, p. 8) define issues of market access as among the five greatest obstacles to unlocking frugal innovation, as small and medium-sized enterprises (SMEs) in particular do not have “distribution and feedback channels in foreign markets and lack the means to explore if solutions will be locally viable” (p. 117). Similarly, Prahalad and Hammond (2002, p. 6) note that the “critical barrier to doing business in rural regions is distribution access,” given the geographic dispersal and poor infrastructure of the markets (London et al., 2010, p. 586). Apart from these more tangible networks, innovators require local social capital as “frugal innovations are the outcome of negotiations among diverse actors” (Devi & Kumar, 2018, p. 66), which ultimately require mutual trust (Gupta et al., 2016, p. 3). In the worst case scenario, local partners may “prove untrustworthy, incompetent, [and] fail to reach customers or comply with national regulation” (Kroll et al., 2017, p. 56), which may discourage companies from entering frugal markets without external support (p. 24).

Institutional Voids

Beyond the difficulty of accessing target markets, frugal innovations are often impeded by the market's weak institutions. Pansera (2013, p. 475) mentions such "institutional voids" as a main deterrent to frugal innovation, including "faulty institutions, corruption, unclear property rights, inappropriate infrastructures and cultural barriers." Soni and Krishnan (2014, p. 39) point out that markets with institutional intermediaries lack cost-efficient access to risk-capital, talent, and information. Kroll et al. thus describe them as "very diverse, diffuse and granular markets," in which "[i]nfrastructures and contact points are often hard to establish, to find or not existing" (2017, p. 33). Thus, the authors conclude that voids (e.g., non-existent infrastructure) can be a bottleneck for frugal innovation, increasing the costs of commercialization, distribution, and logistics, in turn reducing their accessibility and affordability (p. 48). These institutional voids can thus hamper businesses from entering such markets or reduce their success in doing so (Khanna, Palepu, & Sinha, 2005).

Need for a Holistic Innovation Approach

Given this range of constraints and institutional voids, frugal innovations must be designed with consideration of the idiosyncrasies of EMDEs, which is "really, really difficult to do" (Gandikota, 14 July 2020). As defined in Section 3.2.2, frugal innovations go beyond "stripping down existing products" (Simula et al., 2015, p. 1567), and embrace a "true 'clean sheet' approach to product development" (Sehgal, Dehoff, & Panneer, 2010). Along the same lines, Gupta et al. note that such innovations must not only reduce transaction costs but must demonstrate all five A's—affordability, accessibility, acceptability, adaptability, and availability—to truly meet consumer needs (Gupta, Dey, & Singh, 2017, p. 16). As such, the frugal approach to innovations is inherently holistic, as they "rely on a new product or service architecture in combination with a new business model, both of which are specifically tailored to the needs and requirements of customers in resource-constrained contexts" (Neumann et al., 2018, pp. 416-417). Hence, frugal innovation is the most demanding RCI and can be considered the "pinnacle of innovation capabilities" (Zeschky et al., 2014b, p. 13). As such, innovators may be discouraged by the requisite effort to develop frugal innovations, as they combine innovation not only of the process and product but also of the application (Zeschky et al., 2014a, p. 26).

Given the emergence of new possibilities for application due to this holistic character of frugal innovation, an adjacent barrier for companies often arises from the lack of awareness of the product among integrators, markets, and end-consumers (Kroll et al., 2017, p. 34). As frugal solutions often serve first-time customers (Rao, 2013, p. 70), companies must exert considerable effort to educate relevant stakeholders about the product and its benefits and to change their present user behavior, further increasing the product's distribution costs (Bardiya, 2016; Kroll et al., 2017, p. 48).

Limited Market Potential

Even if companies manage to access EMDEs and accommodate the multitude of consumer requirements of their offerings, the challenge arises of doing so profitably. Given the need for frugal innovations to drive prices below a certain level of affordability, Mukerjee (2012) posits that one of the greatest challenges for companies is ensuring "the economic viability of the innovation." Even though parsimony can be a strong trigger for frugal innovations, "it can cross the limits of feasibility quickly" (Kroll et al., 2017, p. 24).

Therefore, Karnani (2007, p. 2) states that the BOP market is "too small monetarily to be very profitable for most multinationals." Similarly, Bardiya (2016) points out that even though price is a key driver, "[p]ricing needs to be disruptive—'lower' alone may not be sufficient," as even instances of 40% price reductions have proven insufficiently disruptive for the market. Given their small margins, frugal innovations often require up-front investment and long developing times of up to ten years (Bardiya, 2016), which companies are often unwilling to invest. Along the same lines, Kroll et al. (2017, p. 42) see long investment cycles as a reason that the "profit-oriented philosophy of most technology firms restrains frugal approaches." They furthermore state that the low-cost business models of many frugal innovations require large economies of scale. Therefore, "a first market introduction only via frugal solutions is almost impossible" (Kroll et al., 2017, p. 32), leading many businesses still to enter markets via premium segments. Lastly, businesses may fear that the market and image of their premium products may be cannibalized by frugal alternatives (Hossain, 2017, p. 205).

Resource Constraints

The lack of resources in EMDEs is a common topic in the frugal-innovation literature, but it is often illustrated as its ignition point (see Section 3.2.2), rather than as a barrier to it. Gandikota, however, emphasizes that the constraints on financial and human resources in EMDEs pose a great barrier to local startups and SMEs as they attempt to push their products to the next level and scale them sufficiently (14 July 2020).

Sectoral Choice

Lastly, the more general barrier of sectoral choice is mentioned by Bardiya (2016), who states that “sectoral price inefficiencies” are of relevance to the success of frugal innovations. The author highlights the healthcare and software markets as especially price-inefficient, providing opportunities for substantial price reductions in frugal solutions. However, price-competitive markets are deemed harder to disrupt (e.g., consumer durables).

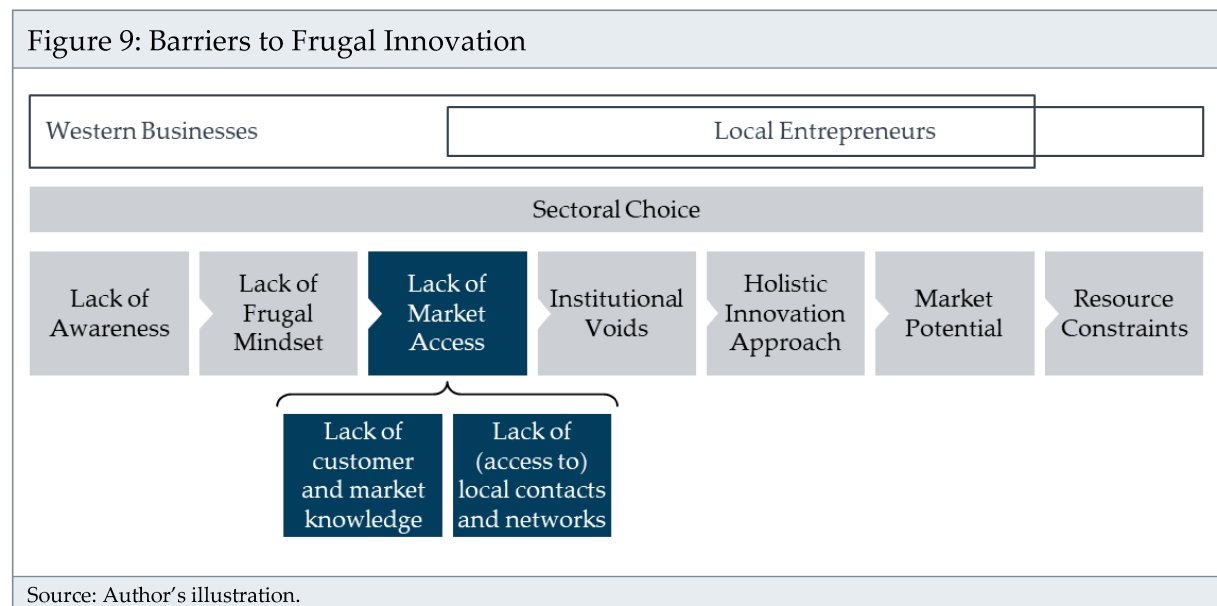
Rationale of the Thesis

Concentrating on the one barrier particularly relevant to Western small and medium-sized social enterprises that are limited in reach, this study focuses on the lack of local market access. It is seen as an impactful barrier, given its strong presence in the literature and its relevance throughout the development process, from the lack of consumer insights during conceptualization to the lack of contacts with local networks in the growth phase. Together with the barriers of lack of awareness and lack of frugal mindset, a lack of local market access is especially important to Western actors, given their cultural, economic, and geographical distance from EMDEs. While this is also true for the first two barriers (i.e., lack of awareness and lack of a frugal mindset), these hurdles are primarily pre-conditions to enter the development process, with levers to activate that are internal to the business.

Conversely, the barriers of institutional voids, the need for a holistic innovation approach, limited market potential, and resource restrictions typify frugal innovation. One expert even highlighted that they are so natural to frugal innovation that if they do not apply at all, the innovation in question “will not be frugal innovation” (Báez Morales, 16 July 2020). However, while these barriers are often portrayed as being ignition points for frugal innovation, when

they become too constraining, they can also limit it. Aside from being highly relevant, these barriers are also very difficult to solve at their core, as the solution would entail the economic, political, and social development of whole markets. Instead, frugal innovations often turn to local knowledge and networks to circumvent these problems: Institutional voids are filled with informal institutions, consumer and market knowledge is increased to understand the holistic needs of the consumer, and costs are reduced as far as possible using local sourcing and distribution systems. Barriers to a holistic innovation approach with limited market potential have also a strong technical component, relating to cost-efficient and feature-adapted product development, which is deemed unsuitable for this analysis.

Consisting of the sub-barriers of lack of consumer and market knowledge and lack of (access to) local contacts and networks, a lack of market access is thus seen as the most impactful lever for NPOs to accelerate frugal innovation, given the multiple direct and indirect benefits of frugal innovation in the innovation development process. Therefore, this thesis focuses exclusively on this barrier, while success in overcoming this barrier also presents indirect benefits for related barriers.



The frugal-innovation literature calls for Western businesses to overcome this barrier of lack of market access through intersectoral and international alliances with partners familiar with the target market (Bhatti et al., 2018; Granqvist, 2016; Neumann et al., 2018; Tiwari & Herstatt, 2012b). This subject is detailed in Section 3.3.

3.2.5 Literature Summary

This section first highlights the different literature streams anteceding resource-constrained innovation. While the literature on innovation in emerging markets and the BOP connects the concept of systematic innovation to the realm of the Global South, the literature on disruptive innovation functionally resembles that of RCI.

Turning the focus to frugal innovation as the main sub-type of RCI, the literature review clarifies the circulating definitions. Combining the most compelling ones, this study defines frugal innovation through the following criteria:

- **Affordable:** Products are priced substantially lower than existing alternatives to be affordable for resource-constrained consumers.
- **Adapted to constraints:** Products are tailored to fit their resource-constrained environment, which may relate to material, infrastructural, technological, knowledge, human, social, or other resources.
- **Providing value on core functionalities:** While products follow a no-frills approach, the performance of their core functionalities provides significant user value.

In general, such frugal innovations have been praised by the literature as contributing to the tripartite of social, ecological, and economic goals, while in individual cases, the fulfillment of these goals can range from being mutually re-enforcing to being mutually exclusive.

Despite its many benefits, frugal innovation may encounter different barriers, including a lack of awareness, a lack of a frugal mindset, a lack of local market access, institutional voids in the target market, a need for a holistic innovation approach, limited market potential, resource constraints, and unfavorable sectoral choices. This thesis focuses on the barrier of a lack of market access, given its strong impact throughout the innovation process and its role as a workaround for overcoming other hurdles. This barrier consists of a lack of consumer and market knowledge, and a lack of, or a lack of access to, local contacts and networks.

To overcome this barrier, the literature strongly emphasizes international and intersectoral partnerships, which are looked at in more detail in the next section.

3.3 Partnerships Between Businesses and Non-Profit Organizations

A success factor for Western businesses in overcoming the aforementioned market-access barrier seems to be a collaborative approach involving multiple stakeholders. As highlighted by Tiwari and Herstatt (2012a, p. 111), successful examples of frugal innovations often include “contribution from various external knowledge sources, domestic or otherwise.” This last section of the literature review thus illuminates how partnerships can accelerate frugal innovation efforts by mitigating the market-access barrier experienced by Western businesses.

This section opens with the *Need for Partnerships to Accelerate Frugal Innovation* (3.3.1), then turns to *Partnerships between Businesses and Non-Profit Organizations* (3.3.2). Subsequently, the *Value of NPOs in Partnerships* (3.3.3) is highlighted, after which the section again concludes with a *Literature Summary* (3.3.4).

Given the still-limited extent of the literature on partnerships between businesses and non-profit organizations (B2Ns) in the context of frugal innovation, this literature strand is complemented by the literature on B2N partnerships in emerging and BOP markets, which is deemed sufficiently close to this research. Similarly, while that literature focuses mainly on NPO partnerships with (for-profit) businesses, it is considered applicable to NPO partnerships with social enterprises as well, given the proximity of these two types of business partners.

3.3.1 Need for Partnerships to Accelerate Frugal Innovation

The market-access barrier is echoed in the literature on partnerships in emerging and BOP markets, highlighted by institutional distances to and within such markets (Van den waeyenberg & Hens, 2012; Webb et al., 2010), unknown market conditions (Schuster & Holtbrügge, 2014, p. 190), different business model logics (Chesbrough et al., 2006; Dahan et al., 2010, p. 327), underdeveloped transportation and communications infrastructure (Chesbrough et al., 2006, p. 57), and different cultural (Dahan et al., 2010, p. 327), ethnic, kinship, or religious subgroups (Rivera-Santos & Rufín, 2010a, p. 136). Moreover, foreign companies often lack the “market knowledge and expertise regarding needs identification, local sourcing abilities, a direct access to local distribution systems, and the trust of customers and important gatekeepers such as civil society groups and governments” (Grimm & Gilbert, 2019, p. 181).

Against the backdrop of this market-access barrier, scholars have highlighted the necessity to partner with different stakeholders. As in most cases, the resources to overcome this barrier are unavailable for purchase in the market, “partnerships form the only base available for exploiting these necessary resources” (Grimm & Gilbert, 2019, p. 193). Such partnerships are thus often cited as “explanatory factors of success (and failure)” in BOP projects (Hahn & Gold, 2014, p. 1322). Hence, Rivera-Santos and Rufin (2010a, p. 136) note that to “create value successfully at the BOP, MNEs must be prepared to share control over their activities with other actors,” who help address market-access gaps and increase the business’ local embeddedness. This view is echoed by Dahan et al. (2010, p. 328), who note that such partnerships are “vehicles through which new business models are developed, and facilitate the creation of new products and services.” Therefore, referring to Prahalad (2005), London and Hart (2011, p. 1) shift the focus from unilateral efforts to find a fortune *at* the BOP towards “creating a fortune *with* the base of the pyramid.”

Given the importance of such partnerships in accelerating frugal innovation, the remainder of this section clarifies both their international and intersectoral dimension, then regards B2N partnerships as the central theme of this thesis in Section 3.3.2.

International Partnerships

Collaborations to accelerate frugal innovations are often international, with the literature focusing on cooperation between the Global North and South (Crisp, 2014, p. 2). As noted by Agnihotri, “most of the low-cost innovations (apart from Jugaad) are developed in collaboration with multinational companies from [the] developed world” (2015, p. 408). Examples are the \$30 Jaipur knee, developed by Jaipur Foot and Stanford’s ReMotion, or the \$5 intraocular lens, manufactured by Aravind and the SEVA Foundation (Bhatti, Khilji, & Basu, 2013, pp. 139-140). While such partnerships have long existed, early instances saw unequal relationships, with Western partners attempting to aid and teach partners from the Global South (Basu et al., 2017). To achieve more mutually beneficial partnerships, partners from the West need to be “humble enough to listen and learn” (Basu et al., 2017, p. 3) instead of “assuming the superiority of developed world technologies in every setting” (Cotton, Henry, & Hasek, 2014, p. 4).

The accompanying literature highlights the complementarity of the partners' motivations, expertise, and resources. A study published by the European Commission (Kroll et al., 2017) notes that for innovators in industrialized countries, a "lack of a frugal culture or mindset is today a barrier to engaging more widely with frugal innovation" (p. 82). Should they still choose to do so, many face considerable obstacles when entering EMDEs. Western businesses are thus advised to "[u]se international collaboration as a vehicle to unlock markets" to "assess risk and understand user preferences before fully engaging in actual development projects" (Kroll et al., 2017, p. 11). In the same vein, Tiwari and Herstatt (2012b, p. 268) note that "[o]ffshore development without substantial local development capacities is not expected to function well," as innovators must understand the "needs, wishes, mind-set, cultural preferences, and not the least, infrastructural shortcomings" of their potential consumers. While Altmann and Engberg (2016, p. 49) raise "concern for the transferability of knowledge related to emerging market requirements," Granqvist (2016, p. 15) states that gaining this "know-how of local market and tacit knowledge transfer can only be done through face-to-face interactions."

Intersectoral Partnerships

In addition to partnerships being international, many authors agree that successful frugal innovations should engage different players to ensure the needs of various stakeholders are met and ideas are sourced from the largest pool possible. In this context, Prahalad and Hart (2002, p. 11) emphasize that "MNCs must work together with NGOs, local and state governments, and communities," while Granqvist (2016, p. 14) sees "businesses (multinational and small and medium-sized enterprises), civil society, universities and public R&D institutions" as the main frugal innovators. Bhatti et al. (2018, pp. 186-187) observe a "myriad of state, market and community actors and institutions involved in shaping this emerging market and field," specifying that MNCs, non-profits, entrepreneurs, universities, policymakers, funders, consulting firms, and social movements are relevant players. In addition, Arnold mentions financial institutions, international banks and agencies, public authorities, and legislative powers (2018, pp. 224-225). Apart from different sectors, Gupta et al. mentions the need to include "both the community level initiatives but also corporate contributions" (Gupta et al., 2017, p. 18). The most frequently mentioned players in intersectoral partnerships are outlined below.

Multinational Companies

Many MNCs closely monitor the emergence of new market opportunities in middle- and low-income countries (Granqvist, 2016, p. 14; Radjou & Prabhu, 2015a, pp. 12-13). As the target markets of frugal innovations are often far-flung and vast, MNCs provide the ideal geographical reach and ability to scale (Prahalad, 2005, p. 32). In addition, MNCs have “access to financing, (global) capabilities, infrastructure and network [as well as] capabilities of synergy and integration for developing [...] appropriate frugal innovations” (Arnold, 2018, p. 224). However, the size and established structures of MNCs have drawbacks, as they often thwart creativity and spontaneity. López-Fernández and Rajagopal (2018, p. 429), thus, note that large MNCs often turn to SMEs as “innovation feeders,” while themselves providing “resources and a holistic approach to business dynamics.”

Entrepreneurs and Small and Medium-Sized Enterprises

Due to their proximity to markets, local entrepreneurs and SMEs “introduce new products which are more accessible and appropriate to the underprivileged and utilize new technologies which make use of civil society” (Granqvist, 2016, p. 16). SMEs are thus valued for their “inspiration, creativity, and passion for transformation” (López-Fernández & Rajagopal, 2018, p. 424). However, when operating alone, small businesses may encounter difficulties in scaling the commercialization of their innovations (Chataway, Hanlin, & Kaplinsky, 2014, p. 49).

Universities and Research Institutions

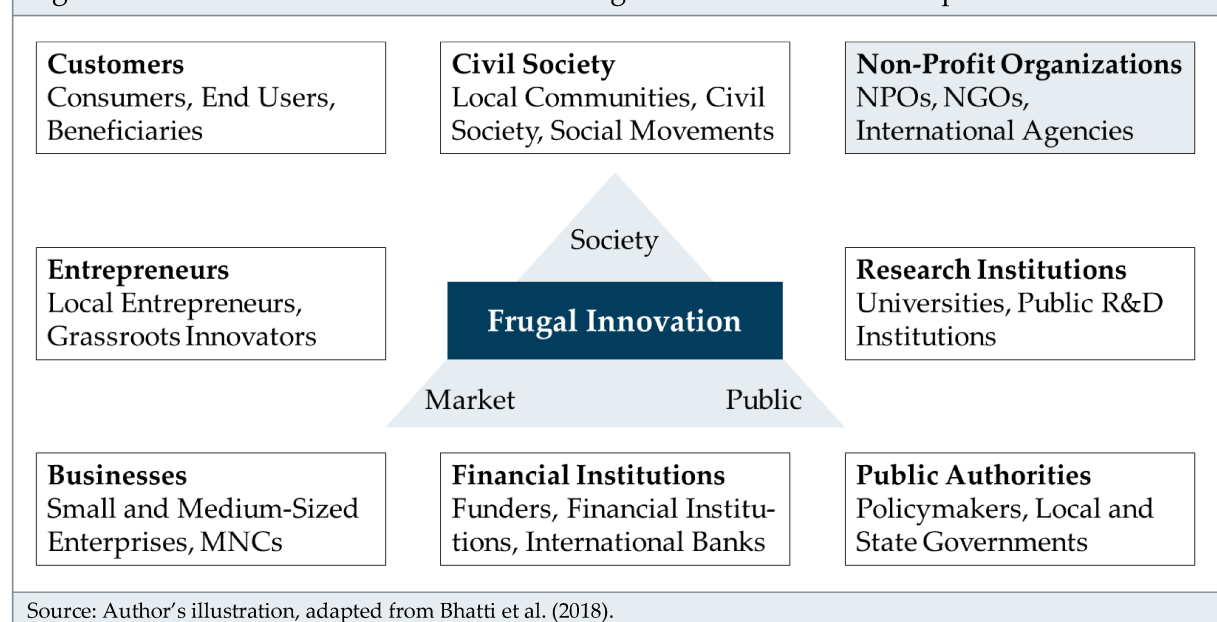
Although relatively rarely mentioned, universities and R&D institutions play a “potentially crucial role [...] in bringing the concept of frugal innovation to the forefront of innovation research and practice” (Kroll et al., 2017, p. 82). In theoretical research, institutions contribute to the understanding and awareness of new methods to develop frugal innovation (Kroll et al., 2017, p. 82). In applied research, programs such as the Santa Barbara University’s Frugal Innovation Lab conduct applied research and develop frugal innovations that can be commercialized (Granqvist, 2016, p. 17). Universities can also contribute at the student level: students could provide technical and business assistance to grassroots innovators (Gupta, 2007, p. 7).

Non-Profit and Non-Governmental Organizations

NGOs and NPOs, ranging from local to international entities, provide frugal innovators with a vital docking-station for entering EMDEs. They offer, among other benefits, “knowledge of local markets and informal institutions, access to legitimacy in terms of local informal institutions, and an understanding of both the local and MNEs’ [multinational enterprises’] institutional contexts” (Webb et al., 2010, p. 556). There has thus been a surge in public–private partnerships to accelerate the development and adoption of frugal innovation (Granqvist, 2016, p. 17). With NPOs and NGOs as proxies, another vital stakeholder is civil society, as grassroots innovators or beneficiaries of the frugal innovation (Granqvist, 2016, p. 17).

Collaboration between NPOs and businesses is among the most frequently mentioned type of intersectoral partnership (deemed similar enough to partnerships between NPOs and social enterprises). Radjou and Prabhu (2015a, p. 161) label this type a “win–win partnership”: “businesses gain access to profitable new markets, while NPOs achieve their desired social impact.” Similarly, the European Commission encourages “public–private collaboration platforms for frugal innovation” that help “the broader objective of fostering a spirit of open science and open innovation” (Kroll et al., 2017, p. 11). The remainder of this thesis thus focuses on the contributions of NPO partners in accelerating frugal innovation.

Figure 10: Stakeholders in Cross-Sectoral Frugal Innovation Partnerships



3.3.2 Partnerships Between Businesses and Non-Profit Organizations

While the previous sections have relied on a general understanding of the concepts of NPOs, NGOs, and social enterprises, this section defines these terms more precisely, before proceeding to define the level of mutual interaction required to qualify as a B2N partnership.

Non-Profit and Non-Governmental Organizations

According to Teegen, Doh, and Vachani (2004, p. 3), the non-profit sector is used to “broadly describe all aspects of society that extend beyond the realm of the public sector and the private sector.” Non-profit actors include NPOs, development and aid agencies, public donor organizations, and church-related organizations (Grimm & Gilbert, 2019, p. 182).

Much attention is thereby given to NGOs, divided by Teegen et al. into inward-looking “club NGOs” (p. 4; e.g., unions or church groups, which primarily create value for their own members), and outward-looking “social purpose NGOs” (p. 4; e.g., environmental or human rights organizations, which promote broader interests). The work of social-purpose NGOs can be classified as advocacy or as operational (or a hybrid thereof), with the first type working “on behalf of others who lack the voice,” and the second type working for the more direct provision of goods and services (p. 5). Focusing only on the social-purpose type, Teegen et al. (2004) define NGOs as “private, not-for-profit organizations that aim to serve particular societal interests by focusing advocacy and/or operational efforts on social, political and economic goals, including equity, education, health, environmental protection and human rights” (p. 4). Their scope can vary from local to international as “required by their clients and mission” (p. 7).

Even though the literature on B2N partnerships focuses strongly on NGO partners, it explicitly mentions the importance of collaborations beyond NGOs (Grimm & Gilbert, 2019, p. 179; Rivera-Santos et al., 2012, p. 1723; Webb et al., 2010, p. 575). Therefore, the present thesis focuses on NPOs including NGOs, development and aid agencies, and public development organizations that can be characterized as the social-purpose type and that focus mainly on operational work (as opposed to advocacy). Given the large overlap between NPOs and NGOs, Sections 3.3.3 and 3.3.4 include literature concerning both types, as their roles in B2N alliances are considered similar enough for the research goal.

Social Enterprises as Business Partners

This thesis focuses on social enterprises as B2N business partners, a concept only partially congruent with traditional commercial businesses.

The term “social entrepreneurship” was coined by Bill Drayton in the 1980s when founding *Ashoka* as the first organization fully dedicated to supporting social entrepreneurs. Today, Ashoka (n.d.) defines them as “individuals with innovative solutions to society’s most pressing social, cultural, and environmental challenges.” For the Schwab Foundation for Social Entrepreneurship (2020, p. 9), social entrepreneurship “is the demonstration of alternative working models as we face the current challenges to our planet, our societies and our economies,” highlighting the importance of a venture’s social mission. Other definitions focus on the duality of a social mission and entrepreneurial principles. The BC Centre for Social Enterprise (n.d.) states that a “social enterprise applies an entrepreneurial approach to addressing social issues.” Similarly, Abu-Saifan (2012, p. 25) defines social entrepreneurs to be mission-driven, to act entrepreneurially and within entrepreneurially oriented organizations, and to act within financially independent organizations that execute earned-income strategies.

Across these definitions, the legal form of the social enterprise is unspecified. Austin, Stevenson, and Wei-Skillern (2006, p. 2) state that “social entrepreneurship is not defined by legal form, as it [...] can span the nonprofit, business, or governmental sectors.” Social enterprises cut through the for- and non-profit distinction (Abu-Saifan, 2012): on the commercial end, social enterprises include for-profit organizations with mission-driven strategies (p. 26), while on the non-profit end, social enterprises cover NPOs with earned income strategies (p. 27). In return, authors such as Martin and Osberg (2007) explicitly differentiate social entrepreneurship from adjacent concepts: social enterprises differ from commercial enterprises in their “primacy of social benefit” (p. 35) over financial revenue, differ from social service provision because of the new equilibria they create and sustain (p. 36), and differ from social activism due to the direct nature of their action (p. 37).

This thesis shares the definition of social enterprises as for- and non-profit organizations taking entrepreneurial approaches to address social issues. However, given their entrepreneurial character, social enterprises are considered similar enough to the role of businesses in B2N alliance, wherefore the *business-to-NPO* literature and wording are deemed applicable.

Business-to-Non-Profit-Organization Partnerships

In accordance with Murphy, Perrot, and Rivera-Santos (2012, p. 1700), this thesis uses the term “B2N alliances” to denote cross-sector collaborations between businesses and NPOs. Various authors have noticed the surge in such partnerships (Webb et al., 2010, p. 564) and have attempted to define a typology of B2N alliances. Based on the degree of interaction, Rondinelli and London (2003, p. 64) distinguish three levels of collaboration: arm’s-length relationships, interactive collaborations, and intensive alliances (see Table 5), with the latter involving “collaborating on internal corporate processes and product development” (p. 65).

Table 5: Definitions of NPO–Corporate Collaboration		
Type	Intensity	Forms of Collaboration
Arm’s-Length Relationship	Low	Corporate support for employee participation in NPO activity
		Corporate contributions and gifts
		Corporate–NPO marketing affiliations
Interactive Collaborations	Moderate	NPO certification of corporate business practices
		Targeted project support
		Awareness and educational collaborations
Management Alliances	High	More formal alliances, including direct collaboration
Source: Rondinelli and London (2003, pp. 66-67).		

Another classification was made by Nahi (2016) after reviewing the literature on co-creation in BOP contexts (see Appendix 9). She divides different forms of co-creation along their width (the scope of participants) and their depth (the purpose of the collaboration) (p. 419). In terms of width, co-creation may range from the inclusion of internal company staff, to collaborating with business partners, to engaging wider groups of co-creators, such as non-business partners and locals (p. 424). In terms of depth, Nahi identifies four different purposes: boosting corporate legitimacy, increasing efficiency through new business models and ecosystems, promoting sustainability, and empowering poor communities (pp. 423-424).

The present thesis focuses on B2N partnerships that show a sufficient level of interaction to be categorized as a management alliance according to Rondinelli and London (2003). With reference to the distinctions made by Nahi (2016), these must be wide enough to include non-business partners (and possibly poor people), and deep enough to focus on sustainability (and possibly empowerment).

3.3.3 The Value of Non-Profit Organizations in Partnerships

One way in which NPOs can foster frugal innovation in collaboration with businesses is through intermediary platforms and competence centers. Gupta et al. see one of the benefits of intermediaries as reducing transaction costs between corporates and communities. As their “monetary and nonmonetary help” empowers local innovators, intermediaries make partnerships between corporations and local entities “much more viable than in the case when knowledge or ideas are in the raw form” (2016, p. 11). With an explicit focus on frugal innovation in the Austrian market, Tiwari et al. (2018) identify relevant levers through which platforms can accelerate frugal innovation in Western markets: awareness building, capacity building, and cooperation with emerging markets (as well as the adaption of domestic innovation policies) (p. 48). To enhance awareness among businesses, the authors suggest information events for companies and industry associations, the establishment of competence centers on frugal innovation to share knowledge and relevant contacts, and enhanced efforts to coordinate and communicate existing offerings (pp. 49-50). In addition, the study suggests training and consulting services in the area of frugal products and business-model innovations to build the needed capacities (p. 51). Lastly, the authors call for intensified cooperation with frugal innovation lead markets through the initiation and financial and institutional promotion of collaboration programs with international business and research partners (pp. 52-53).

Another form of NPO support is frugal innovation accelerators and funding schemes, usually targeting startups. According to Granqvist (pp. 20-21), the first category of schemes supports frugal innovations at the grassroots level through scouting, documenting, disseminating, and scaling. The second category supports frugal businesses as they improve their access to funds and business contacts. These schemes function as early-stage incubators, catalyzing mutual learning, technology-transfer, and joint development between countries. The third category supports the tackling of global challenges, seeking more efficient and innovative alternatives to development aid. Granqvist distills the services offered by such schemes (p. 23) into funding, including grants, loans, equity, or seed-funding, and advisory services including training and capacity building, business coaching, accelerator services, partnering, and ecosystem development. Schemes may further include awareness-raising, documentation and intellectual property services, research, feasibility studies, and product development.

The B2N literature further highlights the importance of NPOs beyond the context of frugal innovation. In their seminal work on B2N partnerships at the BOP, Webb et al. (2010) define a tripartite of NPO-benefits: “(1) acquire knowledge about social issues, especially at localized levels; (2) gain expertise in stakeholder management, with which NGOs are intimately familiar; and (3) obtain access to new markets and sources of innovation as they adapt to highly uncertain conditions and resource constraints” (p. 564). For Hahn and Gold (2014, p. 1329), the resources contributed by non-business partners include “basic knowledge and skills,” “access to local markets and supply chains,” and “legitimacy and [...] social capital.” In contrast to traditional markets where the central position within a supply chain often falls to large corporations, usually non-business partners take on this intermediary role in BOP markets, highlighting the importance of the “central position in the socio-economic network” (p. 1329).

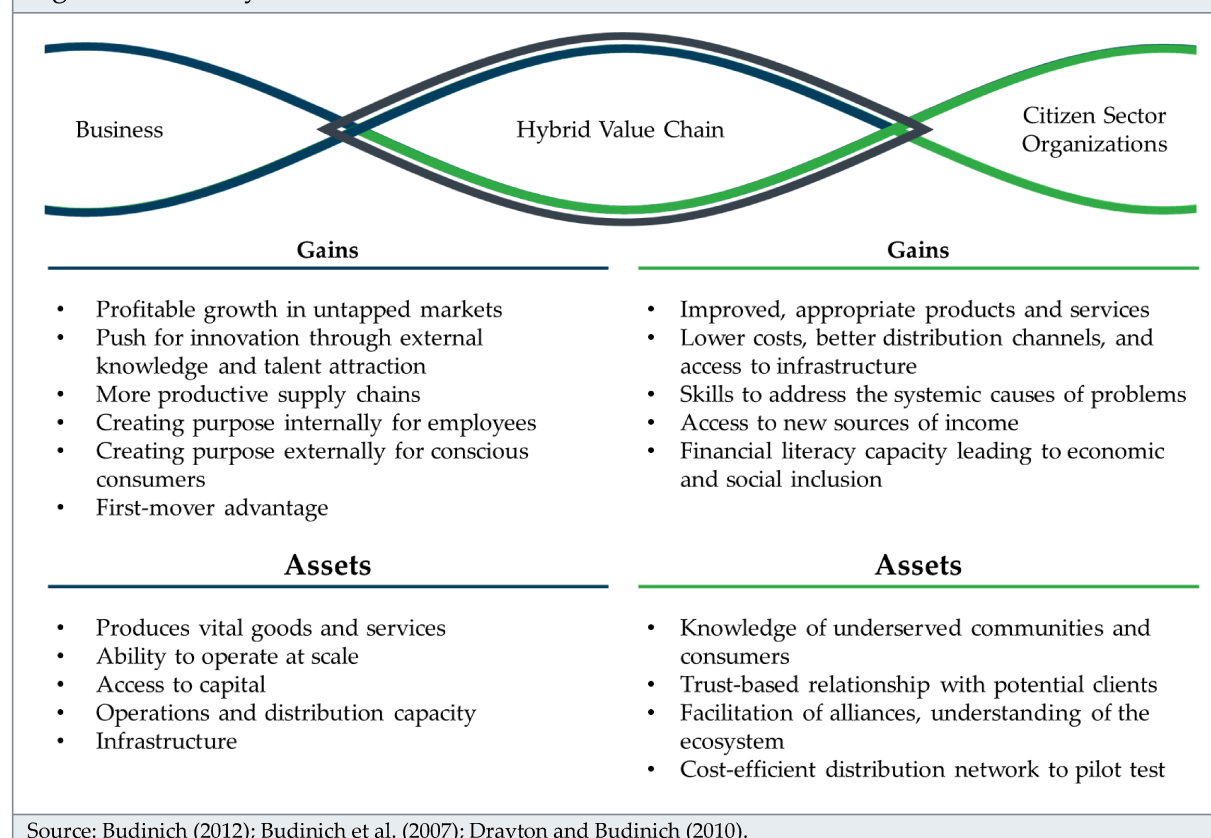
According to Dahan et al. (2010, pp. 326-327), NPOs can “enable corporations to overcome business model liabilities in developing countries by helping them to identify market shifts and trends, accelerating market entry, and in some cases, co-developing innovative new business models.” They further highlight the “market expertise,” “value of NGO brands,” and “ownership of—or access to—local distribution systems and local sourcing abilities” (p. 327).

London et al. (2010, p. 590) see the value of NGOs in “providing financing, technical and other resources, as well as building initial trust,” while Webb et al. view NGOs as “unique local alliance partners for multinationals to facilitate their entrepreneurship processes, serving society’s social needs while positioning the multinationals to gain financial benefits” (pp. 559-560). Further benefits with regard to customer-centricity include credibility and legitimacy in local communities (London et al., 2010, p. 590; Oetzel & Doh, 2009, p. 113; Van den waeyenberg & Hens, 2012, p. 1696), awareness of and responsiveness to customer needs and market conditions (Oetzel & Doh, 2009, p. 113; Schuster & Holtbrügge, 2014, p. 198), consumer education, behavioral change and feedback collection (Van den waeyenberg & Hens, 2012, p. 1697; Vermeulen et al., 2008, p. 378), and help in addressing consumer constraints (London et al., 2010, p. 590). Other benefits focus on business aspects, including insights into efficient production, promotion, sales, and distribution of the product (Sánchez & Schmid, 2013, p. 65); access to geographically and demographically remote groups (Oetzel & Doh, 2009, p. 115); and patience with long business cycles (Chesbrough et al., 2006, p. 58).

Hybrid Value Chains

One model for the partnership potential between businesses and NPOs is the Hybrid Value Chain™ developed by Ashoka (referring to NPOs as citizen sector organizations). Budinich (2012) defines it as “the chain of collaborative activities of private and social sector partners, along which products pass and gain economic and social value—more value than any one actor could have created alone.” As their agendas converge, companies hoping to enter BOP markets become “natural partners” for NPOs (Budinich, Manno Reott, & Schmidt, 2007, p. 2), with their alliance having the potential to tackle large-scale problems. These “win-win-win” partnerships, based on “mutual economic and social value creation,” draw on the relative strengths of the partners (Budinich et al., 2007, p. 2 & 6): “businesses offer scale, expertise in manufacturing and operations, and financing. Social entrepreneurs and organizations contribute lower costs, strong social networks, and deep insights into customers and communities” (Drayton & Budinich, 2010). The gains and assets that both parties acquire and contribute to the partnership are depicted in Figure 11. Combined, these partners can work on “large-scale problems that neither group has been able to solve on its own” (Drayton & Budinich, 2010).

Figure 11: The Hybrid Value Chain Model: Gains, Assets, and Barriers



Source: Budinich (2012); Budinich et al. (2007); Drayton and Budinich (2010).

3.3.4 Literature Summary

This section explores the definitions of NPOs, social enterprises, and B2N alliances:

- **NPOs:** Social-purpose type NGOs, development and aid agencies, and public development organizations that create value for beneficiaries beyond their own members and that focus mainly on operational work (as opposed to advocacy).
- **Social Enterprises:** For-profit and non-profit organizations taking an entrepreneurial approach to addressing social issues and creating positive social value.
- **B2N Partnerships:** Cross-sectoral partnerships between at least one (social) enterprise and one NPO partner, with both parties' involvement including mutual investment of resources and adaption of internal processes to achieve the parties' common goal.

This chapter highlights NPO contributions for business partners to overcome access barriers to EMDEs. These comprise (1) *Knowledge and Experience*, (2) *Network*, (3) *Reach*, and (4) *Social Capital*, and they ground the theoretical framework (see coding in Appendix 10).

Table 6: NPO Resources to Enhance Market Access for Businesses (Excerpt)	
Categories	Sub-Categories
Knowledge and Experience	
Customer Knowledge	Consumer knowledge, feedback collection, knowledge on local communities, knowledge on consumer behavior
Market Knowledge	Knowledge on competition, ecosystem, institutions, local customs, knowledge on social and economic context, social issues, political advice
Social-Business Experience	Experience with social business, impact assessments, mission-driven, sources of innovation, untried approaches
Network	
Brokerage	Brokerage, partner identification, partner selection
Distribution	Access to distribution channels, distribution, distribution systems
Network	Access to stakeholders, field access, local embeddedness, network
On-site Premises	Meeting space, on-site facilities, warehousing
Sourcing	Contacts to suppliers, sourcing, supply of local resources
Staffing	Procurement of labor, recruitment, staff
Reach	
Education	Awareness building, education, product demonstration, training
Marketing	Piloting, promotion, social marketing
Social Capital	
Legitimacy	Acceptance, legitimacy, long-term presence, political goodwill
Trust	Brand value, credibility, reputation, trust
Source: Various authors, see full list in Appendix 10.	

4 Theoretical Framework

This chapter explains the theoretical lens of this research. Even though Hahn and Gold (2014, p. 1322) underline the “explanatory potential of an established framework,” the field of frugal innovation remains “in a state of infancy from a theoretical perspective” (Hossain, 2018, p. 930), with “no study [having] rigorously applied any of these theoretical perspectives” (p. 933). Regardless of this limited scope, authors such as Hoskisson, Eden, Lau, and Wright (2000) and Hossain (2018) review the field of frugal innovation from a theoretical perspective, revealing a range of underlying theories. Among these, the relational-view theory has been deemed most suitable for the present thesis as it emphasizes the value-creating mechanisms within organizational relations, reflecting the contributions of NPOs in B2N partnerships.

Following the call for a more rigorous application of theory, this chapter introduces the *Relational View* (4.1) as the theoretical frame of this study. Building on this framework and on the literature on frugal innovation and B2N partnerships, the next section introduces the *Initial Theoretical Framework* (4.2) that guides the empirical analysis.

4.1 Relational View

The relational view is grounded in the seminal work of Dyer and Singh (1998). The theory argues that “a firm’s critical resources may span firm boundaries and may be embedded in interfirm resources and routines” (p. 660), thus setting a firm’s relationships as the unit of analysis for understanding competitive advantage. The theory focuses on the dyad and the network routines and processes of a company, with the resulting “relational rent” (p. 661) defined as the above-average profit that is jointly generated in interfirm relationships. The authors also refer to the “explosion in alliances” (p. 661) observed in practice, suggesting further study of the impact of company relationships on company performance.

Dyer and Singh identify four potential sources from which interorganizational partnerships generate competitive advantage: (1) relation-specific assets, (2) knowledge-sharing routines, (3) complementary resources or capabilities or both, and (4) effective governance (p. 662).

By investing in (1) interfirm relation-specific assets, firms build up assets specialized for a specific relationship that unfold their value in conjunction with the alliance partner’s assets (p.

662). According to Dyer and Singh (1998), these may include site-specific, physical-asset-specific, or human-specific assets. Apart from assets, firms can invest in (2) interfirm knowledge-sharing routines: institutionalized interfirm processes that facilitate knowledge exchange and joint-learning in partnerships. These routines are defined as the “regular pattern of interfirm interactions that permits the transfer, recombination, or creation of specialized knowledge” (p. 665). While relation-specific assets and knowledge-sharing routines focus on the joint aspects of partnerships, the third source of relational rents stems from complementary (3) resource endowments. Firms can leverage their own resources and capabilities by using them in conjunction with the complementary resources and capability endowments of their alliance partner. These “synergy-sensitive resources” are defined as “distinctive resources of alliance partners that collectively generate greater rents than the sum of those obtained from the individual endowments of each partner” (pp. 666-667). Lastly, partner firms can employ (4) effective governance mechanisms to lower the transaction costs of their alliance and increase the partners’ willingness to invest in relational rents (p. 669). Dyer and Singh thereby distinguish between third-party enforcement and self-enforcing agreements as governance structures, with the latter including both formal and informal safeguard mechanisms (p. 671).

Positioning of the Relational View

Focusing on company relations, the relational view offers a complementary view to two prominent, but hitherto isolated, perspectives: the resource-based view (RBV) (Barney, 1991), which focuses on internal resources of a single firm, and the industry-structure view (Porter, 1980), which considers the relative bargaining powers of a whole industry. The RBV explains above-average returns by considering a firm’s idiosyncratic resources and capabilities, and the industry-structure view roots them in a firm’s association to a specific industry with favorable characteristics. Given its broader focus, the relational view complements and expands the RBV as it locates sources of competitive advantage beyond company boundaries (Hahn & Gold, 2014, p. 1322; Lavie, 2006, p. 641). Furthermore, Lavie (2006, p. 642) mentions the theory’s influence on transaction cost theory, given its focus on governance structures.

Suitability of the Relational View in Innovation and BOP Research

Since its creation in 1998, many researchers have applied the relational view to management, and more specifically, to innovation, B2N partnerships, and BOP literature (see Appendix 11). Sánchez and Schmid (2013) apply the framework to assess the performance of BOP projects, differentiating between the contributions of the corporate, the private or public agency, and the target community partner. Hahn and Gold (2014) explicitly enlarge the relational view to include collaborations with non-business actors in BOP markets, noting that this “broader conception of relationships brings about new partnership characteristics” (p. 1322). Similarly, but drawing from both the resource-based and relational view, Schuster and Holtbrügge (2014) examine the benefits of corporate partnerships with partners in business, government, and civil society when entering BOP markets. More recently, Grimm and Gilbert (2019) use the concepts of the relational view and relational rents to analyze the determinants of economic and social-value creation in B2N partnerships at the BOP.

Given the high importance of partnerships in BOP and emerging markets, many authors appreciate the relational view as a suitable theoretical lens. As noted by Sánchez and Schmid (2013, p. 61), the relational view “may contribute to BoP research because so much of the success of BoP projects depends on specific resource combinations that develop from the unique partnerships among the organizations involved in BoP projects.” Furthermore, Grimm and Gilbert (2019, p. 184) interpret the concept of “relational rent” as congruent with the mutual economic and social value created in B2N partnerships. These various uses of the relational view by prior researchers in this field thus qualify it as a suitable theoretical lens for the present research.

Application of the Relational View

To tailor the concept of the relational view to the specific goal and context of the present research, certain modifications were made to the original concept.

Inter-Organizational Relations: While the traditional relational view considers inter-*firm* relations, the present research enlarges this concept to include NPOs as non-firm partners and therefore to inter-*organizational* relations. This enlargement of scope of the original concept aligns with previous applications in B2N contexts (Arya & Lin, 2007; Hahn & Gold, 2014).

Focus on Synergy-Sensitive Resources: The present research singles out the pillar of synergy-sensitive resources—comprising both organizational assets and capabilities—as the sole unit of analysis, as described and substantiated in Section 2.2. To allow for an in-depth analysis of this lever, the other three cornerstones of the relational view (assets, knowledge-sharing routines, and governance mechanisms) are excluded, resulting in a partial application of the relational view. While those pillars lie outside the scope of this research, some scholars have also noted their reduced relevance in the B2N context; these scholars have suggested that investments in partner-specific assets are less likely for NPOs (Grimm & Gilbert, 2019, p. 187) because NPO contributions are usually “non-tangible assets, such as information and know-how, local access and networks, and social capital” (Hahn & Gold, 2014, p. 1329). Similarly, while acknowledging the risk of opportunistic behavior and thus the relevance of governance mechanisms, Rivera-Santos and Rufín (2010b, p. 58) suggest that the “overall risk associated with opportunism may not be as acute in B2N alliances as it is in B2B [business-to-business] alliances between competitors.” They also refer to the different context of NPOs, often rendering conventional mechanisms such as equity-based hostages legally or financially impossible (p. 58).

Focus on Value Creation: This thesis focuses on the value created in partnerships, rather than its appropriation, capture, or distribution. This approach parallels that of comparable work on B2N alliances in emerging markets, with Dahan et al. (2010, p. 335) stating that while “complementary social and economic value is being created [...] it would be difficult to quantify precisely the benefits to the different types of collaborators.” Similarly, Hahn and Gold exclude rent generation and its effect on competitive advantage and focus instead on value creation (2014, p. 1322). Furthermore, they point out that value creation usually differs between B2N and B2B alliances, with the latter focusing on private goods, while the former usually includes public goods as well. Given this complementarity, the authors argue that value appropriation is circumvented and thus of lesser relevance in B2N partnerships (p. 1323).

Innovation Development Process: The framework is applied throughout the frugal-innovation process, which consists of the following—mostly chronological—stages: conceptualization (research, idea development, and prototyping), implementation (product development and market entry), and growth (within and across markets), derived from the frugal-innovation and B2N literature (Granqvist, 2016; Neumann et al., 2018; Webb et al., 2010).

4.2 Initial Theoretical Framework

To conclude the theoretical part of this thesis, the NPO resources that enhance market access for business partners, extracted from the B2N literature (see summary on page 67 and Appendix 10), are entered into a preliminary framework along the innovation development process.

The first stage, the conceptualization of the innovation, is mostly dominated by the *Knowledge and Experience* endowments of the NPO. As the target markets are “mostly uncharted territory” (Hahn & Gold, 2014, p. 1329) for the business partner, they often lack even basic firsthand knowledge of them. In contrast, the local embeddedness of the NPO allows it to provide deep *Customer Knowledge* and *Market Knowledge*, which are vital to thoroughly grasp the market’s needs. Hahn and Gold note that larger, yet locally connected NPOs are particularly suited for this translation of local knowledge, as they “are nevertheless still rather close to the MNCs in terms of organization and mindset” (2014, p. 1329), as compared to the end-user to which they provide access. In addition to local knowledge, NPOs can complement the often more profit-oriented rationales of businesses with their *Social Business Experience*, ranging from a mission-driven mindset to more specific skills, such as impact assessments. In combination with business resources, this social business experience can further ignite innovative solutions (Schuster & Holtbrügge, 2014, p. 198; Webb et al., 2010, p. 564).

In the subsequent implementation stage, the *Network* resources of the NPO come into play. As EMDEs are often more decentralized and substitute informal institutions and intermediaries for formal ones, businesses may lack access to the local ecosystem. In this situation, NPOs can either provide direct access to resources of their own or serve as a *Broker* to facilitate access to resources in the market through their experience and “information-rich position in the socio-economic network” (Hahn & Gold, 2014, p. 1329). These resources include their general *Network*, and the more specific *Staffing*, *Sourcing*, and *Distribution* systems that NPOs can identify, select, and connect business partners to. As an intermediary, NPOs thus help to leverage the resources, sourcing systems, and distribution networks already in place, which often were inaccessible to business partners acting alone (Hahn & Gold, 2014, p. 1329). Thus, being legitimized by the NPO is also beneficial for local entities, enabling them to cooperate and do business with the foreign business partner (Webb et al., 2010, p. 567). Additionally, NPOs can provide (access to) *On-Site Premises* in the early stages of the initiative.

Once the product has been successfully launched, market growth, including the scaling of the product within and across markets, constitutes the last stage of the innovation development process. While the NPO's *Reach* resources—namely *Customer Education* and *Marketing*—are also somewhat relevant in the implementation phase, their main contribution is in the growth stage. Especially in cases where frugal solutions become accessible to certain customer segments for the first time, customers must be made aware of the product and its benefits and sometimes even need to be trained in its correct use. Given the closer and more trusting relationship of NPOs with the target audience, they are well situated to support this market-scaling from the customer's perspective.

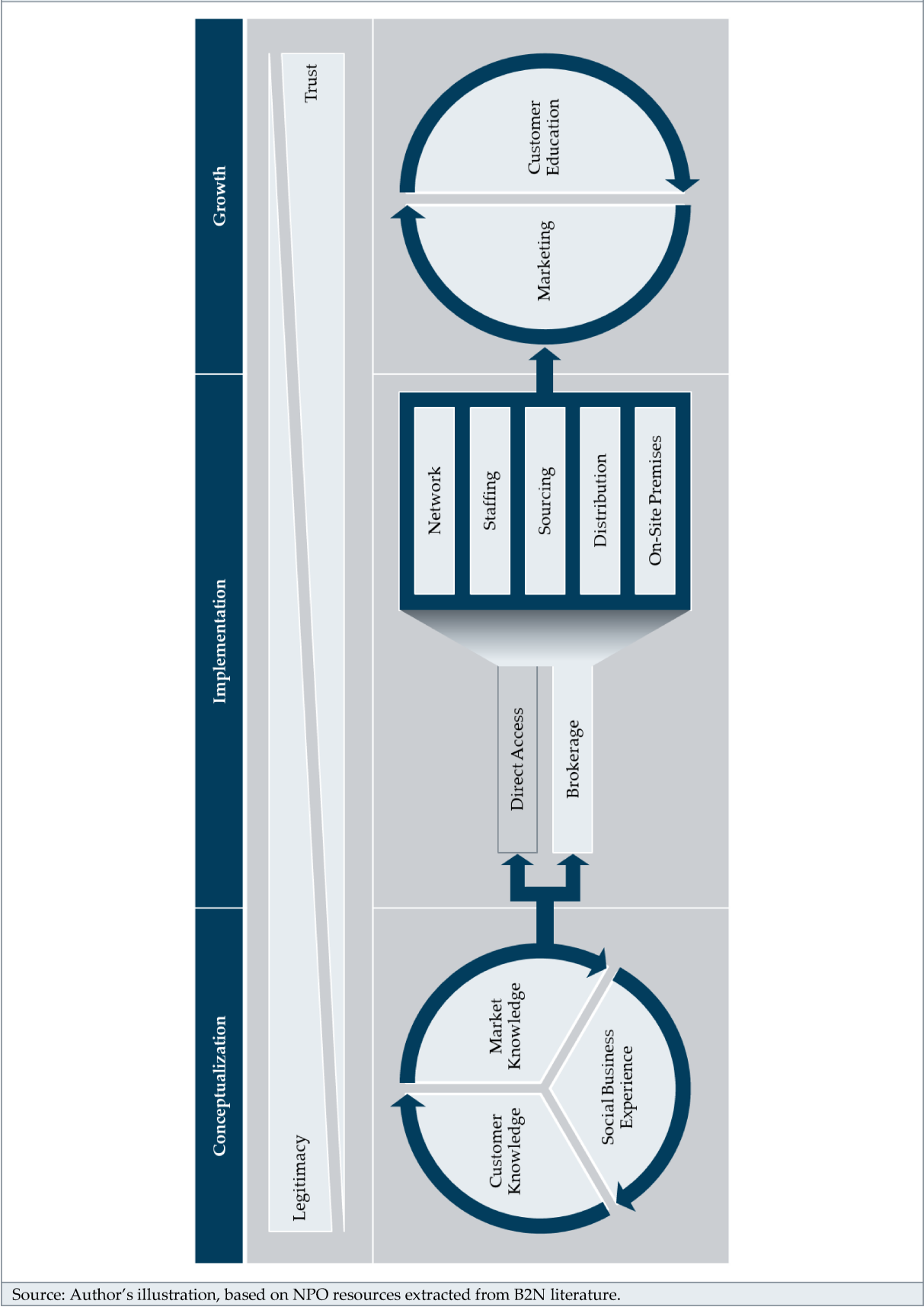
Lastly, the *Social Capital* of an NPO, that is, the *Legitimacy* and *Trust* it receives from external parties, is an overarching resource that facilitates the whole innovation process. However, there is a shift in the relative weights of these two endowments. In the beginning, the legitimacy of an NPO is of superior importance, as businesses often need to justify their license to operate in markets previously overlooked by foreign companies. As the innovation development progresses, more importance is gained through the trust placed in the NPO and thus in the partnership, especially with respect to the customers' buying decisions.

Further Development of the Framework

Combining the frugal-innovation and B2N partnership literature streams and the theoretical perspective of the relational view, the initial theoretical framework depicted in Figure 12 concludes the theoretical part of the present thesis.

This framework serves as a reference model for the empirical analysis, during which it will be verified, adapted, and improved to reflect the insights of practitioners and the specific context of frugal-innovation development in EMDEs. The first part of the empirical analysis, namely the expert interviews, results in the empirically adapted framework (see Section 5.3), which serves as an improved guide for the subsequent case study research. During the second stage of the empirical analysis, the insights derived from these case studies illustrate the framework with case knowledge (see Sections 6.2–6.5), which are later compared and discussed (see Chapter 7) to conclude this research.

Figure 12: Initial Theoretical Framework: NPO Resources for Frugal Innovation



Source: Author's illustration, based on NPO resources extracted from B2N literature.

5 Expert Interviews

This chapter summarizes the first part of the empirical phase: the research, analysis, and interpretation of the expert interviews, which further developed the theoretical framework. The chapter first illustrates the *Interviewee Overview and Selection Criteria* (5.1) and outlines how the research processed the *Interview Findings* (5.2). It concludes by introducing the resulting *Empirically Adapted Framework* (5.3), including the synergy-sensitive resources through which NPO partners can accelerate the development of frugal innovation.

5.1 Interviewee Overview and Selection Criteria

As this study combines different areas of research, the interviewees—divided into experts and case representatives—were drawn from a variety of positions. The experts were selected to represent a thematic focus on frugal innovation or B2N partnerships, as well as an NPO, business, or external perspective. The case representatives were selected to illustrate a combined focus of frugal innovation within a B2N alliance. The combination of both groups of interviewees resulted in the categorization of Table 7. While this selection ensures a balanced intake of perspectives, the differences are gradual, with some interviewees spanning both groups.

Table 7: Categorization of Expert Views

	A) NPO Perspective	B) Business Perspective	C) External Perspective
1) Experts: Frugal Innovation Focus	NPO experienced in frugal innovation development	Business experienced in frugal innovation development	External expert on frugal innovation
2) Experts: B2N Partnership Focus	NPO experienced in B2N alliances	Business experienced in B2N alliances	External expert on B2N alliances
3) Case Representatives: Combined Focus	NPO experienced in frugal innovation development with a business partner	Business experienced in frugal innovation development with an NPO partner	
Source: Author's illustration.			

Experts were selected based on criterion sampling. The selection criteria, listed below, are to be understood as complementing the thesis' focus criteria for NPO and business partners, as outlined in Section 1.3.

General Criteria

- *Quality*: The organization is highly respected or frequently mentioned in the relevant literature (except for new businesses launching frugal innovations) and the interviewee is from the highest available level of hierarchy directly involved in the project.
- *Diversity*: Combined, the organizations cover all perspectives and foci in Table 7 (except the yet under-researched external view on B2N alliances for frugal innovation).

Frugal Innovation Focus Criteria

- *Thematic link*: The organization is, or has been, involved in developing or promoting frugal innovation. Alternatively, other forms of RCI in EMDEs can substitute for an explicit focus on frugal innovation.
- *Diversity in size*: Combined, the organizations address frugal innovation in ventures of various sizes, from startups specifically founded around frugal solutions to larger enterprises already established in multiple markets.
- *Diversity in geographic focus*: Combined, the organizations cover frugal innovation in EMDEs and Western high-income countries.

B2N Partnership Focus Criteria

- *Thematic link*: The organization is or has been involved in (facilitating) partnerships focused on joint innovation between at least one NPO and one business partner. Organizations providing an external perspective should include this facilitation service in their offering.
- *Innovation type*: The resulting innovation should approximate a frugal type of innovation, including social or other forms of RCIs for EMDEs.
- *Diversity in geographic focus*: Combined, the organizations cover B2N partnerships from the perspectives of EMDEs and Western high-income countries.

Case Criteria

- *Alignment with research focus*: The organizations, partnerships, and resulting innovations align with the research focus outlined in Section 1.3.

Experts: Frugal Innovation Focus

1) *NPO Perspectives on Frugal Innovation*

The first perspective on frugal innovation is provided by experts from NPOs involved in promoting such specific innovations. *InnoFrugal* is among the best-known organizations focusing on awareness and capability-building for frugal innovation in Western companies. More generally, the development organization *BRAC* positions itself as a supporter of social innovation in general, but their *Frugal Innovation Forum* makes the explicit link to this kind of innovation. Similarly, *Hatch CoLab* in Switzerland and the *SELCO Foundation* in India accelerate social innovations of a more general kind, with the latter focusing specifically on cases in resource-constrained environments.

2) *Business Perspectives on Frugal Innovation*

The second perspective stems from startups and medium-sized companies from Western markets developing frugal innovations for EMDEs. *Gradian Health Systems*, headquartered in the United States and with offices in Kenya and Tanzania, developed affordable ventilators and anesthesia machines designed to work in resource-constrained environments, while *Hemolytics*, a Swiss startup, develops affordable diagnostic tools for malaria. Complementing these healthcare innovations with insights from another sector is Switzerland-based *hiLyte*, which introduced solar-powered off-grid energy solutions for the Tanzanian market. The latter two have furthermore received a degree of NPO support, thereby offering insights from multiple angles.

3) *External Perspectives on Frugal Innovation*

A third view is taken by external experts on frugal innovation, including highly regarded academic entities such as the *EXTREME - Design for Extreme Affordability* program at Stanford University and the *Frugal Innovation Hub* at Santa Clara University in the United States, as well as the *EPFL (École polytechnique fédérale de Lausanne) EssentialTech Centre* in Switzerland. Complementing the academic institutions are the independent research organizations *Centre for Social Innovation* in Austria and the *Fraunhofer Society* in Germany, with the latter one incorporating frugal innovation expertise in the *Institute for Systems and Innovation Research (ISI)*.

Experts: B2N Partnerships Focus

1) NPO Perspectives on B2N Partnerships

The first perspective on B2N partnerships is provided by international NPOs. The NGO *World Vision International* regularly works with other-sector partners in its Digital for Development and Innovation division. *PLAN*, an international NGO focused on children's rights, was selected for its involvement in the co-development of a frugal energy solution launched in Uganda (*PLAN Finland*), as well as for its membership in the innovative Zurich Flood Resilience Alliance (*PLAN Switzerland*). Shifting to international organizations, the *International Federation of the Red Cross (IFRC)* is an active member in the same alliance, while the *World Food Programme* as a supra-national development agency works together with and develops entrepreneurial solutions for EMDEs (among other services).

2) Business Perspectives on B2N Partnerships

The complementary view on such partnerships is that of business partners. These companies are involved in partnerships with international NPOs to jointly develop frugal innovations, or at least ones that are resource-constrained or social. The *Z Zurich Foundation of Zurich Insurance* is an initiator of the Zurich Flood Resilience Alliance introduced above and has been actively collaborating with a range of NPOs. In addition, *Dimagi*, based in the United States with offices in India and South Africa, specializes in digital solutions developed in collaboration with governments and NGOs, including the above-mentioned World Vision International.

3) External Perspectives on B2N Partnerships

The external experts on B2N partnerships belong to neither side of the alliance but function as facilitators. These include the organizations *Swissnex India* and *Switzerland Global Enterprise*, both initiated and supported by the Swiss government. These organizations often offer cross-sectoral connections as they provide Swiss companies with a soft landing into emerging markets. Additional insights come from the *Humanitarian Innovation Exchange and Accelerator* of the *Swiss Agency for Development and Cooperation*, which actively sources and develops affordable innovations for EMDEs and introduces them to local stakeholders.

Case Representatives: Combined Focus

In addition to expert interviews, the framework development also feeds from interviews with case representatives of frugal assistive technology innovations developed in B2N partnerships. For a better understanding, the case representatives are listed below grouped along their alliances instead of their perspectives. Their insights are detailed in Chapter 6, which also features more in-depth portraits of the involved NPOs and social enterprises.

Combined Perspectives on Frugal Innovation in B2N Partnerships

The first case of frugal innovation in the AT market is the Swiss startup *Project Circleg*, developing accessible high-quality prostheses. To enter the Eastern African market, they are working together with the German NPO *Pro Uganda*, which has a local presence in Uganda to treat amputees on site.

Also focusing on mobility aids, U.S.-based *MiracleFeet* provides a range of software and hardware solutions to treat the negative impact of untreated clubfoot. For their work in Tanzania, they collaborate with the *Tanzania Clubfoot Care Organization (TCCO)*, a network of medical and paramedical professionals working on clubfoot in Tanzania.

Shifting to AT for vision impairment, the United Kingdom-based *Peek Vision* provides a range of eye health software solutions to facilitate the delivery of care in EMDEs. In Zimbabwe, they collaborate with *Zimbabwe Council for the Blind (ZCfB)*, a leading non-profit provider of eye services in Zimbabwe, and *CBM*, an international NGO focused on disability-inclusive development.

The fourth case is the Germany-based *OneDollarGlasses (ODG)*, producing affordable and robust glasses designed for use in low-income regions. For their work in Bolivia, they are collaborating extensively with the NPO *Hostelling International Bolivia (HI Bolivia)*, which offers a range of social projects and volunteering opportunities alongside its primary work as a global hostel chain. In addition, ODG is supported through the *empowering people.Network (epN)* of the German foundation *Siemens Stiftung*.

An overview of all interviewees of this research is provided in Table 8 below.

Table 8: Selection of Experts and Case Representatives			
Perspective	Organization	Position	Name
Experts: Frugal Innovation Focus			
NPO	InnoFrugal	Founder & President	Venkata Gandikota
NPO	BRAC (incl. Frugal Innovation Forum)	Head, Programme and Enterprise Communication	Sarah-Jane Saltmarsh
NPO	Hatch CoLab	Head, Ecosystem Development	Lorenzo Niola
NPO	SELCO Foundation	Program Manager	Shahaab Javeri
Business	Gradian Health Systems	Communications Manager	Rati Bishnoi
Business	Gradian Health Systems	Market Strategy Associate	Sofia Stafford
Business	Hemolytics	Founder	Dr. Jonas Pollard
Business	Hemolytics	Head, Business Development	Lan Tran
Business	hiLyte	Co-Founder & CTO	David Lambelet
External (R&A)	Stanford Design for Extreme Affordability	Lead Professor	Prof Dr. Stuart Coulson
External (R&A)	Frugal Innovation Hub (Santa Clara University)	Director, Programs and Partnerships	Allan Báez Morales
External (R&A)	EPFL EssentialTech Centre	Head, Humanitarian Division	Dr. Grégoire Castella
External (R&A)	Fraunhofer Institute for Systems and Innovation Research (ISI)	Coordinator, Innovation Trends and Knowledge Dynamics	Dr. Henning Kroll
External (R&A)	Centre for Social Innovation	Project Manager (prev.)	Dr. Kaisa Granqvist
Experts: B2N Focus			
NPO	World Vision International	Program Manager, Global ICT4D	Andrew Ogongo
NPO	Plan Finland (prev.) / Fingo	Senior Specialist (prev.) / Advisor, Innovation and Development	Mika Väitalo
NPO	Plan Switzerland	Program Coordinator	Manuel von der Mühlen
NPO	International Federation of the Red Cross (IFRC)	Senior Officer, Floods Resilience	Francisco Ianni

NPO	World Food Programme (prev.) / NutriPride Foods Africa	Programme Policy Officer (prev.) / Founder	Yutaro Oka
Business	Zurich Foundation	Senior Manager, Climate Change and Partnerships	David Nash
Business	Dimagi	Director, Customer Success	Erin Quinn
External (Gov.)	Swissnex India	Head, Startup Partnerships	Prateek Khare
External (Gov.)	Switzerland Global Enterprise	Internationalization Consultant	Philip Morger
External (Gov.)	Humanitarian Innovation Exchange and Accelerator / Swiss Agency for development and cooperation	Project Management Public Outreach Humanitarian Aid and SHA	Susanna Graf
Case Representatives: Combined Focus			
NPO	Pro Uganda	On-Site Workshop Lead	Dieter Scharwatt
NPO	Tanzania Clubfoot Care Organization (TCCO)	Program Manager	Emmanuel Kowero
NPO	Council for the Blind Zimbabwe	Director	Aplos Nyathi
NPO	Hostelling International Bolivia	President	Max Steiner
NPO	Siemens Stiftung	Development Cooperation / Head of Unit	Christine Janezic
NPO	Siemens Stiftung: empowering people.Network	Head of Network	Carola Schwank
Business	Project Circleg	Co-Founder	Fabian Engel
Business	MiracleFeet	Director, Program Operations	Amanda Springer
Business	Peek Vision	Co-Founder & CEO	Dr. Andrew Bastawrous
Business	Peek Vision	Head, Programme Partnerships	Farhana Rehman-Furs
Business	OneDollarGlasses	Founder	Martin Aufmuth
Source: Own illustration. Abbreviations: R = Research; A = Academia; Gov. = Governmental Institution; prev. = previously			

5.2 Interview Findings

The interview findings allowed for the testing and adaption of the initial theoretical framework to the reality of practitioners working within frugal innovation and B2N partnerships. This section presents the synthesized findings resulting in the empirically adapted framework.

Coding Procedure

The lens of synergy-sensitive resources and the initial theoretical framework served as a starting point to identify mentions of NPO resources in the interviews, which totaled 1,048. Using QCA, these mentions were iteratively coded into categories based on conceptual similarity, resulting in 44 *sub-resources*. To further reduce the level of granularity, these sub-resources were consolidated into 19 *resources*. Subsequently, these were classified into broader pillars or innovation phases to embed them within the empirically adapted framework. These new (sub-)resources are summarized in Table 9 and Table 10 below.

Distinction Between Assets and Capabilities

To allow for a more nuanced view, and in line with the theoretical definition in Section 4.1, the umbrella term “resources” was split into “assets” and “capabilities.” This division allows differentiation between NPO assets that exist independently of the partnership, on the one hand, and those activities the NPO performs for the alliance partner, on the other hand. The analysis led to six distinct NPO assets and 13 NPO capabilities (in combination still referred to as “resources”) which can be leveraged to accelerate frugal innovation. While assets are possessed independently of the partnership, capabilities can be associated with the phase of the innovation development process during which they are most relevant (see below).

Phases

The initial framework’s phases (“conceptualization,” “implementation,” “growth,” “overarching”) have been revised threefold: First, the “conceptualization” phase has been renamed to “development” phase, to reflect its explorative character. Second, the “growth” phase has been subsumed under the “implementation” phase, as there was substantial overlap in relevant

NPO capabilities in these two phases. Third, an additional phase of “discovery” was added at the beginning of the process to better capture the customer-centric nature of frugal innovation. Accordingly, the empirically adapted framework follows the process of “discovery,” “development,” and “implementation,” accompanied by an “overarching” element.

Revised Synergy-Sensitive Resources

Based on the interviews, all 13 initial resources were revised to a varying degree. This section retraces these revisions, while Table 9 and Table 10 present the final labeling in overview.

In the discovery phase, “Market Knowledge” and “Customer Knowledge” were subsumed as sub-assets under “Local Understanding,” considering the many overlaps between them. Furthermore, “Customer Knowledge” was redefined as “User Empathy,” as customers and users of frugal innovations are often different parties and NPOs are mostly valued for their deep understanding of the latter. In addition, the resource “Social Business Experience” was reformulated as a “Topic Expertise” asset. This shift can be explained with the change in business partners: In shifting from MNCs as the focus of the B2N literature towards social enterprises as the focus of this research, a different type of expertise became synergy sensitive.

While the interviews confirmed all the resources of the implementation phase, certain changes were made to their naming and hierarchy. “Network,” renamed “Stakeholder Network,” was subsumed as a sub-asset of “Stakeholder Access,” while “Brokerage” was generalized to the broader capability of “Market Accessing.” The previous standalone resources “On-Site Premises,” “Sourcing,” and “Distribution” were merged into the sub-asset “On-Site Infrastructure,” subsumed under “Structures,” due to each term’s low significance in the interviews. In addition, the previous “Sourcing” and “Distribution” resources also feed into the sub-capability “Procurement,” to better distinguish between their asset character and capability character. Similarly, “Staffing,” the concluding initial resource of the implementation phase, was split into the sub-asset of “Human Resources” and the sub-capability of “Staffing.”

The two initial resources of the growth phase, “Marketing” and “Customer Education,” raised reservation among interviewees, as the traditional communication efforts of NPOs may jeopardize their credibility. Therefore, the two were combined into the sub-capability “Awareness Raising” to better characterize the scope and NPO character of this activity.

The overarching social capital resources “Trust” and “Legitimacy” were rearranged to increase their tangibility and distinctiveness. An NPO’s social capital is now described through the asset “Trust,” consisting of the sub-assets “Brand Value” and “Legitimacy,” and the asset “Stakeholder Access,” including “Embeddedness” and “Stakeholder Network.”

Added Synergy-Sensitive Resources

In addition to revising the initial resources, nine new capabilities were added to the framework (while no new assets were added). Two new capabilities were added in the discovery phase (“Opportunity Definition” and “Advisory”), while four new capabilities constitute the development phase (“Co-Development,” “Testbed Provision,” “Feedback Provision,” and “Impact Assessment”). One new capability appears in the implementation phase (“Monitoring”), and two new capabilities in the overarching phase (“Integration” and “Financing”).

In contrast to the initial theoretical framework, the empirically adapted framework comprises 14 sub-assets and 30 sub-capabilities to further detail the resources across the framework and to provide more tangible descriptions of them. These sub-categories are depicted in Table 9 and Table 10 and detailed in Section 5.3.

Relative Weights

The number of times a resource was mentioned in the interview process allows an approximation of its relative weight (although the coding was performed aiming at a relatively even distribution to ensure a comparable significance of the resources at each level; see numbers in parentheses in Table 9 and Table 10). The most often mentioned sub-assets are “Stakeholder Network” (44), “Embeddedness” (38), and “Market Knowledge” (38), highlighting the importance of an NPO’s strong ties to the local market. This focus mirrors the most frequently mentioned sub-capabilities, namely “Connections” (53), “Training” (53), “Coaching & Support” (52), and “Government Advocacy” (51), which in turn strongly focus on leveraging the local context in which the NPO is embedded.

Illustration

In contrast to the initial theoretical framework, the empirically adapted framework refrains from illustrating the resources in a process-like manner. The previous format confused interviewees about the distinction between the NPO resources and the overall innovation development process (which would also include business resources). Consequently, the new format depicts the resources as individual elements that can be chosen independently of each other.

Overview

Table 9 and Table 10 list the assets and capabilities resulting from the expert and case interviews, grouped by their respective pillars (for assets) or innovation phases (for capabilities). The numbers in parentheses indicate the count of the mentions in the interviews, while the delta indicates areas of alteration to the initial theoretical framework.

Table 9: NPO Assets Derived from Expert and Case Interviews		
Asset	Sub-Asset	Delta
A. Knowledge		
A.1. Local Understanding (60)	Market Knowledge (38)	Revised
	User Empathy (22)	
A.2. Topic Expertise (47)	Technical Expertise (28)	Revised
	Entrepreneurial Expertise (19)	
B. Social Capital		
B.1. Stakeholder Access (82)	Stakeholder Network (44)	Revised
	Embeddedness (38)	
B.2. Trust (27)	Brand Value (16)	Revised
	Legitimacy (11)	
C. Operating Vehicle		
C.1. Structures (60)	Legal Entity (13)	Revised
	On-Site Infrastructure (26)	
	Scaling Structures (21)	
C.2. Operating Drivers (61)	Ongoing Programs (18)	Revised
	Human Resources (20)	
	Financial Resources (23)	
Source: Own illustration; number in parentheses indicates count of mentions in interviews.		

Table 10: NPO Capabilities Derived from Expert and Case Interviews		
Capability	Sub-Capability	Delta
1. Discovery		
1.1. Opportunity Definition (26)	Opportunity Identification (16)	Added
	Need Definition (10)	
1.2. Market Access (76)	Connections (53)	Revised
	Field Visits (23)	
1.3. Advisory (62)	Data & Reports (10)	Added
	Coaching & Support (52)	
2. Development		
2.1. Co-Development (37)	Requirement Setting (12)	Added
	Own Contribution (25)	
2.2. Testbed Provision (55)	User Selection & Access (30)	Added
	Product Integration (25)	
2.3. Feedback Provision (48)	User Feedback Gathering (15)	Added
	Own Feedback (33)	
2.4. Impact Assessment (29)	Impact Analysis (19)	Added
	Long-Term Planning (10)	
3. Implementation		
3.1. Implementation (62)	Strategic Planning (20)	Revised
	Procurement (18)	
	Operations (24)	
3.2. Capacity Building (93)	Staffing (12)	Revised
	Training (53)	
	Multiplication (28)	
3.3. Monitoring (50)	Supervision (10)	Added
	Impact Evaluation (17)	
	Reporting (23)	
4) Overarching		
4.1. Integration (83)	Partner Involvement (32)	Added
	Government Advocacy (51)	
4.2. Enablement (52)	Awareness Raising (20)	Revised
	Facilitation Services (9)	
	General Advancement (19)	
4.3. Financing (42)	Funding (30)	Added
	Funding Access (12)	
Source: Own illustration; number in parentheses indicates count of mentions in interviews.		

5.3 Empirically Adapted Framework

The initial theoretical framework from Section 4.2 is revised and adapted based on the interview findings. This section guides readers through this revised framework, highlighting the different resources that NPOs provide along the innovation development process, illustrated in Figure 13 below.

5.3.1 Assets: The NPO's Endowment

To support frugal innovations, NPOs revert to a range of six assets that can be grouped into three pillars: *Knowledge*, *Social Capital*, and *Operating Vehicle*.

5.3.1.1 Knowledge

The first asset pillar is the NPO's *Knowledge*, often complementary to that of its business partners, including the assets *Local Understanding* and *Topic Expertise*.

Local Understanding

The NPO's *Local Understanding* comprises its *Market Knowledge* and *User Empathy*.

At the core of an NPO's local understanding lies a deep *Market Knowledge*, including both market and competitive dynamics and social, economic, legal, political, and religious systems—or, as coined by one business representative, “that 20,000-foot view of the broader country context” (Quinn, 9 April 2021). In that same vein, Peek Vision's NPO partner was “able to understand all the nuance of the culture, the language, the relationships, which is absolutely core to making it work” (Bastawrous, 8 April 2021). Familiarity with the country's development agenda is thereby especially important, as frugal innovators design products fitting local constraints. If planned improvements in public infrastructure or healthcare provision are not considered, products may target challenges that will be solved in the near future.

Narrowing the focus from the market to the user, NPOs possess a deep *User Empathy* to understand the user the innovation is designed for, their needs and alternatives, their social, economic, and religious context, and—important for frugal innovation—their obstacles and

constraints. As stated by one expert, “if you’re going to do something that’s affordable, you need to understand what affordability means to your clients” (Báez Morales, 16 July 2020).

Topic Expertise

The NPO’s *Topic Expertise* is rooted in its *Technical Expertise* and *Entrepreneurial Expertise*.

NPOs who themselves operate in the domain of the innovation can contribute to the partnership with their *Topic Expertise*. Tapping into this additional knowledge can be hugely advantageous for the business partner, especially if there are differences in the processes, standards, or stakeholder interactions between the origin and target market of the innovation.

Depending on their positioning, NPO partners can provide further knowledge in the area of *Entrepreneurial Expertise*, including knowledge of the local business logic and founding processes, as well as of topics such as organizational development, growth, and financial independence. As one expert put it, the NPOs “understand how the system works and how the business model can be made profitable” (Granqvist, 3 September 2020).

5.3.1.2 Social Capital

The second asset pillar concerns the NPOs’ *Social Capital*, which depends strongly on their local presence and social mission and consists of the assets *Stakeholder Access* and *Trust*.

Stakeholder Access

The NPO’s *Stakeholder Access* features their *Stakeholder Network* and their local *Embeddedness*.

Foreign business partners can face hurdles when accessing local ecosystems, as EMDEs are often decentralized and substitute formal institutions and intermediaries with informal ones. Thus, the *Stakeholder Network* of NPOs is a crucial asset, including relations to the government and regulatory authorities, companies, other NPOs, and political and social decision makers locally, regionally, nationally, or internationally.

Beyond their knowledge of and contact with local stakeholders, NPOs also profit from their deeply rooted *Embeddedness* in the local ecosystem, allowing them to leverage this network. This embeddedness is reflected in their long-standing presence on site, their tight and trusting

relationships with local stakeholders, and a workforce local to the region and speaking the local language(s). One NPO expert described this asset as follows: “We don’t go to the field; we are in the field. We never leave the field; we are from the field” (Saltmarsh, 30 August 2020).

Trust

Closely connected to the embeddedness is the *Trust* placed in NPOs, which is critical in the discovery and development phases, as they require an intimate relationship with the local community. This trust is comprised of an NPO’s *Brand Value* and *Legitimacy*.

The NPOs’ *Brand Value* often develops over an extensive period of time based on their work and accomplishments in their social mission. Depending on the strength of their brand value, NPO partners are more widely recognized, associated with more positive attributes, and perceived as more credible, easing their interactions with various stakeholders. As such, an NPO with a well-known brand name was deemed by one expert to “have a different weight to it [...], as it has a higher degree of credibility” (Ianni, 22 April 2021).

NPOs may also enjoy *Legitimacy* to be active in their field, which is heavily based on their inherent non-profit logic, their social mission, and their previous work in the focal area. Business partners, especially if foreign to the country, might lack this legitimacy, which one business representative formulated thus: “[We] have no credibility in that space, it would be impossible to do, which is why we need to work with NGOs” (Nash, 16 April 2021).

5.3.1.3 Operating Vehicle

The third asset pillar concerns the *Operating Vehicle* that NPOs have in place, consisting of the incumbent *Structures* and *Operating Drivers*.

Structures

The NPO’s *Structures* comprise its *Legal Entity*, *On-Site Infrastructure*, and *Scaling Structures*.

NPOs are usually construed as a *Legal Entity*, including licenses and value added tax (VAT) numbers, especially if monetary transactions, legal employments, or (international) logistic

chains are involved. In addition, they can have *On-Site Infrastructure* including their own premises with relevant machinery and equipment, as well as logistic systems for sourcing and distribution. NPOs can further leverage *Scaling Structures* if they are present in multiple countries. Their offices in different locations can be used by the business as “a very good door opener to an additional market” (Morger, 18 December 2020), as the same NPO can serve as a partner organization for multiple countries. Thus, larger NPOs can scale frugal innovations across markets, allowing the social enterprise to “piggy-back on those relations already built” (Báez Morales, 16 July 2020).

Operating Drivers

NPOs' *Operating Drivers* include *Ongoing Programs*, *Human Resources*, and *Financial Resources*.

Often contrary to foreign partners, NPOs have functioning operations in place that the innovator can access instead of having to implement its own systems. First, these operations comprise *Ongoing Programs*, through which the NPO regularly interacts with users, and which can serve as “host systems” for the implementation of the innovation. Second, some of the NPO's *Human Resources*, including employees and volunteers, can be put into the service of the partner to conduct operations on site. Lastly, certain types of NPOs can provide a partner with *Financial Resources* in the form of project-based grants or ongoing support.

Summary

In sum, to accelerate frugal innovation, NPOs can leverage six assets comprising 14 sub-assets, grouped into the following three pillars and illustrated in Figure 13:

- A) *Knowledge*: Local Understanding and Topic Expertise
- B) *Social Capital*: Stakeholder Access and Trust
- C) *Operating Vehicle*: Structures and Operating Drivers

5.3.2 Capabilities: The NPO's Activities

Complementing the synergy-sensitive assets, NPOs support frugal innovations through diverse capabilities. Although overlaps exist between these capabilities, they can be grouped along the innovation development process, divided into the discovery, development, implementation, and overarching phase.

5.3.2.1 Discovery Phase

The first phase of the innovation process is the discovery phase, allowing the innovators to gain a deep understanding of the local market and its relevant stakeholders. During this phase, NPOs bridge the foreign business partner with the local environment through their *Opportunity Definition*, *Market Access*, and *Advisory* capabilities.

Opportunity Definition

NPOs conduct *Opportunity Definition* through *Opportunity Identification* and *Need Definition*.

Due to their physical proximity to the market, NPOs can ignite innovations through *Opportunity Identification*, drawing their business partner's attention to unsolved challenges and the viability of the underlying opportunity. For example, after seeing an unrealized opportunity in the local market, one NPO representative actively approached possible business partners, convincing them of the envisioned project (Välitalo, 27 July 2020). In cases where business partners have a pre-existing innovation, NPOs can help identify the most appropriate use for it, either in terms of target group or geographic region of focus.

Once the opportunity is identified, NPOs can use their local understanding and user empathy to elaborate the *Need Definition* of the proposed solution, as business partners usually lack an intimate understanding of the local context. As put by one business representative, their NPO connection supported them in "identifying gaps and having an ear to the ground in terms of what needs may be occurring" (Bishnoi, 5 August 2020). This point is mirrored by Ogongo (16 March 2021), emphasizing that such innovations "are not [done] for yourself, they are [done] for other people. You need to be in their shoes to understand their requirements."

Market Access

Once the innovation opportunity is defined, NPOs can facilitate their business partner's *Market Access* through *Connections* and the organization of *Field Visits*.

As EMDEs are often based on informal institutions, foreign businesses can face hurdles in accessing these ecosystems. The information-rich position of NPOs allows them to offer *Connections*, as they identify, select, and connect local stakeholders with a business partner, potentially providing (linguistic and cultural) translations. These stakeholders range from those in high-ranking positions to people who “do the dirty work in the field” (Tran, 18 November 2020), often inaccessible to the business partner on their own. Being curated by the NPO is thereby also beneficial to the local parties, as it enables them to do business with the foreign partner. Aside from connections to local market actors, NPOs can facilitate contacts with funders, other NPOs, and other relevant stakeholders on an international level.

Furthermore, NPOs can organize *Field Visits*, allowing the business partner to experience the local environment firsthand. These immersive visits range from roadshows, networking events, home visits, and shadowing experiences (where the innovator silently observes the user engaged in a certain activity), as well as the accommodation of the business partner. Through such experiences, NPOs can play a “ground reality role by getting people in to see what it looks like [on site]” (Saltmarsh, 30 August 2020).

Advisory

Beyond experiencing the local context themselves, business partners can profit from an NPO's *Advisory* capabilities, comprised of *Data & Reports* and *Coaching & Support* activities, each based on the local understanding and topic expertise they possess.

The first way that NPOs can impart their long-standing experience is by providing the business partner with *Data & Reports*. This activity includes the provision of publicly available or commissioned research studies to shed light on the frequently under-researched realities of resource-constrained customers. Similarly, NPOs can be a valuable steppingstone in the innovation development process, sharing data about their own operations and experiences that the business partner can then build on.

Furthermore, NPOs can offer *Coaching & Support* on a wide range of topics. First, they can provide technical support by exchanging and developing ideas together or by letting the partner observe their own operations. Second, they can provide strategic support and act as a sparring partner on business development topics, and third, they can inform the business about local market customs. This aspect often includes building the right mindset for development efforts and RCI. As one NPO expert described their work, “it is about the projects, but mostly, it is about transferring the mindset” (Javeri, 30 September 2020). This also requires the “un-learning” of traditional methods and preconceived opinions about the local context, as businesses are advised to “leave all [their] judgments and concepts back home and try to just shut up and listen” (Báez Morales, 16 July 2020). The NPO partner can either provide this support itself or link the business partner with the relevant experts, coaches, and peers.

5.3.2.2 Development Phase

Based on insights from the discovery phase, the innovation reaches the development phase (although these phases usually occur iteratively in a loop of experimentation, measurement, and adjustment). In this phase, the NPO partner can support the innovation through the capabilities *Co-Development*, *Testbed Provision*, *Feedback Provision*, and *Impact Assessment*.

Co-Development

The NPO’s *Co-Development* capability comprises *Requirement Setting* and *Own Contribution*.

To guide the innovation development, the NPO can provide the *Requirement Setting* for the solution, including the exact need and target group, solution specifications, and desired user experience. In the case of Hemolytics (Pollard & Tran, 18 November 2020), the NPO provided a target product profile with optimum and minimum values for the innovation. These included categories based upon the costs of the device and usage, the time needed for the procedure and staff training, the technology’s specificity, and the sensitivity of the test results. This NPO support “reduces the problem to one of a technological nature,” as it provides the frugal innovator with “somebody speaking the language of the company” (Kroll, 6 October 2020).

Beyond setting the requirements, NPOs can provide their *Own Contribution* to the innovation development, as they “have their own role also as developers of ideas in the process” (Kroll, 6 October 2020). Although some experts voiced that not all types of NPOs would be strong contributors to the product development, some NPOs interviewed showed successful instances of co-development, as they were “actively part of the design, testing, piloting, and giving feedback, [in what] was a genuinely joint project” (Välitalo, 27 July 2020).

Testbed Provision

Once the innovation takes form, NPOs can contribute with a *Testbed Provision*, including *User Selection & Access* and *Product Integration*, to test the solution at different stages of maturity.

To optimize testing conditions, NPOs can support *User Selection & Access* by recommending the place, time, and target group to their business partner, facilitating access to users. One NPO representative supported their business partner by selecting those amputees among their patients who were most suitable to test the partner’s prosthesis prototype and invited these patients to their local workshop (Scharwatt, 20 July 2021).

If NPOs are actively involved in the testing, they can further offer *Product Integration*. Such integration allows the business partner to integrate its product in the ongoing operations and sales channels of the NPO to distribute them and test their efficacy and perception in real-life circumstances. As such, “frugal innovations can be integrated as components of already existing projects, [which] create a ready-made platform for testing” (Välitalo, 27 July 2020).

Feedback Provision

After testing innovations in the field, NPOs can advance the product development through *Feedback Provision*, be it through *User Feedback Gathering* or the provision of *Own Feedback*.

NPOs can support *User Feedback Gathering* either through interviewing users directly or by bringing relevant stakeholders together in focus groups. Because of their trusting relations with local stakeholders, NPOs are better suited to overcome cultural barriers preventing users from voicing (especially negative) feedback, as these users “are particularly not going to say that to somebody who just turned up” (Saltmarsh, 30 August 2020).

Beyond collecting user feedback, NPOs can offer their *Own Feedback* to evaluate different aspects of the innovation, including the potential of the innovation, the quality of the technology, or its fit for a specific usage. As one expert put it, “An NGO can better judge if a solution really fits the market, as a barrier can be very hidden sometimes” (Morger, 18 December 2020). One example of NPO feedback is given by Hemolytics, whose NPO partner assessed their malaria diagnosis technology by sending partially infected blood samples and comparing Hemolytics’ diagnosis with their own results (Pollard, 18 November 2020).

Impact Assessment

Enlarging the scope of feedback, NPOs can further support the innovation through an *Impact Assessment*, including *Impact Analysis* and *Long-Term Planning*.

As external partners often lack an in-depth understanding of the complexity of local systems, frugal innovations might cause unintended side-effects, harming the user or the local environment. To avoid causing problems, NPOs can perform an *Impact Analysis* of the innovation, evaluating its quality and sustainability, its short- and long-term impact on the community, and their safety and security, as well as the impact and potential risks of the innovation on religious, societal, or gender norms. As one expert stated, “that is the claim we have from the ‘Do No Harm’ principle—to not just play guinea pigs [with the communities]” (Graf, 27 May 2021).

Another impact area of an innovation project concerns its *Long-Term Planning*. As put by one expert, “the biggest problem that we see with people coming in is that they are starry-eyed and just don’t think about the long-term impact of what they are doing” (Saltmarsh, 30 August 2020). Therefore, NPOs can assess the long-term sustainability of the project, regarding the involvement of the business partner, the NPO, and potential third parties over time. The goal is to ensure that the project does not run an increased risk of being discontinued prematurely, leaving the involved communities vulnerable. One NPO representative thus claimed that at “the moment you are starting a project, you also need to have that exit in mind” (Ogongo, 16 March 2021).

5.3.2.3 Implementation Phase

With the development phase concluded, the subsequent implementation phase erects the systems to bring the innovation to market, including the NPO's capabilities of *Implementation*, *Capacity Building*, and *Monitoring*.

Implementation

Operating in EMDEs can be challenging for small foreign businesses, as key infrastructure and formal institutions are yet being built. For this reason, NPOs can support the innovation's *Implementation* on the ground via *Strategic Planning*, *Procurement*, and *Operations*.

Leveraging their understanding of the local context, NPOs can support the *Strategic Planning* of the project, including parameters such as the definition of the price of the frugal innovation or the selection of organizations to partner with. But it can also entail the complete strategic planning on the ground, such as with MiracleFeet, where “[the NPOs] need to give us a strategy of how many clinics they are going to open, how many children they are going to treat, and what metrics they are going to collect” (Springer, 24 April 2021).

Beyond the strategic planning, NPOs can support *Procurement* processes. This support occurs if NPOs procure the frugal innovation either for themselves or for third-party service providers on site. Alternatively, NPOs can identify third-party sourcing and distribution providers and link them to the business partner, thereby leveraging the existing local logistic resources which otherwise might have been inaccessible to foreign businesses. If the NPOs are operationally active, they can even support the *Operations* of the innovation, either by offering access to their own operating systems to co-use, or by taking on the operations themselves. For Peek Vision, the NPO partners “were effectively the implementers of the programs as it would be their teams who were doing the day-to-day activities” (Bastawrous, 8 April 2021).

Capacity Building

To run operations adequately, the implementation phase relies heavily on the NPO's capability of *Capacity Building* on site. This activity ranges from *Staffing*, to *Training*, to *Multiplication*.

As the innovation matures and businesses establish operations on site, they usually rely—at least partially—on the local workforce. NPOs can play a crucial role in the *Staffing* process, as they select and recruit suitable local employees or volunteers to the innovation venture. This capability allows the organization to be grounded in the local ecosystem, while bringing in local expertise.

Following the staffing of the workforce, NPOs can facilitate their *Training* in hard- and soft-skills. NPOs combine their own knowledge with their partner's knowledge and their understanding of the local context to build the capabilities required to operate the frugal solution in the local context. Apart from benefitting the business partner, this upskilling of local people may directly align with the NPO's inherent mission and beneficiaries.

A third approach to capacity building is *Multiplication*, where NPOs replicate the process in different settings. This replication can be done by cascading train-the-trainer activities, enabling implementing teams to themselves build capacity in other teams. NPOs can also multiply projects using their own scaling structures in other markets. As stated by one NPO representative, “once we develop an application for one country, we can easily roll it over to another country, only doing basic context customizations” (Ogongo, 16 March 2021). Similarly, one NPO office, usually the headquarters or the office in geographic proximity to the business partner, can function as a multiplier and diffuse the project across multiple of its offices.

Monitoring

Once operations are in place, NPOs can contribute their *Monitoring* capability, including the *Supervision* of operations, their *Impact Evaluation*, and the *Reporting* to the business partner.

In cases where the business partner lacks an ongoing presence on the ground, NPOs are well positioned to take on the *Supervision* of a project, which can include overseeing the operation of its own staff or third-party implementers, as well as the quality control of the logistics and production processes.

In line with the social component of frugal innovation, NPOs can support the *Impact Evaluation*, including setting metrics and evaluating the innovation's output, outcome, and impact. For OneDollarGlasses and its NPO partners, the impact evaluation included not only the

number of glasses manufactured and the quality of the optician's work but also the long-term persistence of patients wearing the glasses and the potential obstacles restricting them from doing so, as well as the impact of the glasses on patients' daily routines, classroom performance, or ability to find work (Aufmuth, 9 March 2021 & Janezic, 29 July 2021).

Linking the business with the operations on site, NPOs can further resume a role in *Reporting*, regularly transmitting the evaluation findings back to the business. This activity requires them to leverage their two-sided trust relations, because, as one business representative stated, "the only way to get to people is through that trusted conduit" (Nash, 16 April 2021). NPOs overseeing projects in multiple areas can also synthesize the communication flow from various local entities, serving as the business's single point of contact (von der Mühlen, 2021).

5.3.2.4 Overarching Capabilities

While some NPO capabilities are more relevant in certain phases of the innovation development process, others take on an overarching role and support the process continuously. These capabilities include *Integration*, *Enablement*, and *Financing*.

Integration

To embed the innovation locally and to eventually exit the partnership, NPOs can employ their *Integration* capability, comprising *Partner Involvement* and *Government Advocacy*.

On the one hand, local integration results from *Partner Involvement*, which is crucial for local project ownership and long-term success. Partners can include local businesses and service providers, other (in-country) NPOs, important decision makers and influencers, or the local community. As one NPO representative phrased it, "it is important that any party that you want to bring on board is part of it when you start the journey" (Ogongo, 16 March 2021).

On the other hand, local integration can occur through *Government Advocacy*, as frugal innovations often occur in essential sectors with strong government involvement. Having frugal solutions integrated into public structures can thus guarantee long-term funding; additionally, it can guarantee that the solutions are "mainstreamed to the general public, not just to a small group" (Saltmarsh, 30 August 2020). Advocating for government adoption, NPOs can conduct

regular meetings with local authorities; provide updates, reports, and proof of the project's impact; lobby for increasing buy-in from authorities; and build capacity within the government.

Both levers of integration eventually aim to make the innovation independent of the NPO, and, in some cases, even of the business. This “exiting” is supposed to put the innovation into the hands of a player with the long-term capacity to run it, which can either be the business itself or a local stakeholder. Because while their involvement can last a long time, “at the end of the day, NGOs are only supposed to facilitate, develop capacity, and leave the project for the beneficiary to continue running it” (Ogongo, 16 March 2021).

Enablement

Beyond their direct involvement, NPOs can pave the way for frugal innovations through *Enablement*, comprising *Awareness Raising*, *Facilitation Services*, and *General Advancement*.

As frugal solutions often target underserved communities, users might be unaware of the product and its correct use. Given their position of trust and their established channels, NPOs are well positioned for *Awareness Raising*, including introducing the product, leading technical training on its use and maintenance, and offering support in overcoming cultural, political, religious, or infrastructure-based barriers. Accordingly, NPOs organize meetings with community leaders and commission posters, radio announcements, or television spots. Beyond customer-centric communication, NPOs can use their credibility to significantly raise general visibility and public awareness for the topic through articles, public statements, or prize competitions.

Another form of enablement is *Facilitation Services*, through which NPOs ensure users' accessibility to the frugal product through pre-use and post-use services. This facilitation includes door-to-door services, complimentary transportation to treatment sites, early detection and referral services, and bookings of follow-up services. To provide these additional services, NPOs often work in multilateral collaborations with other NPOs, funders, or local authorities. In the case of Peek Vision, the “most successful programs are the ones that are either working hand-in-hand with health insurance providers [...], or the ones able to subsidize the cost of treatment working with other partners” (Rehman-Furs, 21 April 2021).

NPOs can further contribute to the *General Advancement* of the focal topic on a national, regional, or global level. This involvement includes strategic coordination with other players in the field to set agendas, standards, and metrics. To that end, MiracleFeet and all its NPO partners are members of the Global Clubfoot Initiative, a consortium dedicated to the elimination of clubfoot. “MiracleFeet alone can’t solve the problem of clubfoot globally, a lot of other organizations need to be involved. Together, we’ve developed a global strategy on how we could essentially eliminate clubfoot disability by the year 2030” (Springer, 24 April 2021).

Financing

Apart from their operational involvement, NPO partners can also play a role in the *Financing* of frugal innovations, be it through direct *Funding* or enabling *Funding Access*.

Larger NGOs and foundations can provide *Funding* if the frugal innovation aligns with their own social mission. As such, they can either provide crucial initial investments that ignite the business mechanisms of self-sustaining initiatives, or support projects with a more charitable financial model consistently with funds or in-kind donations.

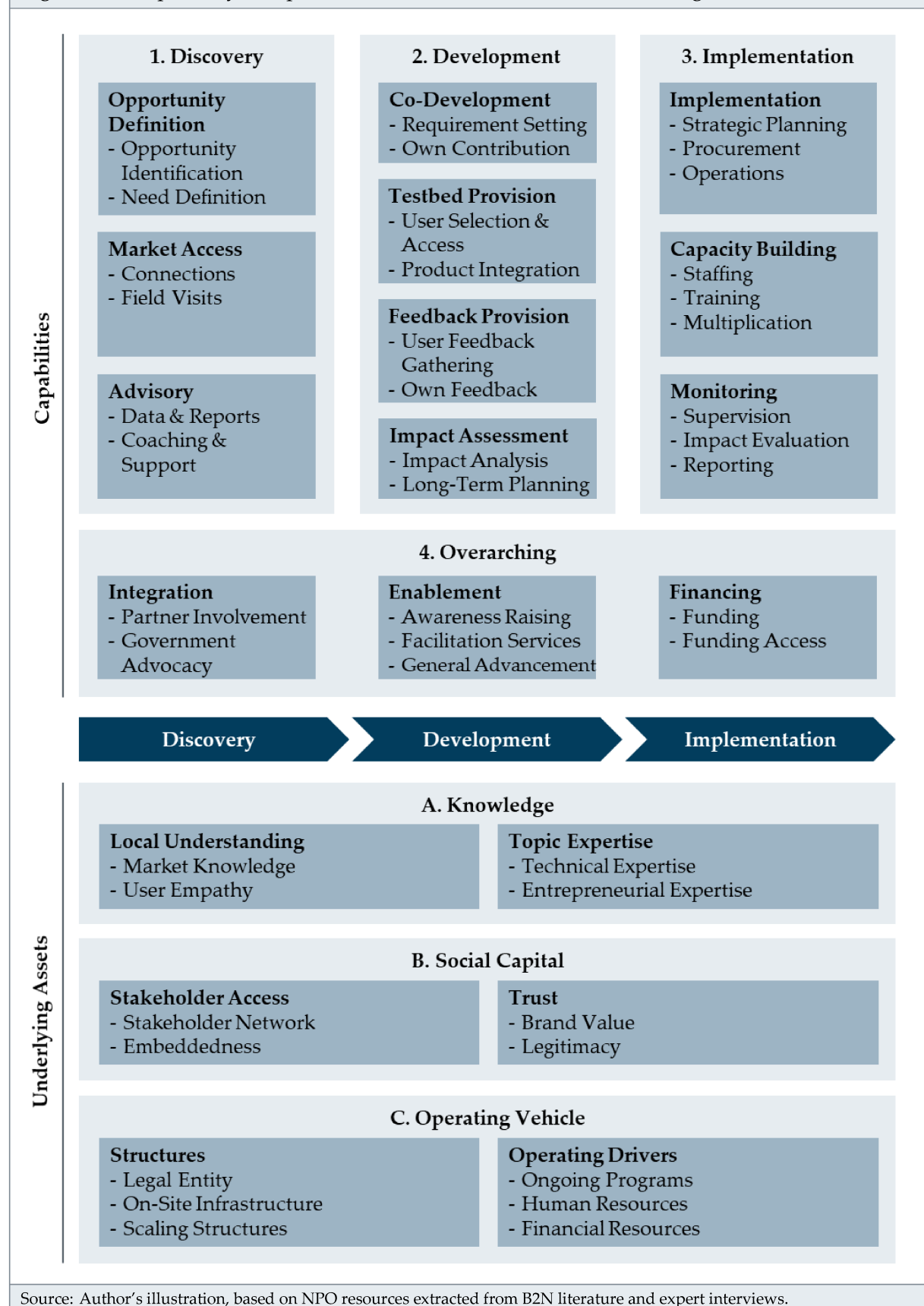
Alternatively, NPOs can support business partners by enabling *Funding Access*, be it through letters of support for credibility or through joint fundraising. As witnessed by one expert, “if you fundraise with a partner that is an important stakeholder in the development sector and has a good brand, it makes it easier to finance [a project]” (Castella, 30. April 2021).

Summary

NPOs can activate a total of 13 capabilities (further detailed into 30 sub-capabilities) to support partnerships for frugal innovations. These synergy-sensitive NPO capabilities can be grouped along the innovation development phases and are illustrated in Figure 13 below:

1. *Discovery*: Opportunity Definition, Market Access, and Advisory
2. *Development*: Co-Development, Testbed Provision, Feedback Provision, and Impact Assessment
3. *Implementation*: Implementation, Capacity Building, and Monitoring
4. *Overarching*: Integration, Enablement, and Financing

Figure 13: Empirically Adapted Framework: NPO Resources for Frugal Innovation



6 Case Studies

This chapter applies the empirically adapted framework to concrete cases within a single sector to derive specific and comparable case knowledge. The chapter first introduces the *Assistive Technology Market* (6.1) in which the case studies are situated. It then presents the four case studies of frugal innovation developed in partnership between social enterprises and NPOs. These cases include *Case 1: Project Circleg and Pro Uganda* (6.2), *Case 2: MiracleFeet and Tanzania Clubfoot Care Organization* (6.3), *Case 3: Peek Vision, Council for the Blind Zimbabwe, and CBM* (6.4), and *Case 4: OneDollarGlasses, Hostelling International Bolivia, and Siemens Foundation* (6.5). Each case study first introduces the partners involved and the resulting frugal innovation, then illustrates the NPO resources relevant in each case.

6.1 Assistive Technology Market

Assistive Technology (AT), a subset of health technology, is defined by the World Health Organization (WHO) as products that “maintain or improve an individual’s functioning and independence, thereby promoting their well-being” (2018a). Amongst others, assistive technologies include visual and hearing aids, wheelchairs, prostheses and other walking aids, communication aids, and learning materials and memory support, which can come in the form of low- or high-tech products and services (Assistive Technology Industry Association, n.d.). Assistive technologies are needed by different beneficiaries, including people living with disabilities, elderly people with age-related frailties, people affected by chronic health conditions and noncommunicable diseases, and people in need of rehabilitation (Tangcharoensathien, Witthayapipopsakul, Viriyathorn, & Patcharanarumol, 2018, p. 84). In line with this broad range of users, the Assistive Technology Industry Association (n.d.) defines AT as products that help “people who have difficulty speaking, typing, writing, remembering, pointing, seeing, hearing, learning, walking, and many other things.” Common to all ATs is their shared goal of “[enabling] people to live healthy, productive, independent and dignified lives, and to participate in education, the labour market and civic life” (World Health Organization, n.d.).

Beyond the direct benefits to the wellbeing of the user, AT can prevent or mitigate the effects of secondary health conditions, reduce the need for carers, formal health, and support services,

and delay or prevent the need for long-term care (World Health Organization, 2018c, p. 3; n.d.). Consequently, ATs entail socio-economic benefits ranging from reduced health system costs to better education and employment opportunities for both AT-users and their carers (World Health Organization, 2021, p. 2).

Market Size & Lack of Access

The WHO estimates that in 2018, over 1 billion people worldwide needed one or more assistive products—a number expected to double by the year 2030 due to the ageing of the population and an increase in noncommunicable diseases (World Health Organization, n.d.). In line with this expected growth, the AT market was valued at US\$15.4 billion in 2016, growing to US\$15.9 billion in 2018, and is currently forecasted to reach US\$20.1 billion by 2023 and US\$24.4 billion by 2025 (BBC Research, 2018; Statista, 2020b). Yet, even though the WHO considers access to AT a “fundamental human right” (2021, p. 1), a mere 5–15% of people worldwide can currently access required assistive products, with almost 200 million people lacking access to visual aids, for instance (2018a). While needs persist in all countries, the shortages are most prevalent in low-income countries, where estimates of unmet needs reach up to 97% (World Health Organization, 2021, p. 3).

The main barrier to AT in low-income countries is a lack of affordability, due to high costs and missing financing options (AT2030, n.d.; World Health Organization, n.d.). Yet, AT is often offered in stand-alone programs, disintegrated from national healthcare systems and global development agendas. As a result, AT is often either provided by the private sector at high up-front costs and through unevenly distributed healthcare facilities, or is dependent on erratic charity-based donations, which often ignore individual user needs or lack the necessary instructions and follow-up appointments (World Health Organization, 2021, p. 1; n.d.). The private market for AT is further characterized by a fragmented structure of relatively small companies and a concentration of purchasing power within intermediary bodies such as insurance companies, government authorities, or donor organizations, diminishing the influence of end users (De Witte, Steel, Gupta, Ramos, & Roentgen, 2018, p. 468).

While affordability is a prohibitive factor, access to AT in resource-constrained environments is further aggravated in different areas. In an attempt to conceptualize these interlinked

impediments, the WHO (2021, p. 4) defines three main challenges to accessible AT: first, limited demand, ensuing from sparse knowledge of AT, incomplete data and evidence, and persistent stigma and discriminatory policies; second, fragmented supply, resulting from shortages in workforces, unreliable procurement systems, substandard production, and the limited scope of AT standards; and third, a lack of political and economic support, stemming from high market barriers, international trade tariffs, national taxes, and restrictive over-regulation.

In an alternative framework, Tangcharoensathien et al. (2018) list four key sets of gaps contributing to the shortage of AT: The first comprises gaps between high need and low demand for AT, resulting foremost from the missing awareness among users, their carers, and healthcare providers (p. 85). The second consists of gaps in research, product design, and technology transfer, as AT is often insufficiently adapted to the environment and constraints of the users in EMDEs, hindering the transfer of existing AT from high-income markets (p. 86). The third comprises gaps in access to AT supply, stemming low-quality products, a lack of (government) funding, and a scarcity of trained healthcare workers (p. 86). Fourth, gaps in the evidence, due to the significant lack of high-quality data on the size of unmet needs, the market environment, and the effectiveness of AT in these contexts (pp. 86-87).

While these frameworks focus on the initial inaccessibility of AT, challenges continue after the AT is received. Inferior quality and inadequate provision, use, and maintenance impel up to 75% of users to eventually abandon the provided AT solution (World Health Organization, 2021, p. 3).

A directly consequence of a lack of access to appropriate AT is poorer health outcomes, resulting in severe and often chronic health problems for affected people. An indirect consequence of inaccessibility to AT is children being excluded from education and adults being excluded from the workforce (AT2030, n.d.). Consequently, exclusion from AT solutions can put people at risk of a vicious cycle: Poverty and the accompanying lower standards of health and safety increase the risk of disability and a subsequent need for AT, which in turn places an additional financial burden on people (World Health Organization, 2021, p. 3).

Solution Frameworks

Given the urgency of needs and the persistence of inaccessible AT, a range of international frameworks and legal obligations were developed. Although they primarily address national and international policy makers and international development actors, they explicitly extend into the realm of innovation and product development.

The first international legal obligation on AT was the United Nation's Convention on the Rights of Persons with Disabilities (CRPD) in 2006, since ratified by 175 member states. Ratifying countries are obliged to provide users with access to affordable AT, ensuring they can fully and equally enjoy all human rights and fundamental freedoms (World Health Organization, 2018c, p. 1). In terms of innovation, the convention requires countries to "undertake or promote research and development of, and to promote the availability and use of new technologies, including information and communications technologies, mobility aids, devices and assistive technologies, suitable for persons with disabilities, giving priority to technologies at an affordable cost" (United Nations, 2007).

Another international mandate promoting accessible AT comes in the form of the widely used SDGs of the United Nations, endorsed by its member states in 2015. The role of AT as a prerequisite for or facilitator of the SDGs is illustrated in the work of Tebbutt et al. (2016, p. 2), who argue that each of the 17 SDGs can be facilitated by AT, either as a mediator or as a moderator of an intervention. The authors conclude that "[w]ithout promoting the availability of assistive products, the SDGs cannot be achieved equitably " (p. 1).

Despite both frameworks, insufficient provision of AT persists in virtually all countries, leading the 71st World Health Assembly (WHA), the decision-making body of the WHO, to adopt resolution WHA71.8 in 2018. The resolution calls on countries to develop, implement, and strengthen policies and programs to improve access to AT (World Health Organization, 2021). Regarding innovation, it urges member states to "promote or invest in research, development, innovation and product design to make existing assistive products affordable; [...] in partnership with academia, civil society organizations, in particular with persons with disabilities and older persons and their representative organizations, and the private sector, as appropriate" (World Health Organization, 2018d).

To assist member states in fulfilling their commitments to CRPD and to concurrently comply with resolution WHA71.8 and the SDGs, the WHO launched the Global Cooperation on Assistive Technology (GATE) in 2014. GATE aims to “improve access to high-quality affordable assistive products globally” across people, policy, products, provision, and personnel (World Health Organization, 2018b). This multifaceted approach is echoed by authors such as Tangcharoensathien et al. (2018, p. 87), who call for action in awareness and demand, product development and adoption, financing and delivery, multisectoral action, and evidence.

This market overview again highlights the substantial need for affordable and appropriate AT for EMDEs, alongside the importance of the industry, civil sector organizations, and intersectoral collaboration. The subsequent case studies are thus in line with the existing calls for action, illustrating how B2N partnerships help to provide affordable AT.

6.2 Case 1: Project Circleg and Pro Uganda

The first case of frugal innovation in AT concerns Project Circleg and Pro Uganda, specifically their affordable lower-limb prosthetic system designed for EMDEs.

6.2.1 Case Introduction

Social Enterprise and Frugal Innovation

Project Circleg is a Swiss social enterprise in its startup stage. It is developing a lower-limb prosthetic system for amputees in low- and middle-income countries, with a specific focus on Eastern Africa. Created in 2018 as a spin-off from the industrial design degree program of the Zurich University of the Arts, it has since grown its Switzerland-based workforce to six employees. They are supported by a range of experts and Swiss and East-African orthopedic technicians. Project Circleg’s product is a lower-limb prosthetic system for above- and below-knee amputees, designed for patients in EMDEs. Apart from its affordable price, the product is designed for use in rugged and resource-constrained contexts, such as the ankle joint’s tolerance for sharp angles required for the use of squat toilets.

Furthermore, the modular components—a polycentric knee, a pylon, and a dynamic foot with an ankle joint—can all be individually adjusted and replaced. These components allow the product to be customized to each patient’s body measurements, activity level, and even color preferences, positioning the prosthesis as an aspirational product and thereby reducing stigma. In addition, the modular design and the limited number of components reduce the risk of spare part requirements and make a partially broken product easier to repair. In the same vein, they enable the simplified production, fitting, and maintenance of the prostheses, making them appropriate for practitioners with more moderate levels of education. Striving for a local and affordable product, the prosthetic system is designed to be made from readily available local plastic waste, reinforced and recycled under quality control.

Non-Profit Organization

The charitable association Pro Uganda e.V.⁵ improves orthopedic and physiotherapeutic care for people with amputations in Uganda. Founded in 2013, it is headquartered in Germany and has on-site presence in Kiyunga, Uganda. The orthopedic workshop in Uganda, under German leadership, employs multiple local employees.

Pro Uganda focuses on improving the quality of life of amputees in Uganda by building and fitting lower- and upper-limb prosthesis and providing physiotherapeutic follow-up care. These services are offered at its own orthopedic workshop in Uganda, including outreach campaigns to rural areas via its own mobile unit. It further provides on-site education and training to Ugandan orthopedists to promote high-quality orthopedic skills within the country. In parallel, Pro Uganda offers short-term stays to German orthopedists to apply their knowledge in a resource-constrained context and to gain experience in a different healthcare system. To coordinate the orthopedic care and exchange knowledge among orthopedic professionals nationally, Pro Uganda also actively builds a large network of aid agencies, care providers, and local authorities in Uganda.

⁵ e.V. = German “eingetragener Verein”, i.e., a registered voluntary association under German law.

B2N Collaboration

This B2N collaboration is preliminary, centered mainly around two immersive field visits that brought the Project Circleg team to Uganda in 2019 and 2021. The collaboration was initiated by Project Circleg, systematically reaching out to potential partners within their target market of Eastern Africa before their first field visit. At that stage, the social enterprise had already identified the problem and developed the first prototype independent of Pro Uganda. However, both sides are open to closer collaboration in the future and, once the product is viable, to integrating it into the NPO's operations.

6.2.2 Relevant NPO Resources

This section illustrates the underlying assets and capabilities that Pro Uganda possesses and leverages to support Project Circleg (see Figure 14).

Underlying NPO Assets

Pro Uganda leverages multiple assets, to cover all the framework's assets bar one.

Knowledge Assets

Since its founding in 2013, Pro Uganda's local presence allowed it to build substantial *Market Knowledge*, including the number of and types of local prosthetic care providers and their logistic processes, the local market size and price ranges, and local customs. This knowledge includes the range of Ugandan body and foot sizes, as "usually, we require smaller foot sizes for adults here, which we would use in Germany to treat a child" (Scharwatt, 20 July 2021). Through their regular patient interaction, Pro Uganda also possesses deep *User Empathy*. As such, they are familiar with the prevalent stigmatization of amputees and the resulting need for aesthetically appealing products, such as matching the locally present skin colors.

Pro Uganda acts as an orthopedic care provider itself, wherefore it possesses much *Technical Expertise* in the domain of prostheses development and fitting, as well as patient treatment. Their expertise includes the idiosyncratic standards and processes of the Ugandan prosthetic sector, as well as insights about (in)dispensable features of the product to keep it as simple as possible.

Social Capital Assets

As a local player, Pro Uganda built up a *Stakeholder Network* of private, charitable, and state-run orthopedic workshops, material suppliers, healthcare providers, and development organizations. Due to the informal market structure, “you inevitably build a network here, as you need to be as connected as possible” (Scharwatt, 20 July 2021). Beyond knowing these stakeholders, Pro Uganda also promotes a regular exchange with local workshops, including the exchange of material or volunteers, thus increasing its *Embeddedness* in the region.

However, neither side of the partnership felt that Pro Uganda enjoyed above-average *Trust* from the local population, presumably due to their stand-alone structure and short time in the market. However, this only moderate level of trust did not cause further difficulties, as both Project Circleg and Pro Uganda rated the Ugandan people as very open-minded and with low levels of mistrust towards foreigners.

Operating Vehicle Assets

In 2017, Pro Uganda built its own fully equipped orthopedic workshop as *On-Site Infrastructure* in Uganda, financed through its many donors. According to the NPO, “there is no other workshop [in Uganda] that works anywhere near as professionally as we do—whether it’s an NGO, a private, or a public one, they are all less equipped than we are” (Scharwatt, 20 July 2021). Pro Uganda is also a *Legal Entity* under Ugandan law, and its employees possess the necessary licenses to operate on patients, including a yearly renewed technical license and a work permit for its non-Ugandan residents, which is laborious to obtain.

Embedded in these structures, Pro Uganda runs *Ongoing Programs* in prosthetic care, to regularly build prostheses, fit them on patients, and provide those patients with post-treatment care. To do so, Pro Uganda’s *Human Resources* include a range of orthopedic and physiotherapeutic employees and volunteers, which are complementary to Project Circleg’s workforce focused more on industrial designers and engineers.

NPO Capabilities

Pro Uganda employs a range of partnership-related capabilities to accelerate the frugal innovation of Project Circleg, all of which occur in the discovery and development phase.

Discovery Capabilities

To experience the Ugandan prosthetic market first-hand, Pro Uganda invited Project Circleg twice on a two-week *Field Visit* to their local premises, which “opened a lot of doors to the Ugandan market” (Engel, 16 March 2021). This activity included various insights into Pro Uganda’s daily activities, as well as assistance in the travel and accommodation of the Project Circleg team. During this time, the NPO also facilitated a range of *Connections* between local stakeholders and the social enterprise. The focus was thereby on an exploration and product “roadshow” tour across the country, for which they selected the most relevant orthopedic workshops and, where possible, introduced them in advance to Project Circleg.

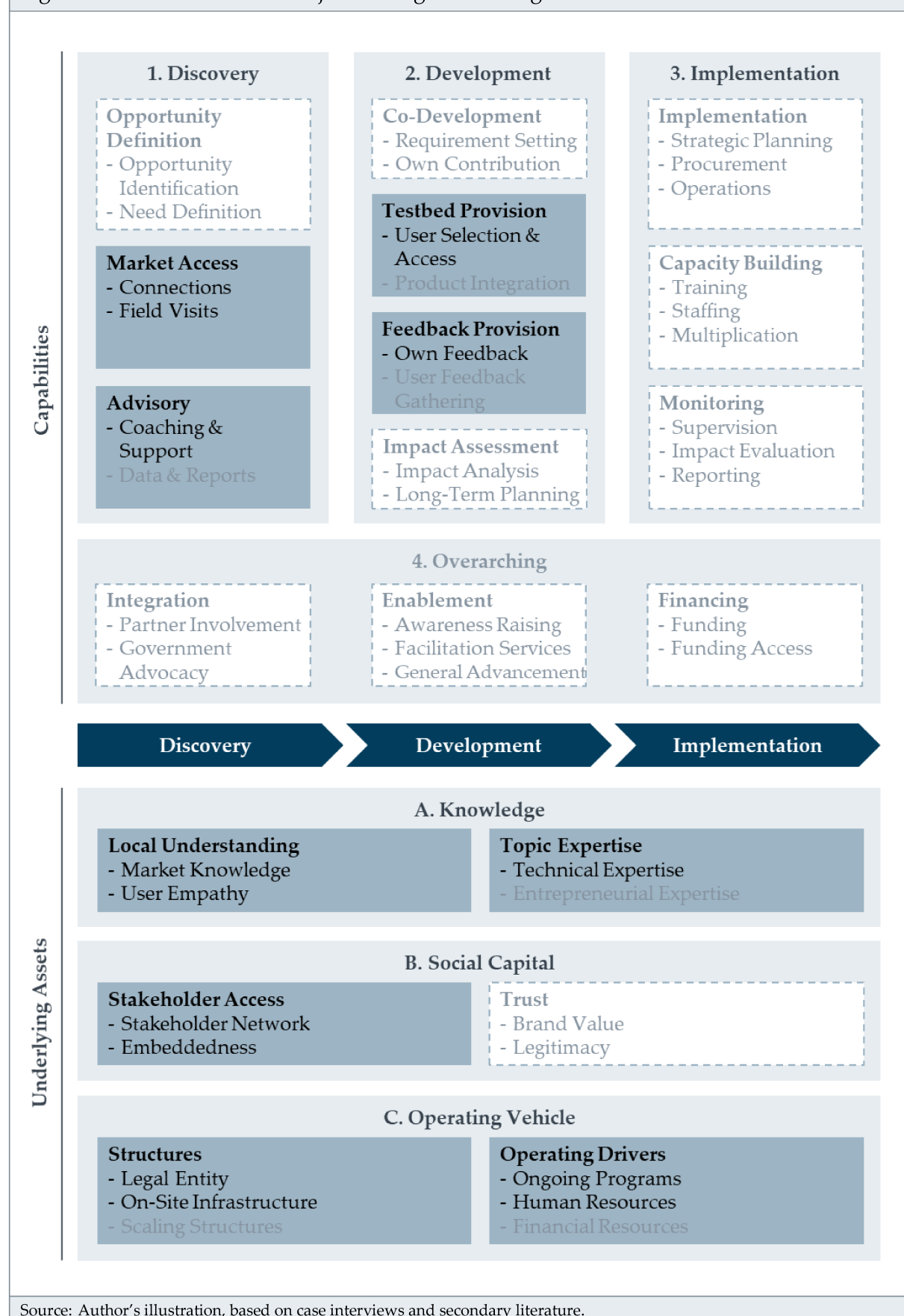
Furthermore, Pro Uganda offered Project Circleg *Coaching & Support* by letting it observe its operations and by sharing its own experience in interacting with various stakeholders, the hurdles and solutions it had encountered, and administrative support as well as language- and safety-related support to navigate Uganda. These insights were all based on personal experience, as “there are virtually no data reports here, at least none that you can rely on” (Scharwatt, 20 July 2021).

Development Capabilities

A central aspect of Pro Uganda’s support was its *User Selection & Access*. Based on its own database, it invited those patients to the workshop who were most compatible with Project Circleg’s solution, based on their body and foot size, potential previous interactions with the system, geographic proximity, and current prostheses adapter systems, which needed to be equivalent to the one of the prototypes. Pro Uganda’s orthopedists fitted these patients with a temporary Project Circleg prosthesis and, where required, even built a compatible shaft to do so. The patients tried them on for several hours, during which “they walked around on different surfaces: inside, outside, climbing stairs” (Engel, 16 March 2021). The NPO also invited a range of local orthopedists to its workshop to experience the product, as they are usually the decision-makers in prosthesis purchases.

Once the prototypes were tested, Pro Uganda’s employees offered their *Own Feedback*, including potential improvements of the prosthesis and the fitting process. As patients and external orthopedists were on site, their feedback was shared with Project Circleg directly.

Figure 14: NPO Resources: Project Circleg and Pro Uganda



6.3 Case 2: MiracleFeet and Tanzania Clubfoot Care Organization

The second case of frugal innovation in AT involves MiracleFeet and Tanzania Clubfoot Care Organization, featuring an affordable solution for clubfoot treatment.

6.3.1 Case Introduction

Social Enterprise and Frugal Innovation

MiracleFeet is a non-profit social enterprise that builds clubfoot⁶ treatment care in EMDEs. It was founded in 2010 in North Carolina, United States, and has provided organizational, technical, and financial support to over 320 clinics in 29 countries in Africa, Asia, and Latin America, which have together treated over 57,000 children (MiracleFeet, n.d.-b).

MiracleFeet partners with local healthcare providers in EMDEs, offering three distinct solutions: its MiracleFeet Brace, a mobile data collection app, and a range of training tools (MiracleFeet, n.d.-c). Its MiracleFeet Brace features shoes attached to a bar that keep the patient's feet in the proper position. This abduction brace is worn for 23 hours a day during the first three months of treatment, after which it is worn at night for up to five years. In partnership with Stanford's Extreme Affordability program, MiracleFeet developed this affordable brace system to cost less than US\$20 to produce (while comparable braces sold in high-income countries cost up to US\$1,000). The Food and Drug Administration (FDA)-registered brace also comes with a wider and stabler base, detachable shoes, and a colorful design to make it easier for parents to use and more enjoyable for children to wear.

To manage electronic patient records, improve clinic management, and track treatment quality across its global network of clubfoot care providers, MiracleFeet developed CAST, a unified mobile data collection app. The app allows the company to monitor and better understand indicators such as patient dropouts or treatment gaps, constantly improving the treatment.

⁶ Clubfoot is a congenital birth defect that causes one or both feet to turn inward and upward. As one of the most common birth defects, it affects approx. one in every 800 children. ([MiracleFeet, n.d.-a](#))

In partnership with the software developer Dimagi, MiracleFeet built CAST specifically for low-resource settings. As these settings often face insufficient internet access, CAST is offline-capable and optimized for use on mobile phones. The app also focuses on easy-to-use data entry and can be adapted to different languages and country contexts.

To ensure that these solutions are employed accurately, MiracleFeet provides a range of in-person and online training tools and services. At its core is the ACT curriculum (originally launched as “Africa Clubfoot Training”), which includes basic, advanced, and train-the-trainer modules in clubfoot treatment for low-resource settings. The curriculum was originally developed by the *Global Clubfoot Initiative* (see below) and transferred into a digital format for online use by MiracleFeet and OPENPediatrics. MiracleFeet also trains local care providers in building awareness, referral systems, and treatment networks in their respective country.

Non-Profit Organization I

The NPO Tanzania Clubfoot Care Organization is a coalition of medical and paramedical professionals in Tanzania providing treatment to children with clubfoot. While TCCO sits in the capital Dar es Salaam, it houses 37 clinics in hospitals and healthcare facilities throughout the country, covering five zones of Tanzania (the Lake and Central zone, the Coastal zone, the Northern zone, and the Southern Highlands). These clinics enroll over 190 clubfoot care providers to treat over 7,600 children (Tanzania Clubfoot Care Organization, n.d.-c).

TCCO manages and provides the clinics with the required treatment equipment and training, including the basic and advanced Ponseti⁷ course, as well as trainings for supervisors, trainers, and fellows. Furthermore, it provides parent and community education to increase awareness around the disability and its treatment. To that end, TCCO also works with local authorities and community workers to reach affected children whose parents are reluctant to disclose their child’s condition (Tanzania Clubfoot Care Organization, n.d.-b).

⁷ A manipulative technique to correct congenital clubfoot without invasive surgery, which is considered the gold standard of clubfoot treatment by the Global Clubfoot Initiative ([n.d.-c](#)).

B2N Collaboration I

Tanzania's clubfoot providers were first trained in the Ponseti method in 2008 by global leaders of the treatment. Despite the trainings, local care providers fell short of reaching national coverage for clubfoot treatment, as materials in public hospitals and funding for treatment and patient transportation were lacking. To support the spread of treatment, MiracleFeet initiated partnerships with three Tanzanian clubfoot care programs in 2013 and 2014. Based on these collaborations, TCCO formed in 2015 as a consortium to unite clubfoot providers across Tanzania (MiracleFeet, n.d.-e).

Since then, MiracleFeet has closely partnered with TCCO to provide the clinics under TCCO's management with funding (for training, treatment supplies, awareness campaigns, and organizational capacity building), technical assistance (in workforce training, development of referral pathways, monitoring and evaluation, partner organization capacity building, and program management support), and commodities (braces, CAST app, and training kits). In return, TCCO distributes these resources to its clinics, supervises their treatment, and reports back to MiracleFeet as a contact point for the Tanzanian market (MiracleFeet, n.d.-d).

As in MiracleFeet's other program countries, these services build up the clubfoot care system in the country. The long-term aim is to empower the local NPO, eventually even the local government, to take on the project, and for MiracleFeet to exit the country. However, this level of program maturity has not yet been reached in any of the program countries.

Non-Profit Organization II

A related non-profit partner relevant for the partnership between MiracleFeet and TCCO is the *Global Clubfoot Initiative (GCI)*. GCI is a consortium of individuals and organizations active in establishing clubfoot treatment in low- and middle-income countries. GCI currently has 35 member organizations, from international NGOs and organizations to local initiatives.

GCI identifies and connects clubfoot programs around the globe to create synergies and avoid replication. It provides them with training resources on the Ponseti treatment and on the establishment of national clubfoot programs, regularly shares updates and events around global clubfoot care, and consolidates global clubfoot data (Global Clubfoot Initiative, n.d.-a).

B2N Collaboration II

Following a successful collaboration on clubfoot care between three NGOs from 2007–2009, a larger group of organizations—including MiracleFeet—realized the potential for an overarching umbrella structure. This realization led to the creation of GCI at the end of 2009, with MiracleFeet being one of its seven founding partners (Global Clubfoot Initiative, n.d.-b). In addition to its own membership, MiracleFeet funds the GCI governing membership of all its partners, such as TCCO, to ensure that they are involved in the development of global clubfoot strategy.

The governing members of GCI pay an annual membership fee, contribute to its governance structure and working groups, and share information on their own activities. In return, GCI aggregates these insights through an iterative process with its members and academic partners, distilling them into several outputs available to all its members. These outputs include training resources and a set of metrics to measure treatment in a standardized way. In addition, GCI developed a joint global strategy outlining how its members collaborate to reach a 70% clubfoot treatment coverage in EMDEs by 2030 (Global Clubfoot Initiative, n.d.-d).

While GCI is relevant for understanding the collaboration between MiracleFeet and TCCO, this research focuses on the synergy-sensitive resources exchanged between the latter two.

6.3.2 Relevant NPO Resources

This section illustrates the underlying assets and capabilities TCCO brings into the collaboration with MiracleFeet (see Figure 15).

Underlying NPO Assets

For its collaboration with MiracleFeet, TCCO leverages assets across the whole framework.

Knowledge Assets

As a consortium of preexisting clubfoot programs in Tanzania, TCCO unites the longstanding *Market Knowledge* of the local healthcare sector. Its decentralized structure, split into five regional zones, also does justice to the vast size and regional differences across the country.

Apart from market knowledge, TCCO accumulates much *User Empathy* through regular exchange with patients and care providers. This is of special importance, as children with clubfoot are often stigmatized and viewed as a shame to their family. TCCO's user empathy thus also stretches to the patients' parents, who are provided with mental and emotional support. In parallel, as a consortium of national medical professionals and thought leaders on clubfoot treatment, TCCO possesses extensive *Technical Expertise*. This expertise is also embedded in its organizational structure, be it through its medical advisors or technical coordinators for each zone (Tanzania Clubfoot Care Organization, n.d.-a).

Social Capital Assets

TCCO's most valuable asset is its vast *Stakeholder Network*, as the consortium is designed as the node of most of the country's clubfoot care providers. This network spans over 190 clubfoot care providers in 39 clinics, and stretches to government officials, brace producers, and community leaders across the country. Furthermore, given its local staff and decentralized clinic network, TCCO profits from strong *Embeddedness* in the Tanzanian market. While TCCO is not a well-known brand outside the clubfoot community, it possesses great *Legitimacy*, invested in it by its (founding) members. As it was created from within the network of clubfoot professionals in Tanzania, it was endowed with a mission to coordinate and collaborate across all member organizations since its inception.

Operating Vehicle Assets

To function as a central hub for clubfoot treatment in Tanzania, TCCO possesses its own *Legal Entity* and *On-Site Infrastructure*. The latter includes its headquarters in the capital of Tanzania, used for administrative work and the clinic management. In addition, the infrastructure contains established logistic systems through which TCCO sources the required foot braces, treatment supplies, and training materials, and provides them to the clinics.

Within these structures, TCCO possesses its own operating drivers, including the *Ongoing Programs* of training and supervising at its clinics. To do so, TCCO employs its own *Human Resources*, including its leadership, medical experts, financial and evaluation officers, and zonal coordinators.

NPO Capabilities

TCCO provides a range of capabilities, all of which either occur in the implementation phase or span the whole process as an overarching activity.

Implementation Capabilities

MiracleFeet's global presence in 29 countries is based on a decentralized collaboration model with local implementing partners. As such, TCCO is responsible for the implementation of MiracleFeet's model in Tanzania, starting with *Strategic Planning*. On a yearly basis, TCCO develops a strategic roadmap and budget for the operations in Tanzania, including the selection of a number of partner clinics, planned treatments, required supplies, and the metrics to measure the program's success. As recalled by MiracleFeet: "They build their budget and tell us every year, 'MiracleFeet, here is what we need from you in order to reach the children we say we are going to reach'" (Springer, 24 April 2021).

To implement these plans, TCCO enters performance and financial agreements with the hospitals and clinics under its reach and supports them in their *Procurement*. As such, it provides them with needed treatment supplies, CAST applications, training kits, and funds for locally made braces. While MiracleFeet provides braces to other implementing partners, Tanzania produces them on its own. As such, TCCO orders them at the local brace manufacturer, ensures they are produced to the right quality standard, and supplies them to its clinics. TCCO also provides the clinics with administrative and technical support.

To ensure that the care providers can use these supplies correctly, TCCO is heavily involved in capacity building at its partner clinics. At its core is a range of *Training* programs it offers to the care providers in its territory, including the basic, advanced, and refresher Ponseti course, CAST basic and refresher course, trainings for supervisors and trainers, and clinic-exchange programs for fellows. The underlying training materials have thereby been developed by the Global Clubfoot Initiative (mentioned above) and are adapted by TCCO to the Tanzanian context. The trainings are either provided by TCCO themselves, or through an external trainer that TCCO selects, ensuring every care provider in Tanzania is trained at least once a year.

As an umbrella organization for clubfoot clinics in Tanzania, TCCO contributes to the *Multiplication* of the solution, predominantly through cascading train-the-trainer activities. As such, it replicates MiracleFeet's model in its five regions and, from there, its 39 clinics.

As the implementation partner for Tanzania, TCCO also monitors on-site operations. Monitoring includes the supportive *Supervision* of the clinics, ensuring that the funding granted by MiracleFeet is spent as intended and all activities are executed correctly. It also includes weekly meetings with the zonal coordinators, who are themselves in direct contact with the clinics. In combination with the training and multiplication capabilities, TCCO also trains supervisors at zonal and clinic levels, ensuring that they act as an extended arm of TCCO, such that "they will do what we need them to do, and they will be able to see what we want them to see" (Kowero, 26 May 2021). In return, TCCO feeds this information back to MiracleFeet through weekly *Reporting* sessions. Apart from regular updates on the pre-defined metrics, TCCO oversees potential issues faced at the clinic level and joint discussions of potential solutions. On a quarterly basis, TCCO also publishes an activity report from its clinics with MiracleFeet.

Overarching Capabilities

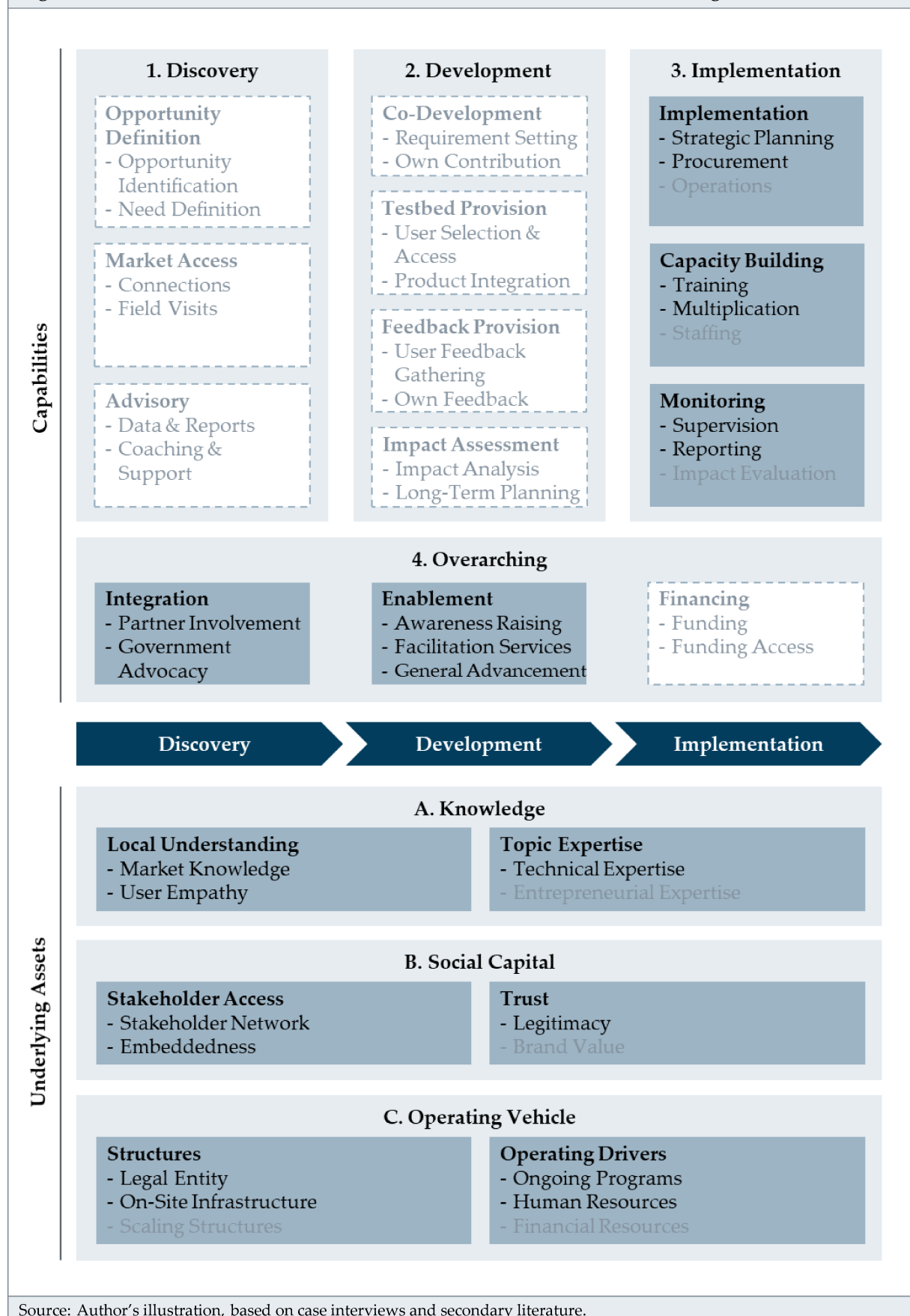
To complement its capabilities in the implementation phase, furthermore, TCCO has a range of overarching capabilities, including the integration of different stakeholders to embed the MiracleFeet solution more broadly in the Tanzanian healthcare system. On the one hand, this activity is carried out through *Partner Involvement*, since TCCO is an umbrella organization spanning over 30 clinics and over 190 clubfoot care providers nationally. While TCCO was specifically created with that goal of coordination in mind, the consortium remains open for new clinics and hospitals to join, to increase the coverage of clubfoot care in the country.

On the other hand, integration includes *Government Advocacy*, through which TCCO informs and collaborates with local authorities, to be "constantly in touch with the ministry of health" (Kowero, 26 May 2021). Through regular meetings with government officials, TCCO lobbies the ministry of health to (at least partially) provide the funds for its operations, so as to gradually reduce its dependence on MiracleFeet's financing. In parallel, TCCO advocates for the Ponseti method to become the standard treatment taught at universities.

Another stream of overarching capabilities concerns the facilitation services TCCO provides to enable the implementation of the program. As such, TCCO is active in *Awareness Raising*, to educate parents of affected children as well as the local population on clubfoot. It does so through posters, radio, or television and by involving the local community leaders in village halls or churches. “This way, we get close to those who are not willing or not ready to come in for treatment,” TCCO’s representative stated, “and sometimes, we then manage to bring them in” (Kowero, 26 May 2021). In addition, TCCO provides *Facilitation Services* to ensure that patients needing treatment can access it. As such, the NPO conducts early detection and referral services in collaboration with other hospitals, which might not be equipped to provide treatment themselves.

Beyond the MiracleFeet-specific support, TCCO contributes to the *General Advancement* of the work on clubfoot treatment, most notably through its involvement in the Global Clubfoot Initiative. Together with MiracleFeet, as well as MiracleFeet’s partner NPOs and others, TCCO contributes to GCI’s work involving strategy development, training resources, and the definition of universally agreed upon evaluation metrics.

Figure 15: NPO Resources: MiracleFeet and Tanzania Clubfoot Care Organization



6.4 Case 3: Peek Vision, Council for the Blind Zimbabwe, and CBM

The third frugal innovation shifts to visibility solutions, featuring Peek Vision as a social enterprise collaborating with two NPOs—Council for the Blind Zimbabwe and CBM—around an integrated solution for eye health treatment.

6.4.1 Case Introduction

Social Enterprise and Frugal Innovation

Peek Vision is a social enterprise that builds eye healthcare capacity through smartphone-based screening tools and eye health program design support in low- and middle-income countries. It was founded in 2016 as a hybrid organization: the Peek Vision Foundation is a registered charity in the United Kingdom and fully owns the Peek Vision Ltd trading company, registered as a legal manufacturer of medical devices in the United Kingdom, with offices in the United Kingdom and Botswana. Any profits generated by the company ultimately belong to the Peek Vision Foundation. Peek Vision employs around 40 employees, and its products are currently used in over 150 countries around the world, in which they partner with regional, national, and international NPOs, governments, associations and the private sector (Peek Vision, n.d.-c).

Peek Vision offers a range of easy-to-use smartphone apps and software tools called Peek Solutions, through which eye health organizations in EMDEs can improve their treatment services and make them available to a wider range of patients. One of the suite's most effective levers is enabling non-specialists to conduct large-scale vision screenings and eye health surveys in rural homes, communities, or schools, allowing local eye health experts to focus solely on cases that need advanced examination. One tool central to this service is Peek Acuity,⁸ a smartphone-based vision screening app that is as accurate as conventional vision tests but

⁸ Peek Acuity is a stand-alone smartphone app which can be downloaded for free by anyone. Peek Vision's (paying) partners use the Peek Capture software, which integrates the Peek Acuity app with a data platform called Peek Admin to track referral pathways from screening to treatment.

allows laymen to check patients' visual acuity using only an Android smartphone. The app, held three meters away from the patient, shows a series of the letter E, pointing left, right, up, or down. The examiner simply swipes in the direction indicated by the patient (even if incorrect), which prompts the next image on the smartphone. Once enough data is registered, the app issues the patient's diopter and visualizes it by a picture blurred by this degree, allowing third parties to easily grasp the eyesight of the patient (Peek Vision, n.d.-a).

Through this triage, only patients in need of further examination are forwarded to local eye care professionals, who can then provide glasses, eye drops, or referrals to specialists if needed. In parallel, local care providers are informed of the incoming patients' status to offer more targeted services, monitor attendance, remind patients of upcoming appointments, and follow-up with no-shows. This service-level data is stored within Peek Solutions, together with insights on national and regional geography, demographics, and available eyecare resources. These insights give the managers of eye health programs real-time reporting and analytics tools to identify gaps in their services and continuously optimize those programs. By deploying their limited resources as effectively as possible, they can improve their screening coverage, patients' attendance at follow-up appointments, and the overall effectiveness of the program (Peek Vision, n.d.-b).

Non-Profit Organization I/II

The NPO Council for the Blind Zimbabwe is a leading provider of eye services in Zimbabwe, offering eye care, education, rehabilitation, and low-cost spectacles. It was founded in 1955 in Zimbabwe's second largest city, Bulawayo, supported by Sight Savers International (then called British Empire Society for the Blind). It expanded from coordinating the voluntary organizations working on blindness in Zimbabwe into its current service portfolio, while growing to over 60 employees. Beyond the work at its headquarters and different workshops, ZCfB works closely with public hospitals and complements the Ministry of Health in delivering eye care on a national scale (Council for the Blind Zimbabwe, n.d.-a).

The Council for the Blind's first and largest pillar is eyecare to prevent blindness, for which it organizes outreach programs with mobile eye units. These units complete around 250 field visits per year across the country, during which they screen locals with eye complaints about

their vision and eye health. Based on the diagnosis, ZCfB provides primary eyecare, spectacles, or minor ophthalmic operations, or it books patients for larger or more specialized operations at local healthcare facilities. The most commonly conducted operations are cataract operations, for which ZCfB also organizes multi-day eye camps with up to 300 operations.

ZCfB's education pillar facilitates the integration of visually impaired children into schools with normal-sighted children. They provide specialized education equipment, Braille literature, and special education units for affected children and their schools. Older patients are cared for through ZCfB's rehabilitation pillar, offering Braille training and job market integration. Lastly, ZCfB's fourth pillar concerns the production and provision of eye drops, low-cost spectacles, and assistive devices. These goods are produced at several ZCfB workshops across the country and sold at affordable prices to low-income groups. Together with patient contributions for cataract surgeries, these revenues contribute up to 50% to ZCfB's otherwise donation-based budget (Council for the Blind Zimbabwe, n.d.-b).

Non-Profit Organization II/II

The development organization CBM (originally short for Christoffel-Blindenmission or Christian Blind Mission) is dedicated to improving the quality of life of people living with disabilities in the world's least developed communities. It dates back to 1908, when German Pastor Ernst Jakob Christoffel built homes for disabled children in Turkey. Today, CBM International is a registered NPO in Darmstadt, Germany. With offices across the world, CBM is active in 48 countries in Asia, Africa, and Latin America, and in 2020 it reached over 4 million people through 460 projects. In Zimbabwe, CBM has a country office supported and overseen by its Africa South Regional Hub in South Africa (CBM, n.d.-a, n.d.-b).

CBM strives to break the vicious cycle of poverty and disability by reducing the prevalence of diseases and conditions leading to disabilities and by promoting equal opportunities for and the full inclusion of disabled people in all areas of society. To do so, CBM works in the areas of disability inclusive development, community based inclusive development, inclusive eye health, community mental health, and humanitarian aid. Within these areas, CBM works via partnerships with and through the funding of local and national disability organizations, strategic and technical advisory services, and policy influence at all levels (CBM, n.d.-c).

B2N Collaboration

To scale to several countries without having to grow in proportion, Peek Vision developed a partnership model involving local implementing partners already active in the screening of eye health patients. Equipping these partners with Peek Solutions allows them to reach their goals more efficiently, while the Peek model is scaled across a range of markets.

In 2018, Peek Vision entered a multi-country partnership with CBM International, which provides them with technical expertise, funds, and strategic advice at an organizational level. In the same year, Peek Vision started to collaborate with the CBM office in Zimbabwe (and in Pakistan, later followed by offices in Kenya, Tanzania, Ethiopia, and Uganda) to launch the Peek Solutions on the ground across seven provinces. At that point, CBM Zimbabwe was providing funding and expertise to different in-country NPOs. One of these was Council for the Blind Zimbabwe, with which CBM had partnered for over 40 years and provided yearly funding to all its four pillars. To increase the effectiveness of this support, CBM Zimbabwe commissioned and financed Peek Vision to provide their solutions to ZCfB. As a result, ZCfB became Peek Vision's implementing partner for the Zimbabwean market, facilitated and financed through CBM International and the CBM country office in Zimbabwe.

To start a partnership and adapt its technology to each new implementing partner, Peek Vision usually conducts a site analysis gathering essential information about the local eye health context and the partner's current processes. The results inform a strategy document outlining the program's main goals. In the subsequent design phase, Peek Vision convenes the NPO's leadership and employees, users, funders, involved partner organizations, and government officials in a two-to-three-day workshop. In collaboration with Peek Vision's design team, they design the ideal workflow of their eye health program to use the digitization process to improve existing process flows. Peek Vision then configures the software, iteratively tested by the partner, and provides the NPO with training on the software, its implementation, and user interaction with it. This training is succeeded by a two-day field test with real patients before the program is officially launched. Once the tool is employed and data is entered regularly, the Peek system provides a dashboard and different reports. Peek Vision regularly supports the partner in analyzing this data to remove barriers and bottlenecks and continuously improve their eye health program.

In the long term, Peek Vision aims for local government adoption (as for all its projects), facilitated through the work of ZCfB. Peek Vision generally expects this to be a process of three to seven years, during which the work with the implementing NPO partner must accumulate sufficient evidence of the solution's impact, scale, and affordability (Bastawrous, 8 April 2021). In the case of Zimbabwe, however, the NPO partner has voiced concerns over whether complete government adoption will be feasible (Nyathi, 23 July 2021).

6.4.2 Relevant NPO Resources

This section illustrates the assets and capabilities that ZCfB and CBM contribute to their respective partnerships with Peek Vision, as illustrated in Figure 16 and Figure 17 below.

A) Council for the Blind Zimbabwe

Underlying NPO Assets

ZCfB can build on a comprehensive asset base covering all the framework's assets.

Knowledge Assets

Being in existence for over 65 years and itself a provider of eye healthcare services, ZCfB possesses much *Local Understanding* of the Zimbabwean market and healthcare system; *User Empathy* with the patient, healthcare workers, and local communities; and *Technical Expertise* in the eye healthcare profession. As such, partners such as ZCfB help Peek Vision adapt its technology during the design process to fit the ground reality of the local context, as some things are “good in theory, but in practice, won't work” (Bastawrous, 8 April 2021). This familiarity with local market restrictions and technical requirements recently led to a change in the procurement process between ZCfB and CBM. Until several years ago, CBM itself selected the equipment with which ZCfB was supplied, occasionally resulting in the procurement of unfit machinery—either because it was too complicated for the level of training received by the local workforce, or because it was not aligned with the locally available type of spare parts. Today, it is ZCfB who suggests the type of equipment it would like to procure to ensure that it fits the specifications of the local context.

Social Capital Assets

The Council for the Blind possesses a vast *Stakeholder Network* across the country, as its regular outreach activities are organized in collaboration with local healthcare providers, district hospitals, schools, or local communities. This access allows Peek Vision to “join the party” (Bastawrous, 8 April 2021) of a larger network, as its solution is designed for large-scale screenings with a recommended catchment area of over half a million people (Rehman-Furs, 21 April 2021). As one of the oldest charitable organizations in the country and due to its local staff and strong integration in the public eye healthcare system across Zimbabwe, ZCfB also possesses strong local *Embeddedness*. On this basis, Peek Solutions can embed itself into a wider solution system. In addition, ZCfB possesses strong *Legitimacy* to operate, as it has been providing services to the blind and visually impaired for over 65 years, complementing the Zimbabwean Ministry of Health in eye health delivery. In Peek Vision’s experience, this recognition of the partner’s work is a strong success factor that allows it to credibly influence the eye health system on a program and policy level.

Operating Vehicle Assets

ZCfB has its own *Legal Entity* in Zimbabwe with the permission to process personal data using cloud services. It further operates its *On-Site Infrastructure* in the form of a headquarters, with several workshops in different provinces equipped for ophthalmic care delivery, and the logistics systems to bring the hardware needed to operate Peek Solutions to frontline health workers. Through its collaboration with the local Ministry of Health, ZCfB is integrated into the public healthcare system, meaning that it also operates from several public hospitals across Zimbabwe. Moreover, ZCfB supports the infrastructure of these premises with operating theaters and eye diagnostic equipment, financed through the donations it receives.

As an active provider of eye health services, ZCfB runs a number of *Ongoing Programs*, out of which the programs of its first pillar, the prevention of blindness, are relevant for the Peek Vision partnership. These include over 250 annual screening trips to rural areas, during which ZCfB was already screening patients before the implementation of Peek Solutions. In addition, ZCfB provides up to 8,000 cataract operations per year, “despite the difficult current economic conditions that we operate in” (Nyathi, 23 July 2021). To operate these programs, ZCfB has its

own *Human Resources* of over 65 employees, consisting of the leadership and of administrative staff, ophthalmic nurses, eye surgeons, and drivers of mobile eye units. This human resource capacity is one of Peek Vision's requirements for collaboration, as it usually demands a minimum of two people to bear ownership of the technology and program management, in addition to the staff using Peek Solutions in their daily activities.

NPO Capabilities

Complementing its asset base, ZCfB exercises a range of capabilities in its partnership with Peek Vision, spanning the development, implementation, and overarching phases.

Development Capabilities

Given the customizable nature of Peek Solutions, each partnership starts with a co-development phase to adapt the software to the new partner's requirements, even though Peek Vision itself has already completed the product's initial development stage.

The co-development with ZCfB started with a multi-day design workshop, involving key personnel from both organizations, as well as ZCfB's users, stakeholders, and funders. As the key informant, ZCfB contributed to the *Requirement Setting* and provided its *Own Contribution* to the solution development. These insights allowed the adaption of the Peek Solutions to ZCfB's way of conducting eye health programs in the Zimbabwean market.

Throughout the subsequent phase of Peek Vision's software development, ZCfB provided its *Own Feedback* on a regular basis, until the solution was mature enough for a multi-day field test. Through *User Selection & Access*, ZCfB provided Peek Vision with a testing ground and with real patients on site. It used Peek Solutions during its screening activities to allow for *Product Integration*. Once the field test was completed, ZCfB again provided its *Own Feedback* on the solutions and supported the *User Feedback Gathering* from patients, which informed the final version of Peek Solutions for ZCfB, ready to be implemented in its operations.

Implementation Capabilities

At the core of ZCfB's role as an implementing partner, ZCfB itself conducts the *Operations* of the Peek Solutions, as the tool is fully integrated into its regular activities. The Peek Capture

tool is used for ZCfB screenings performed at field visits to rural communities, the resulting data stored on the Peek tool, and the overall design of the eye health program analyzed and improved using the Peek reporting function. On a rolling basis, these reports are then used to inform the *Strategic Planning* of the ongoing programs. ZCfB used to conduct these services prior to its partnership with Peek Vision, albeit with less efficient tools. As described by ZCfB's director, "Since we started screening and treating eye patients, we used archaic trial-and-error methods. The Peek software came in as a blessing for Council for the Blind, [as we know now] within three minutes whether the person has got an eye problem or not" (Nyathi, 23 July 2021). ZCfB also organizes the *Procurement* of the much-needed electronic hardware from Peek Vision and distributes it to its own staff, the medical staff working at the public hospitals it works with, and people working at the ministry of health.

As the implementer of Peek Solutions, ZCfB further builds the needed capacity on the ground. Operating the product itself, ZCfB automatically provides the required *Staffing*, including ophthalmic nurses, eye surgeons, and drivers of the mobile eye units. To enable this staff to use Peek to its full scope, ZCfB provides them with all the required *Training*, which, beyond the handling of Peek Solutions, also includes technical knowledge, be it the upskilling of healthcare workers on primary eye care or the admission of its senior staff to international conferences. This training stretches to the personnel of public hospitals, as the public healthcare system often lacks ophthalmic nurses and eye surgeons. To facilitate the *Multiplification* of the Peek system to third parties, ZCfB regularly provides trainings on Peek Solutions and facilitates the training needed to specialize in eye care, both of which attract more healthcare professionals into the field. Additionally, ZCfB trains stakeholders such as teachers, so they are qualified to help with screenings at schools. This process aligns with Peek Vision's cascading train-the-trainer model, which empowers its implementing partners to train other local teams. The training helps Peek Vision increase the number of projects while decreasing its involvement within them, as it plans to "go from low volume/high touch to high volume/low touch" (Bastawrous, 8 April 2021).

By using the Peek Solutions data registry and real-time monitoring function, ZCfB automatically provides Peek Vision with a regular *Reporting* on the tool's usage across all programs and outreach activities. This automatic data transfer is complemented by weekly to monthly

meetings between ZCfB and Peek Vision, during which they jointly review the data and search for solutions. These touchpoints also allow ZCfB to raise challenges faced in the implementation of the tool or place requests to improve or expand the software.

Overarching Capabilities

ZCfB is heavily involved in *Government Advocacy*, in line with Peek Vision's long-term goal of government adoption and its own mission of complementing the Zimbabwean Ministry of Health in the delivery of eyecare services. ZCfB is involved in regular informative meetings with government officials and policy makers and training them in the use and benefits of Peek Vision, such that they "actually see this as [their] program, not a Council-for-the-Blind program" (Nyathi, 23 July 2021). It also includes the training of nurses and eye surgeons at government-run hospitals, which builds up the capabilities within the public healthcare system to eventually take the lead on the partnership with Peek Vision. Given the importance of the public healthcare system in Zimbabwe, ZCfB's integration activities focus primarily on the government, and not on private or public sector partners. Outside of preparing the government to carry the technology itself, ZCfB also facilitates direct interaction between the government and Peek Vision, for instance in the discussion of the storage location of patient data.

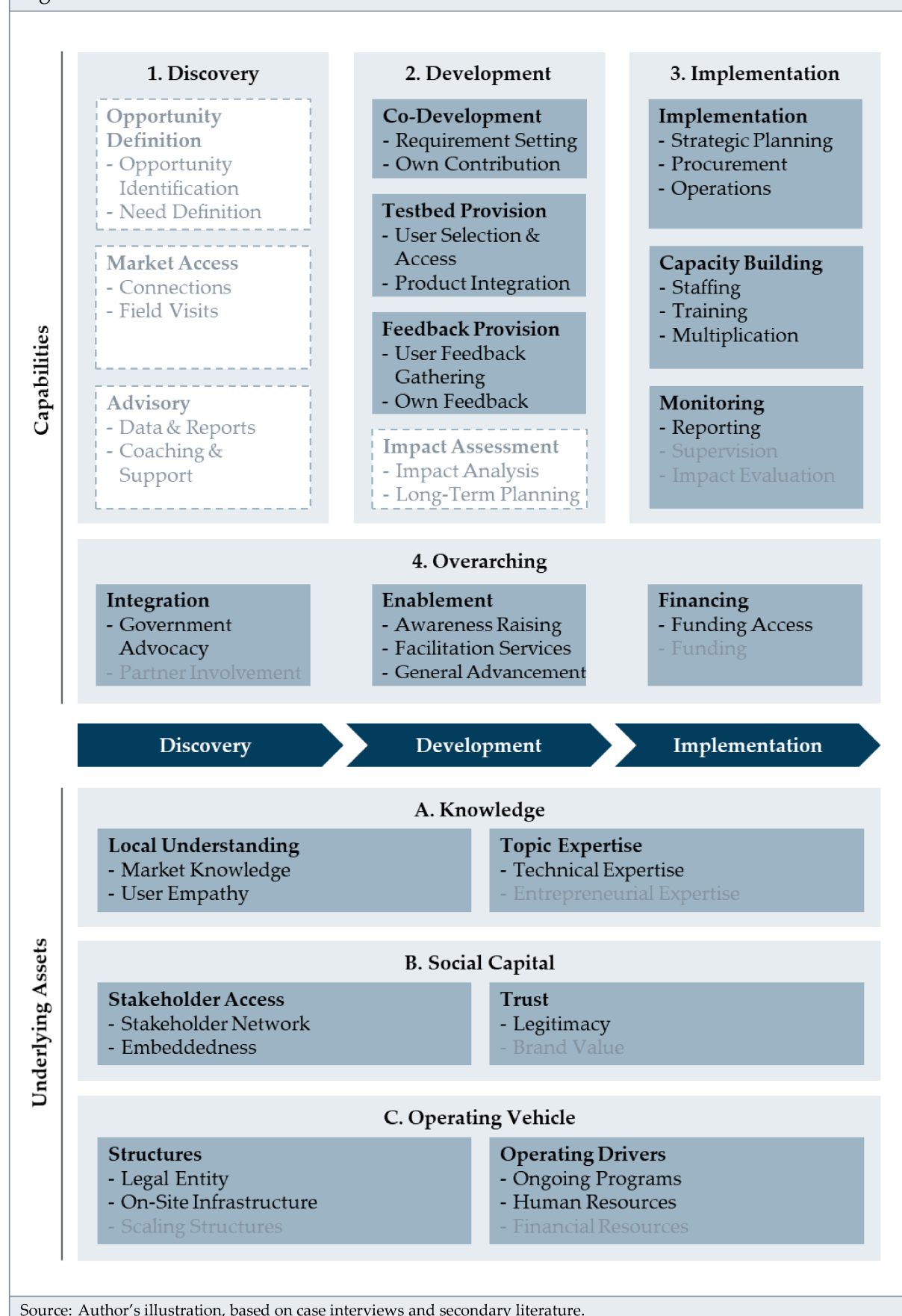
In parallel to its advocacy, ZCfB is also active in *Awareness Raising* for eyecare treatment in order to gather enough patients at its outreach visits in rural communities, for example via posters and radio messages. Raising awareness is especially relevant for screening programs designed for children, whose parents need to be informed about the screening and need to be asked for prior consent. In general, these awareness activities are often centered around Peek as an innovative and state-of-the-art medical device. As recalled by Peek Vision's lead for NGO partnerships, Peek Vision easily captures the attention of the community and the government because it is seen as "an attractive new technology on a phone, a smart system that is going to help you get the treatment you need quicker" (Rehman-Furs, 21 April 2021).

Beyond awareness raising, ZCfB also facilitates post-screening treatment paths for its patients as part of its *Facilitation Services* of eye healthcare in Zimbabwe. This includes forwarding patients to local hospitals and booking them for the required service, or directly providing them with eye care, operations, and spectacles. To ensure this follow-up care is not only accessible

but also affordable, ZCfB has secured additional funding from CBM to subsidize these treatments. This service ensures Peek Vision's most important principle: "no screening without service. If someone is screened, [...] we need to be assured that there is an established process for the individual to follow where they will get the treatment that they require" (Rehman-Furs, 21 April 2021). This principle can be observed only if the partner is embedded within the infrastructure of eye healthcare in the country, such as ZCfB in Zimbabwe.

Lastly, as a project supported by CBM, ZCfB provides Peek Vision with crucial *Funding Access*, as Peek Vision receives targeted funding from CBM to finance its work with ZCfB. While ZCfB does not possess supplementary financial resources itself, its collaboration with Peek Vision allows the social enterprise to access CBM's financial support.

Figure 16: NPO Resources: Peek Vision and Council for the Blind Zimbabwe



B) CBM International and CBM Zimbabwe

Underlying NPO Assets

CBM—both International and Zimbabwe—possesses a range of underlying assets that it leverages for its collaboration with Peek Vision and ZCfB. As CBM International works through its country offices and forwards its assets to them, this section analyzes CBM’s assets on both an international and national level. Where required, assets possessed by the Zimbabwean CBM office, in particular, are highlighted.

Knowledge Assets

As one of the oldest NPOs working on eye health worldwide, one of CBM’s most valuable assets that it provides to Peek Vision, to its in-country offices, and to its implementing partners is its *Technical Expertise*. This expertise centers on the delivery and implementation of eye health programs to reduce visual impairment and avoidable blindness. Beyond its technical knowledge on eye health, CBM has also established considerable expertise on Peek Solutions that, when shared with its country offices and local implementing partners, facilitates the introduction of the solution on the ground. Its dedicated country office in Zimbabwe further allows CBM to build up regional proximity to the Zimbabwean context through local *Market Knowledge*. As CBM does not implement projects itself, this knowledge focuses more on the macro perspective of the Zimbabwean market than on a deep understanding of the beneficiaries.

Social Capital Assets

Through its decentralized structure of nearly 50 country offices, CBM possesses a vast *Stakeholder Network* both national and international in scope. This network encompasses donors, governments, and other eyecare and development organizations, but most prominently its local implementing partners, with whom CBM has long-standing connections. As CBM has “often built these relationships over a number of decades and is starting from a place of trust” (Bastawrous, 8 April 2021), CBM is endowed with a deep *Embeddedness* in the local market.

Being active in eyecare for over 100 years and present in the majority of low- and middle-income countries worldwide, CBM possesses a very strong *Brand Value* recognized worldwide in the spheres of healthcare and international development. Based on its long history in this area, CBM further enjoys an undisputed *Legitimacy* for working with disabled people, with 460 projects funded and over 10 million people worldwide benefitting from them in 2020 (CBM, n.d.-b). In addition to CBM's international standing, in 2021, the Institute of Directors Zimbabwe awarded CBM Zimbabwe's country director as Woman Director of the Year—NGO, as well as Director of the Year—NGO and Civil Society Organizations (CBM, 2021b).

Operating Vehicle Assets

Even though CBM possesses its own international and national legal entities, these are irrelevant for its partnership with Peek Vision and ZCfB, as neither partner uses the CBM entity for its operations. However, CBM has its *On-Site Infrastructure* in place that connects manufacturers and donors to the implementing partners on site, through which CBM provides partners with the required material and equipment. Of even greater significance are CBM's *Scaling Structures*, which allowed it to introduce the Peek Vision partnership to several of its country offices—currently Zimbabwe, Pakistan, Kenya, Tanzania, Ethiopia, and Uganda.

Nationally, CBM Zimbabwe has *Ongoing Programs* with a range of implementing partners including ZCfB. While CBM Zimbabwe is not involved in any of these programs operationally, it retains access to them via the support services it offers to its implementing partners. In addition, CBM as an NPO with a strong funding focus, possesses considerable *Financial Resources*, receiving over €100 million in financial donations in 2020 (CBM, 2021a, p. 11). Finally, while CBM has its own staff, they are not considered to be synergy-sensitive human resources, as the employees are not taking on specific tasks for Peek Vision.

NPO Capabilities

CBM provides a range of capabilities to its partnerships with Peek Vision and CBM, spanning the discovery, implementation, and overarching phases. Again, these are analyzed both for CBM International and CBM Zimbabwe, with distinctions made where necessary.

Discovery Capabilities

As strategic partner, CBM supports Peek Vision's market discovery through a range of *Connections*. These connections include both CBM International, which introduced Peek Vision to CBM Zimbabwe, and CBM Zimbabwe, which introduced Peek Vision to its local implementing partner ZCfB and to other locally relevant market actors. Beyond connecting Peek Vision to these actors, CBM as a middleman also introduces its implementing partners, such as ZCfB, to international and national stakeholders. Most prominently, these connections are to its network of equipment providers, which further facilitates the procurement process of the implementing partner financed through CBM.

In addition, CBM offers its expertise through *Coaching & Support*, centered around a sparring partnership for the strategic development of Peek Vision, as the two organizations meet quarterly at a senior level to discuss progress and to "map out the broader vision for the organization, but also the work that we could do together" (Bastawrous, 8 April 2021).

Implementing Capabilities

While CBM is not operationally involved in the implementation of Peek Solutions, it supports Peek Vision and ZCfB in the *Strategic Planning*. As such, CBM was present at the multi-day design workshop to configure Peek Vision's technology to the needs of ZCfB (described in more detail above). Together with Peek Vision and ZCfB, CBM contributed to the software and program design with insights through its long-standing experience in eyecare.

Furthermore, CBM supports the implementation through capacity building. On the one hand, CBM not only funds Peek but actively contributes its technical expertise and experience to the *Training* received by people who use Peek Solutions. To this end and in collaboration with Peek Vision, CBM International provides trainings on Peek Solutions to its country offices. In turn, the country offices, such as CBM Zimbabwe, send specialized trainers to their implementing partners to support them in implementing, operating, and maintaining Peek Solutions (among other equipment). On the other hand, CBM International drives the *Multiplication* of the Peek Vision partnership across several of its country offices, which then once again introduce Peek Vision to their respective implementation partners on the ground.

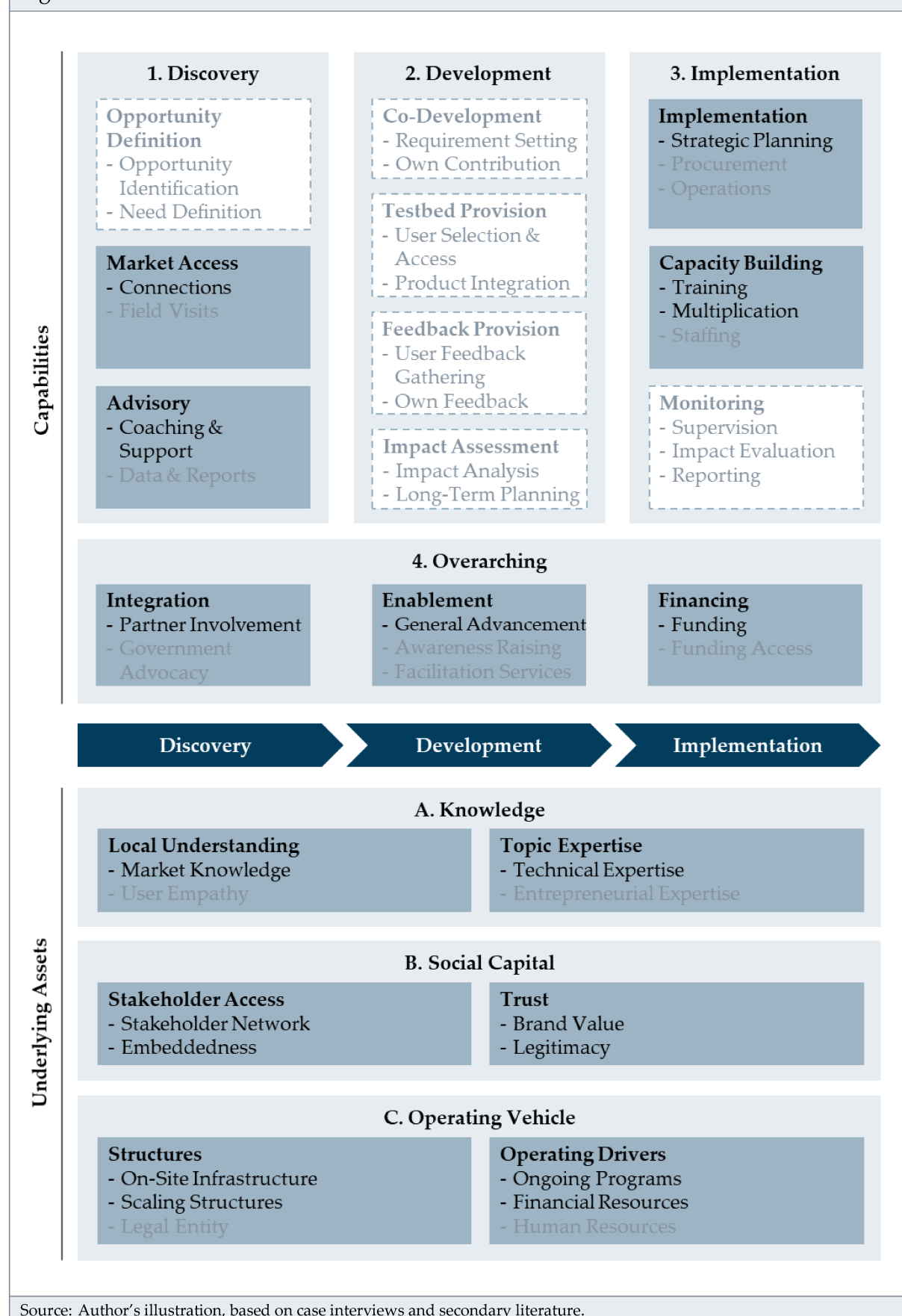
Overarching Capabilities

As the core of its operating model, CBM conducts all its projects via *Partner Involvement*. This holds true for the partnership with Peek Vision for the Zimbabwean market, which CBM realizes by engaging ZCfB as an external implementing partner on the ground. While CBM is also actively involved in influencing policy at different national and international levels, it does so on behalf of eye healthcare in general, without a specific focus on Peek Vision. As such, CBM International or CBM Zimbabwe are not active in any advocating efforts on behalf of Peek Vision with the Zimbabwean government.

Nonetheless, CBM is a very active player in driving the *General Advancement* of eye healthcare in low- and middle-income countries. To orchestrate this work, CBM developed a plan on inclusive eye health within its CBM Federation Strategy 2023, focusing on reducing avoidable visual impairment, empowering people with disabilities, and creating inclusive, resilient, and equitable communities. To achieve these goals, CBM works with people living with disabilities and their communities, NPOs, governments, international networks, academia, and the international donor community (CBM, n.d.-d).

However, CBM's most direct lever of support is the *Funding* it provides its implementation partners. CBM commissions and funds the entire service that Peek Vision provides ZCfB, as well as funding for other services and equipment that ZCfB receives from CBM. On the one hand, the Peek Vision-related funding covers all the software and hardware, as well as the training and ongoing support that ZCfB receives. On the other hand, the residual funding covers the procurement, installment, and maintenance of ophthalmic equipment; the needed medicine, material, and consumables; the eye health services provided by ZCfB across its four pillars; the training of staff; and in some cases, external consultants tasked with additional efforts (e.g., local advocacy). While this funding sometimes includes in-kind donations in the form of standardized equipment and consumables, most is provided through direct payments based on proposals made by the implementing partner or through cash paid upfront for smaller expenses. This system ensures that the funding is used in the most appropriate form to advance the work of the partner on the ground. As stated by ZCfB's director, this funding is how "our good friends overseas help us [...], so that we can carry out our activities" (Nyathi, 23 July 2021).

Figure 17: NPO Resources: Peek Vision and CBM



6.5 Case 4: OneDollarGlasses, HI Bolivia, and Siemens Stiftung

The concluding case of frugal innovation in AT features OneDollarGlasses and its collaborations with Hostelling International Bolivia and empowering people.Network of Siemens Stiftung, featuring extremely affordable glasses for EMDEs.

6.5.1 Case Introduction

Social Enterprise and Frugal Innovation

OneDollarGlasses produces extremely affordable glasses in a fast and easy manner to provide basic ophthalmic care for underserved people worldwide. The organization was founded in Germany in 2012 as the NPO *EinDollarBrille e.V.* Today, the parent organization OneDollarGlasses Germany has national organizations in nine countries, acting under the local brands of Good Vision (Burkina Faso, Kenya, and Malawi), Lentes al Instante (Bolivia and Peru), Care Netram (India), and VerBem (Brazil). In parallel, the sister organizations OneDollarGlasses Switzerland and USA operate their own Good Vision projects in Myanmar and Liberia, respectively. Together, ODG Germany, Switzerland, and USA are supported by approximately 30 full-time employees and over 300 volunteers, while the national organizations employ over 200 local employees (OneDollarGlasses, n.d.-a).

ODG's core product is glasses made of flexible spring steel wire with pre-cut plastic lenses (ranging from -10.0 to +8.0 diopters). This construction results in extremely affordable glasses costing around \$1 to produce and sold at two to three times local daily wages. The glasses are extremely robust, as the frames can be bent back into shape if damaged, and the break-free and scratch-resistant lenses are simply clicked into the light and bendy frames by hand. The frame is manufactured using a simple bending machine that measures less than 30 cubic centimeters, works without electricity, and can host up to six employees to work in parallel. Thus, the glasses can be produced and repaired on site, making them ideal for use in low-income countries. With the use of different color markings, the bending machine can produce glasses in three different sizes that can be individualized by differently colored beads on the sides and shrink tubes around the nose bridge, so that clients enjoy wearing them.

The glasses and the corresponding bending machine were developed by ODG's founder following deep market research, a review of over 1,000 patents, and an iterative trial-and-error process with different materials. However, apart from a pilot test in Uganda, the product was developed without close user interaction. As the founder of ODG states, "even though concepts for development cooperation should be tested prior to their development, this was not possible in the case of ODG because the glasses and the bending machine had to exist before testing them in practice" (Aufmuth, 9 March 2021).

As the lack of visual aids is particularly prominent in rural resource-constrained areas, ODG regularly organizes eye camps in rural villages and shanty towns using mobile units. There, employees test the eyesight of local people and supply them with glasses produced and fitted on site, as enabled by the simple and fast manufacturing process. Apart from their eye camps, ODG has small eyewear shops in strategic locations for people to access vision tests, glasses, or repairs. To date, ODG has supplied over 300,000 people worldwide with glasses and has contributed to raising awareness for good vision through educational work in rural areas and the fostering of relationships with health institutions and NGOs. As ODG's strategic focus is on communities with the greatest need (and, thus, often the lowest purchasing power), its operations are subsidized by donations raised predominantly in Western countries (Good Vision, 2021, pp. 10-11).

To operate in project countries, ODG trains local people, thereby creating valuable job opportunities in low-income regions. Employees are tasked with the production and sale of glasses, for which ODG has developed its own training curriculum suitable for modest levels of education. The combined simplicity of the production process and special engravings in the bending machine allow ODG to integrate disadvantaged groups, even visually impaired and blind people. The local staff of ODG further involves employees tasked with the eye screenings. As many low-income countries lack ophthalmologists and opticians, ODG has developed its own training, in close cooperation with experts, for locals to become optical technicians. The course takes one year to complete and enables graduates to screen patients and fit them with the right spherical glasses. The employees' salaries, together with the ongoing project costs, are largely financed from the revenues generated through glasses sales (Good Vision, 2021, pp. 10-11).

Non-Profit Organization I

Hostelling International Bolivia is a non-profit youth hostel provider in Bolivia that runs a range of social projects for local communities. HI Bolivia was founded in 2000 in Santa Cruz de la Sierra and was recognized by the Bolivian state as a foundation in 2001. Since 2002, it has been a full member of Hostelling International, a worldwide federation of over 70 national youth hostel associations run on a non-profit basis and focusing on sustainable travel and building peaceful connections between young people and local communities. Outside of its core activity of running 18 youth hostels across the country (pre-COVID number), HI Bolivia has been involved in various local social projects (Hostelling Bolivia, n.d.-a).

As guests expressed increasing interest in meaningful long-term stays, HI Bolivia set up its social programs in 2003. Initially, they focused on pedagogic health and the introduction of previously non-existent rural kindergartens, later shifting to dental health in rural areas. While these projects were eventually terminated, they allowed HI Bolivia to build experience in running mobile health units and building a network in rural communities. Today, HI Bolivia's social projects range from health services to youth work and environmental protection, all of which are supported by approximately 100 volunteers every year. These are usually long-term hosting guests or are associated with the volunteering programs of partner organizations such as the Red Cross or the German Federal Ministry of Economic Cooperation and Development; on average, these guests stay with HI Bolivia for a full year (Hostelling Bolivia, n.d.-b).

B2N Collaboration I

ODG tailors its market entry approach to each of its nine project countries, depending on country-specific conditions and the nature of existing contacts. The approach ranges from founding its own local for- or non-profit organizations to partnering with existing ones. In the case of Bolivia, ODG started its collaboration with the incumbent organization HI Bolivia in 2013 as its first partner organization. A group of German volunteers familiar with ODG helped to bring the concept to Bolivia and establish the project on site. Under the lead of HI Bolivia's director, who simultaneously became ODG's Bolivian country director, ODG was integrated as one of HI Bolivia's social projects and eventually became its primary one.

Today, HI Bolivia produces the glasses on site and supplies them to the Bolivian population under the name “Lentes al Instante” (translated into English as “Instant Glasses”). While these activities generate some income, the remainder of the costs are undertaken by ODG Germany, which draws on donations to provide funding for the training, equipment, and bending machines, as well as project costs. In addition, HI Bolivia receives funding via project-specific donations from external sponsors and can refer to its own foundation capital.

As of today, HI Bolivia has fitted more than 53,000 glasses and produced over 75,000 frames for Latin America (Good Vision, 2021, pp. 18-19). As the leaders of both organizations confirmed, “the collaboration with HI Bolivia is very close” (Aufmuth, 9 March 2021), as “there is not much operational difference than if we were a unit of ODG” (Steiner, 9 March 2021).

Non-Profit Organization II

The empowering people.Network of Siemens Stiftung (translated into English as “Siemens Foundation”) supports social entrepreneurs active in development collaboration by providing services geared towards developing a solid business foundation to scale their social impact.

Siemens Stiftung was established as a non-profit foundation in Germany in 2008 by the industrial manufacturing company Siemens, and it is headquartered in Munich, Germany. With its \$450 million foundation capital, it supports projects within its three working areas—development cooperation, education, and culture—to promote sustainable social development. The foundation is active across Europe, Africa, and Latin America, collaborating with over 130 international partners (Siemens Stiftung, n.d.-b).

Siemens Stiftung’s pillar of development collaboration focuses on three key issues: technology for developing regions, sustainable organizations, and community development. Across these issues, one central project is epN, created in 2013 to unite social entrepreneurs using technology to bring basic services to underserved communities while creating employment and economic prosperity. The network spans approximately 80 startups, smaller businesses, and organizations which are active in nearly 100 countries. These organizations are active in five sectors of basic needs: namely clean energy, food security, health, circular economy, and water and sanitation (empowering people. Network, n.d.-a).

These social enterprises are mostly scouted through the empowering people.Award, honoring outstanding projects with prize money and publicity. Since its inception, the award has shifted from honoring tangible products to honoring holistic entrepreneurial business models, and it increasingly supports local entrepreneurs from within resource-constrained countries. Its third and most recent edition in 2019 received over 800 applications from more than 80 countries. The extended list of finalists for each award join epN, which supports them further. One type of support is capacity building, including training for organizational development held at regional network gatherings, personal coaching, and access to subject experts for individual challenges (Siemens Stiftung, n.d.-a). Furthermore, epN offers investment-ready members with seed and growth money from Siemens Stiftung and facilitates their access to external funding sources. In the same vein, epN endorses members with promotional activities and networking opportunities. to increase the scale of support, epN also drives the overall topic of social entrepreneurship for development with publications, roundtables, and stakeholder dialogues, convening actors from various fields (empowering people. Network, n.d.-c).

B2N Collaboration II

The collaboration between Siemens Stiftung and ODG occurs through the vehicle of the empowering people. Network. This collaboration was initiated when ODG applied for and won the first empowering people.Award in 2013, being then endowed with €50,000. When epN was created in that same year, ODG became one of its earliest members and has been supported by the network ever since. epN has ties to ODG's central office in Germany, as well as to two project countries: in 2015, epN started supporting the project in Burkina Faso until it reached a certain level of maturity. Subsequently, epN shifted its focus to Bolivia in 2019, where its collaboration will also soon reach maturity.

Generally, epN offers training and coaching services open to all ODG branches. On a national level, epN focuses on further developing and scaling the project in Bolivia. This focus entails project-specific funding and collaboration for eye camps conducted at 40 local schools in Bolivia, done in cooperation with the German Gesellschaft für Internationale Zusammenarbeit (GIZ). Furthermore, epN is collaborating with HI Bolivia on a social impact study to quantify the outcomes of the project (currently on hold due to the COVID pandemic).

6.5.2 Relevant NPO Resources

This section analyzes the underlying assets and capabilities that HI Bolivia and epN of Siemens Stiftung contribute, respectively, to ODG (see Figure 18 and Figure 19).

A) Hostelling International Bolivia

Underlying NPO Assets

HI Bolivia's assets form the foundation of its ODG collaboration, covering all but one asset.

Knowledge Assets

With a presence in different Bolivian cities for over two decades, HI Bolivia has, on the one hand, deep *Market Knowledge*, including the political system, socioeconomic dynamics, and the mindset of the local population. On the other hand, HI Bolivia has not had experience with eye health projects nor interactions with ophthalmology patients prior to the collaboration with ODG, as its primary activity is in the hospitality industry. Still, due to its social projects, it had at least some degree of technical expertise in running mobile units in Bolivia.

Social Capital Assets

Through their prior social projects, HI Bolivia was “already a known key player in the cooperation with rural villages” (Steiner, 9 March 2021) and had built an extensive *Stakeholder Network* with other health and development organizations, local authorities, and community leaders. As the Bolivian market requires “very strong diplomatic skills,” ODG recognized that organizations usually stand “no chance, if [they] are not incredibly well connected” (Aufmuth, 9 March 2021). This network was created because of HI Bolivia's *Embeddedness*, spurred through its local staff and longstanding engagement in social projects. Furthermore, its director, of Swiss origin, speaks the local language, is locally married, and has received Bolivian citizenship after living in the country for over 20 years. This understanding of Western European and Latin American contexts allows HI Bolivia to mediate between ODG in Germany and the ground realities in Bolivia.

As a provider of hosting services, HI Bolivia is yet not traditionally known for eye health projects. Nonetheless, HI Bolivia can count on social capital in the form of *Legitimacy*, received for its history of non-profit social projects. To increase its legitimacy as a social enterprise, HI Bolivia introduced a “combined social approach,” through which children and disabled people receive glasses for free and retirees receive them at half the price. This strategy strengthens the perception of HI Bolivia’s social mission, as they would “probably really lose out on social prestige, [...] if we merely sold the glasses” (Steiner, 9 March 2021).

Operating Vehicle Assets

HI Bolivia as a foundation—the closest existing Bolivian equivalent to a German NPO—provided the *Legal Entity* umbrella, under which the project Good Vision - Lentes al Instante was created. One of the associated legal restrictions was the missing legal format of NPOs, as Bolivian foundations are normally limited to charity work and are prohibited from selling goods. As stated by HI Bolivia’s director, “if somebody makes business, then you are a business unit. If somebody provides social services, then you are a foundation” (Steiner, 9 March 2021). As HI Bolivia had already lobbied in 2000 to run its youth hostels in a hybrid format, it was granted a compromise format by which to run its non-profit operations with business-like concessions. As such, HI Bolivia is “still the only foundation in Bolivia who runs with a VAT number [...] and an import license” (Steiner, 9 March 2021), providing the ideal prefabricated vehicle to run the ODG project. Beyond its legal entity, HI Bolivia is also endowed with *On-Site Infrastructure*, ranging from mobile units used in previous outreach projects to its hostel accommodations, which can house volunteers. To further expend this infrastructure, HI Bolivia and ODG inaugurated an ODG training center in Santa Cruz de la Sierra in 2019, including a central warehouse and production facility for all Latin American ODG projects.

Lastly, HI Bolivia provides ODG with *Human Resources* in the form of both local employees and international volunteers. First, HI Bolivia employs 20 local employees for the production and distribution of its glasses, as well as optometrists and “Good Vision technician assistants” for the eye screenings and refraction services. Second, HI Bolivia has experience with, and an established processes to integrate, long-term volunteers trained and sent by partner organizations such as the Red Cross, the German Federal Ministry of Economic Cooperation and Development, or the European Youth Hostel movement.

NPO Capabilities

HI Bolivia functions as the on-site implementer of ODG, and its capabilities cover the entire implementation phase and the majority of the overarching phase of the innovation process.

Implementation Capabilities

As the local entity of ODG in Bolivia, HI Bolivia covers all implementation capabilities. Starting with *Strategic Planning*, HI Bolivia selects the communities visited during the outreach activities, estimates the required quantities of glasses, and defines an affordable price point. Currently, the price of the glasses and the related service package is set at €10 for Bolivia—reflecting approximately two to three days' wages—while ranging €9–€15 throughout Latin America. Based on this planning, HI Bolivia submits an annual proposal to ODG Germany to receive the required funding, equipment, and project support. With this equipment and the on-site production facilities, HI Bolivia further covers the *Procurement* of the glasses. HI Bolivia functions as a hub for Latin America, producing glasses not only for its operations in the Bolivian market, but also for other ODG projects across Latin America that are starting to emerge.

HI Bolivia also runs the *Operations*, for which it organizes mobile campaigns with minibuses to schools and community gatherings in rural villages and impoverished urban areas across Bolivia. On site, people in need are screened with mobile auto refractometers before being fitted with a suitable pair of glasses. These campaigns stretch up to 1,000 kilometers from the center in Santa Cruz de la Sierra, with buses equipped with up to 2,000 frames and 5,000 lenses. According to its director, HI Bolivia is thus “the only aid organization in South America who can complete the consultation and selling of glasses out in the jungle in a single visit” (Steiner, 9 March 2021). While HI Bolivia started its operations purely on the basis of donations, it switched to a social enterprise system in 2015, whereby people in need pay at least partially for their glasses. This system creates local employment, ensures that glasses are not distributed in vain, and helps to sustain the organization's operations. As such, the income at least partially covers the employees' salaries, together with other ongoing costs of the eye camps (e.g., accommodation, food, and gasoline).

To perform these operations, HI Bolivia provides the necessary *Staffing* of 20 local employees and approximately 20 long-term international volunteers. In the context of recruiting this staff,

HI Bolivia's director stated that "it might sound easy from a European perspective, but to offer jobs and income is such an incredible gift that the big problem was how to choose" (Steiner, 9 March 2021). The employees receive adequate *Training*, provided or facilitated by HI Bolivia. The staff in glasses manufacturing receive training on ODG's "Manual for Making Glasses," while optometrists and "Good Vision technician assistants" receive the "Best Spherical Correction" training, developed specifically by ODG (OneDollarGlasses, n.d.-b). As HI Bolivia itself does not possess expertise in eye health, its optometrists and technician assistants are either trained by ODG specialists from Germany or through the Instituto Técnico de Salud Seguridad Ocupacional y Medio Ambiente (ISSEM), the ophthalmic institute in Bolivia. However, HI Bolivia contributes to the Spanish translations and digitization of training materials and ensures that all employees are trained adequately.

Not only is HI Bolivia involved in local capacity building, but it also supports the *Multiplication* of ODG into other Latin American countries. Operationally, HI Bolivia pools the production for Latin America, supplying glasses to Brazil, Peru, and eventually also Colombia. From a strategic perspective, its director was involved in the planning of new projects in Latin America, the scouting of suitable people and organizations to lead them, the preparation of these new hires, and the running of their first mobile units in Peru. According to ODG's founder, this accompanied transition from Bolivia to Peru marked "the first time that a new project worked seamlessly from the beginning" (Aufmuth, 9 March 2021), confirming ODG's expansion strategy of entering the neighboring markets of existing projects.

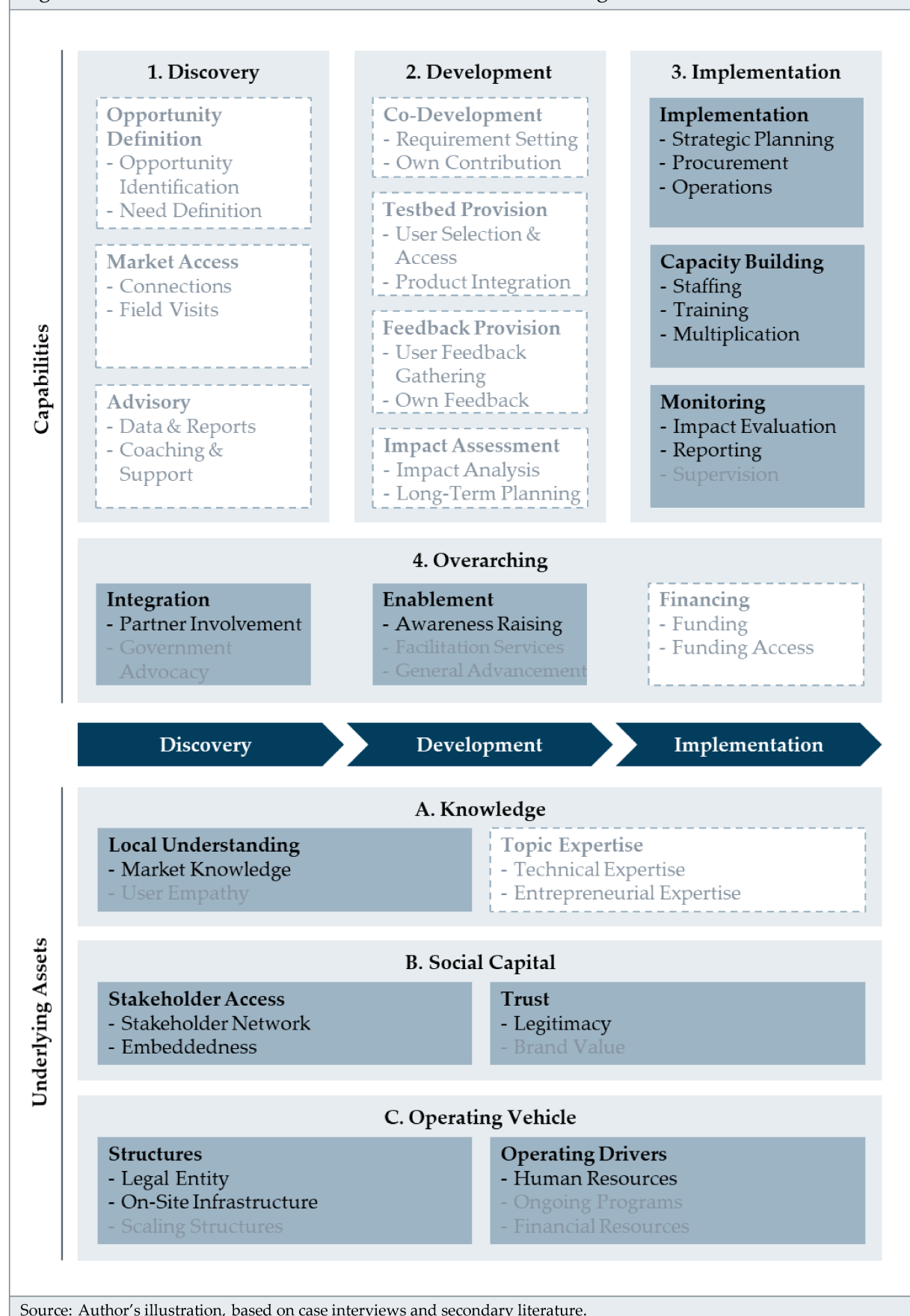
Finally, HI Bolivia also provides the monitoring of ODG in Bolivia and the subsequent *Reporting* to ODG Germany. These activities include monthly calls and bi-annual in-person meetings to share updates and data from each country, exchange best practices, and ensure that quality standards are being met. In addition, HI Bolivia contributes to the *Impact Evaluation* of the operations in Bolivia, in cooperation with Siemens Stiftung. This evaluation not only tracks patient data and the quality of the opticians' work but also the adherence rate of patients wearing the glasses, the potential obstacles to doing so, and the associated ripple effects in people's lives and professions.

Overarching Capabilities

One of ODG's biggest bottlenecks is the need to bring as many people in need of glasses as possible together in one location to provide an efficient screening and fitting process. To achieve this density and "find the patients" (Steiner, 9 March 2021), HI Bolivia strongly focuses on *Partner Involvement* with different local organizations. These include organizations such as the GIZ or SOS Children's Villages, as well as local churches, female civic organizations, schools, disability organizations, and orphanages, granting HI Bolivia access to a large number of patients. According to its director, these "interinstitutional contacts help us organize [the eye camps] and reach out to many patients in an efficient way" (Steiner, 9 March 2021). Often, these organizations are present in more than one location, further increasing the synergy effects of patient bundling. In contrast, HI Bolivia does not collaborate closely with local authorities to access patients, as this type of collaboration has been deemed too bureaucratic for the Bolivian market. Nevertheless, ODG ensures that it has "an official okay from the authorities" in Bolivia and always acts in accordance with local regulations to "get started as a social enterprise" (Aufmuth, March 9, 2021).

As its eye camps are conducted in changing regions, HI Bolivia and its partner organizations strongly focus on *Awareness Raising* to draw as much of the target population as possible to the screenings. By providing them with information about the eye camps and the benefits of glasses in advance, HI Bolivia ensures that a critical mass of potential patients gathers at the predefined location. Due to the holistic nature of its product, covering both the screening and the fitting of glasses, HI Bolivia is not involved in further services that facilitate its offering.

Figure 18: NPO Resources: OneDollarGlasses and Hostelling International Bolivia



B) empowering people.Network of Siemens Stiftung

Underlying NPO Assets

The empowering people.Network, building on Siemens Stiftung's asset base, possesses certain underlying assets to fuel their B2N partnerships with OneDollarGlasses and HI Bolivia.

Knowledge Assets

As an organization fostering entrepreneurial solutions focused on basic needs, one of epN's most distinctive features is its strong *Entrepreneurial Expertise*. This expertise includes areas such as organizational development, growth, and financial independence, applicable to ventures across different sectors. In contrast, epN provides no market-specific knowledge, given its foothold in Germany. Similarly, epN itself does not possess knowledge in optics, as a result of which it was "completely excluded from developing the product, [...] which we have always perceived as readily developed" (Janezic, 29 July 2021).

Social Capital

As highlighted in its name, the empowering people.Network has a strong *Stakeholder Network*. On the one hand, epN has close ties to the approximately 80 social entrepreneurs in its network, most of which have been shortlisted in its previous empowering people.Awards. These organizations cover all of epN's sectors of focus (see above), as well as different geographic regions and maturity levels. On the other hand, epN collaborates with more than 15 highly regarded partner organizations in the fields of social impact and entrepreneurial development around the globe (empowering people. Network, n.d.-d).

In addition, epN, particularly its umbrella organization Siemens Stiftung, possess considerable *Brand Value*. While especially recognized in a corporate context among Western countries, this "weight and reputation [is] still helpful when working with large companies, organizations, or foundations, which would perhaps be more difficult for a no-name foundation" (Schwank, 12 August 2021).

Operating Vehicle

A core asset of Siemens Stiftung is its *Financial Resources* of \$450 million in foundation capital, from which epN receives an annual budget to support its members' projects. Aside from its financial resources, the operating vehicle of epN and Siemens Stiftung are not further considered. Even though both organizations possess their own structures, ongoing programs, and human capital, these elements are not used directly by either partner and are therefore not considered to be synergy sensitive for the focal B2N partnerships.

NPO Capabilities

Siemens Stiftung's epN provides a range of capabilities to ODG and HI Bolivia, focus on overarching funding and entrepreneurial coaching.

Discovery Capabilities

By using its stakeholder network, epN supports ODG and HI Bolivia with *Connections*. On the one hand, these include the so-called network meetings, which all social entrepreneurs of epN are invited to attend every once in two years. On the other hand, epN facilitates connections to local or international stakeholders relevant to ODG Germany or HI Bolivia, if the opportunity arises. One particular connection linked HI Bolivia to GIZ, which had ongoing education programs with Bolivian schools. As several pupils struggled with their vision, epN saw a mutually beneficial opportunity and introduced the organizations to each other in 2019. Since then, HI Bolivia has an agreement with GIZ to offer its eye camps at the schools selected, vetted, and contacted by GIZ.

epN's strongest contribution comes in the form of *Coaching & Support*. At its core are multiple-day training sessions covering diverse topics in organizational development (e.g., scaling, social finance, or impact measurement). These workshops are offered several times per year to all its network members and have been frequently attended by several members of ODG Germany and Bolivia. However, these gatherings do not focus on "explaining to the social entrepreneurs how the world works" (Janezic, 29 July 2021); rather, they stimulate peer-to-peer exchange for social entrepreneurs to mutually support and learn from each other. In addition to these group offerings, ODG Germany and Bolivia are taking part in epN's individual

mentoring program, whereby participants are matched with experienced social entrepreneurs to help them build personal roadmaps to unlock their full potential. Apart from institutionalized coaching programs, epN itself acts as a sparring partner both for ODG Germany and HI Bolivia by providing ad hoc collegial advice on different topics. It also provides its members with access to the support services of other organizations. These services include integrating those members in the programs and solution libraries of partner organizations and providing them with stage time and exhibition booths at international conferences.

In addition to this direct support, epN provides a range of relevant *Data & Reports* to support the work of ODG. These resources encompass studies on social entrepreneurship in low-income countries in general, specific reports on innovative finance solutions or the job creation potential of ventures, and various manuals and workbooks for social entrepreneurs to apply (empowering people. Network, n.d.-c). While these outputs are not directly tailored to ODG, they can inform their organizational development and strategic decision-making.

Implementation Capabilities

Although epN is not usually involved in project implementations on the ground, it recently initiated a joint study concerning the *Impact Evaluation* of ODG in Bolivia. In collaboration with HI Bolivia and ODG, epN supported the development of a concept for an online social impact measurement by providing a topic expert and relevant data. The study analyzes the patients' adherence rate in wearing the glasses, their social acceptance, the potential obstacles in wearing them regularly, and the medium- and long-term effects of the glasses on the patients. As illustrated by Siemens Stiftung's head of Development Cooperation, the study includes questions such as, "Do I feel more comfortable at school? Are my grades better? [...] What happens to patients who are referred to a doctor? Do they go to the doctor, or do they pocket the money for the referral? Is there even a doctor available?" (Janezic, 29 July 2021).

Overarching Capabilities

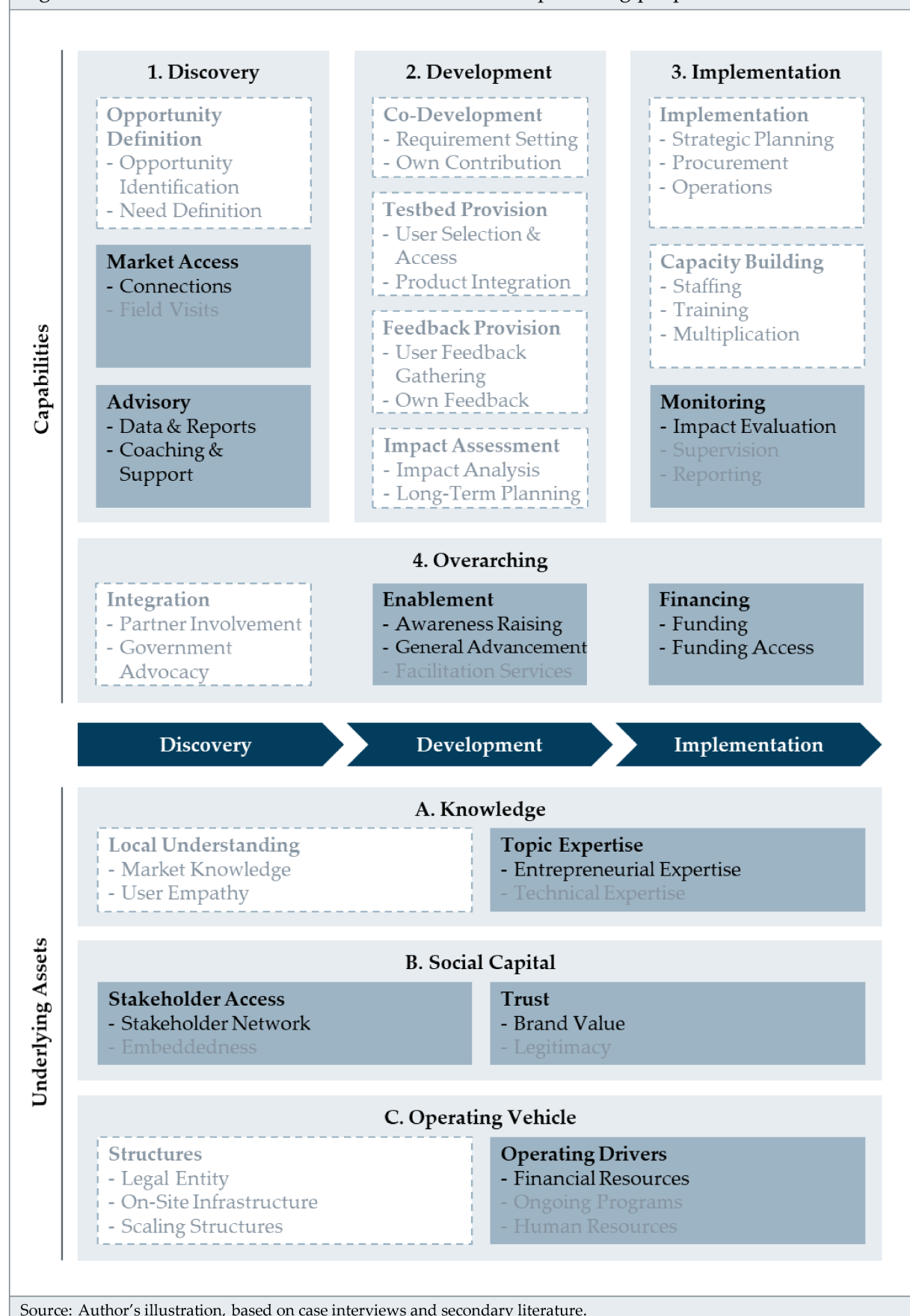
epN uses its platform for *Awareness Raising* among its members, such as ODG. This ranges from its award, which presented ODG to a distinguished jury and an interested public, to articles, interviews, newsletters, and blog posts about ODG, published via epN and Siemens

Stiftung's communication channels. These activities help ODG to reach a wider audience, underline its legitimacy, and eventually fundraise more successfully.

Beyond ODG-specific support, epN is also active in the *General Advancement* of the topic of social entrepreneurship as a means to spur development collaboration. To this end, epN grants public access to its reports and manuals, as mentioned above, designed to advance the operational development of social enterprises. epN furthermore develops the wider ecosystem of development cooperation, as it regularly organizes or participates in roundtables, panels, podcasts, and workshops with relevant stakeholders from different fields and regions. These resources are designed to drive exchange and collaboration in the field and to help stakeholders increase the social impact of their efforts (empowering people. Network, n.d.-b). As stated by the head of epN, "these ecosystem building, awareness raising, and motivating of stakeholders are not just readily available to social entrepreneurs, but there simply has to be someone who is committed to it and who takes on this advocacy role" (Schwank, 12 August 2021).

epN itself also provides ODG with *Funding*, which—apart from the €50,000 prize money received through the empowering people.Award—is tied to certain projects. In the case of HI Bolivia, epN funding focused mainly on two larger projects. Developed in collaboration with GIZ, one concerned a range of eye camps at different Bolivian schools, while the other was to conduct a social impact study to measure the effect of ODG's operations in Bolivia (see above). However, epN's funding for ODG is limited to smaller project-specific grants, as they are not eligible for larger funding offers or impact investments due to their underlying non-profit logic (Schwank, 12 August 2021). At the same time, epN enables ODG with *Funding Access* by facilitating access to external funding opportunities. This support can encompass personal introductions, fortnightly newsletters listing funding opportunities, letters of recommendations to third-party donors, and support with funding applications.

Figure 19: NPO Resources: OneDollarGlasses and empowering people.Network



7 Discussion

This chapter extends the in-depth single-case analysis of the previous section by discussing the similarities and differences between the four case studies in a *Cross-Case Evaluation* (7.1). Based on these insights, the different archetypical *Roles of NPO Partners* (7.2) are distilled. The resulting seven distinct NPO roles each emphasize different assets and capabilities, are of special relevance in different phases of the innovation development process, and can be combined by a single NPO partner.

7.1 Cross-Case Evaluation

To cross-analyze the cases, the identified assets and capabilities of the six different NPO partners are juxtaposed to discern underlying patterns explaining their similarities and differences.

A) Assets

Table 11 summarizes the assets of the six NPO partners. With the exception of the universally present *Stakeholder Network*, the asset endowments of the NPOs present variations that can be explained with three differentiators categorizing the NPO partners, derived from the characteristics of the NPOs that do or do not possess the asset(s) in question.

Operational vs. Supporting NPOs

The first differentiator divides operational NPOs, which themselves provide services to beneficiaries, from supporting NPOs, which support the operations of others. Of the six NPOs in the case studies, four can be classified as operational given the extent of their own programs, namely Pro Uganda, TCCO, ZCfB, and HI Bolivia. The other two, CBM and epN of Siemens Stiftung, mainly support the operations of other organizations, resulting in their classification as supporting NPOs. Despite their shared supporting role, these two NPOs vary greatly in their area of focus, with CBM and epN providing support from a technical and entrepreneurial perspective, respectively.

Operational NPOs seem to be endowed with *User Empathy* and *Technical Expertise*, resulting from their direct involvement in the focal topic. In addition, operating NPOs appear to bring their *Legal Entity*, *Ongoing Programs*, and *Human Resources* into partnerships with social enterprises. One of two NPOs deviating from this pattern is HI Bolivia, which, prior to its current partnership, operated in an unrelated area. For this reason, it had no preexisting user empathy, technical expertise, and ongoing programs in the focal area. The other deviation is from CBM, which—although classified as a supporting NPO—mainly advances partners through its technical expertise and has beneficiaries who provide it with access to a range of ongoing programs.

In return, the supporting NPOs possess substantial *Financial Resources* leveraged to subsidize projects outside their own activity areas. By contrast, the operating NPOs—Pro Uganda, TCCO, ZCfB, and HI Bolivia—at least partially depend on external funding and, donations, and they are also supported with revenues from their own operations. In addition, epN uses its strong *Entrepreneurial Expertise* to further promote the operating NPOs in its network.

On-Site vs. Remote NPOs

A second differentiator regards on-site and remote NPOs. With the exception of epN, all NPOs have an on-site presence, including Pro Uganda, TCCO, ZCfB, CBM, and HI Bolivia (with CBM operating from local offices and a global headquarters). Having an on-site presence appears to influence whether NPOs possess *Market Knowledge*, *Embeddedness*, *Legitimacy*, and *On-Site Infrastructure*, all of which are strongly tied to a geographic proximity to, and long-standing presence within, a target market. This relation also explains the missing legitimacy of Pro Uganda, which can be attributed to its relatively young presence in the local market, insufficient to develop legitimacy and trust among the local population.

National vs. International NPOs

The third differentiator distinguishes national from international NPOs. The national NPOs—Pro Uganda, TCCO, ZCfB, and HI Bolivia—dedicate their activities (and organization names) to national causes. Conversely, CBM is a classic international NPO that is active and present in several countries. Similarly, epN of Siemens Stiftung is active in multiple countries but has no local market presence outside Germany.

Regarding their assets, the internationally active NPOs can rely on their *Brand Value* as a widely recognized label of trust. Accordingly, CBM's sphere of influence is greater than that of epN, in proportion to the extent of their international activities. In comparison, the national NPOs rely more on personal connections than on their image, explaining the absence of this asset. In addition, and in combination with their on-site presence, CBM is an international NPO that possesses *Scaling Structures* across numerous markets, allowing it to scale solutions more easily across borders.

Table 11: Cross-Case Analysis of NPO Assets

Sub-Asset	Pro Uganda	TCCO	ZCfB	CBM	HI Bolivia	epN
Market Knowledge	x	x	x	x	x	
User Empathy	x	x	x			
Technical Expertise	x	x	x	x		
Entrepreneurial Expertise						x
Stakeholder Network	x	x	x	x	x	x
Embeddedness	x	x	x	x	x	
Brand Value				x		x
Legitimacy		x	x	x	x	
Legal Entity	x	x	x		x	
On-Site Infrastructure	x	x	x	x	x	
Scaling Structures				x		
Ongoing Programs	x	x	x	x		
Human Resources	x	x	x		x	
Financial Resources				x		x

Source: Empirical interviews conducted by author.

B) Capabilities

Table 12 lists the capabilities of the six NPOs. As NPOs vary more in their capabilities than in their assets, this cross-case analysis proceeds case by case instead of introducing common differentiators. This analysis then feeds into the definition of the different roles of NPOs (see Section 7.2), juxtaposing the different capabilities more directly.

Pro Uganda

Of all the B2N partnerships analyzed in this research, Pro Uganda's collaboration with Project Circleg is of the smallest scope and duration. Given Project Circleg's low level of maturity, Pro

Uganda functions primarily as a sparring partner for Project Circleg, with its involvement confined to the early stages of Innovation development. In the discovery phase, Pro Uganda's capabilities focus on introducing the Swiss startup to the Ugandan market through *Connections* and *Field Visits* and supporting the progression of the innovation through thematic *Coaching & Support*. In the development phase, the NPO supported Project Circleg through *User Selection & Access* and *Own Feedback*, both of which built on its own operations in the field of prosthetics.

The motivation for this support stems from the aligned missions of the two organizations, with Pro Uganda having an interest in the promotion and eventual market launch of Project Circleg's frugal prosthetic solution. Nonetheless, all focal capabilities are characterized by the ease of their implementation, and none require Pro Uganda to significantly adapt its internal processes or invest substantial resources in the partnership. This scope again emphasizes the early phase of this B2N collaboration, in which the innovation development is still completely driven by Project Circleg. It thus remains to be seen whether the scope and intensity of this collaboration will grow as the innovation matures.

Tanzania Clubfoot Care Organization

The collaboration between TCCO and MiracleFeet represents an exception in this analysis, as the former was specifically founded to facilitate collaboration between MiracleFeet and the local clubfoot care providers. The financial and technical support from MiracleFeet thus constitute TCCO's inherent reason for existence, rendering it heavily dependent on the partnership with the social enterprise.

In return, TCCO coordinates the work of MiracleFeet in Tanzania, covering most capabilities within the implementation phase (*Strategic Planning, Procurement, Training, Multiplication, Supervision, and Reporting*). However, as an umbrella entity spanning the local clubfoot care providers, TCCO does not provide the daily operations and required staffing itself but ensures that these are deployed by the local clinics and hospitals in its network. Instead, TCCO emphasizes the overarching capabilities that facilitate the work of these care providers, covering all non-financial capabilities of this phase (*Partner Involvement, Government Advocacy, Awareness Raising, Facilitation Services, and General Advancement*).

The scope of this B2N collaboration, specifically the missing capabilities in the discovery and development stages of the innovation process, underline TCCO's role as a local implementing partner of MiracleFeet. From the very beginning, TCCO could build on a product already viably developed and successfully implemented in similar markets. Consequently, MiracleFeet did not require TCCO to provide any capabilities during the first two innovation phases to discover the Tanzanian market or to develop essential features of the product.

Zimbabwe Council for the Blind

From all the B2N partnerships analyzed in this research, the scope of collaboration is the most extensive for ZCfB and Peek Vision, as the NPO's capabilities occur in the phases of development and implementation, and it also provides overarching support. During the development phase, ZCfB was actively engaged in co-developing the solution and arranging suitable testing grounds for it (*Requirement Setting, Own Contribution, User Selection & Access, Product Integration, User Feedback Gathering, Own Feedback*). This early involvement diverges from the progression of other implementing NPOs such as TCCO and can be explained by the customizable character of the Peek Vision solution, whose strong software component requires every implementing partner to co-design the solution to fit the specific situation on the ground. However, as the fundamentals of the tool have already been successfully implemented in other markets, this co-development did not require ZCfB to also provide an impact assessment of the solution.

During the implementation phase, ZCfB provides the operations of the innovation itself; for this reason—in contrast to the coordinating role of TCCO—its implementation capabilities include *Operations* and *Staffing* but omit the supervision of a third-party service provider (*Strategic Planning, Procurement, Operations, Staffing, Training, Multiplication, and Reporting*).

These capabilities along the innovation development process are complemented with overarching ones covering all capabilities and resemble the role that TCCO takes in paving the way for the frugal innovation (*Government Advocacy, Awareness Raising, Facilitation Services, General Advancement, Funding Access*). In contrast to TCCO, ZCfB does not involve external clinics as partners, as it either operates its own clinics or disseminates the Peek Vision model in publicly run hospitals through government advocacy work. Regarding financing, however, its

affiliation with CBM allows ZCfB to grant Peek Vision *Funding Access*, which is a capability not provided by any other implementing partner in this analysis.

CBM

CBM's involvement with Peek Vision and ZCfB signals a distinct composition of capabilities, as compared to those typically observed among implementing partners. CBM's support along the innovation development process is more sporadic and scattered across the phases (*Connections, Coaching & Support, Strategic Planning, Training, and Multiplication*). In addition, CBM provides overarching capabilities in the form of *Partner Involvement* and *General Advancement*. The unifying element across these different capabilities is that they center around strategic support and knowledge transfer, as they use CBM's pre-existing, vast network of stakeholders and its longstanding expertise in eye health. As such, CBM assumes the role of a sparring partner with a strong thematic link to the focal area but not involved in the partners' operations as an implementing NPO would be. Thus, none of CBM's capabilities require any adaptation of its internal processes, as is characteristic of non-exclusive partnership formats in which the NPO partner offers the same services to a range of social enterprise partners.

Beyond this strategic support, CBM is also the first of the analyzed NPO partners to offer *Funding* to a social enterprise, an impactful lever for donor NPOs to accelerate frugal innovations. As the funder of the collaboration between Peek Vision and ZCfB, CBM also has a self-interest in the success of the collaboration and the innovation, which explains its multifaceted support along the innovation development process.

Hostelling International Bolivia

As the local implementer of ODG in Bolivia, HI Bolivia provides all its phase-specific capabilities during implementation, covering all of the phase's nine sub-capabilities bar one (*Strategic Planning, Procurement, Operations, Staffing, Training, Multiplication, Impact Evaluation, and Reporting*). This comprehensiveness underlines the autonomy with which HI Bolivia operates the ODG model in its local market. The only capability not covered in this phase is the *Supervision* of third parties, which underlines the NPO's role as a direct implementer, similar to ZCfB. In addition, the two overarching capabilities *Partner Involvement* and *Awareness Raising* ensure that this implementation work is facilitated where needed.

In contrast, the one-sided distribution of capabilities along the innovation process emphasizes that HI Bolivia was not involved in supporting ODG in the discovery of the Bolivian market or subsequently developing the innovation, similar to the involvement of TCCO analyzed above. This can be explained with the high level of technical maturity that ODG had before implementing the model in different countries: even though Bolivia was among ODG's first project countries, the glasses system and bending machine were already functioning at the time the collaboration was initiated (although both have improved considerably since then). This high degree of self-reliant development also allowed ODG to collaborate with a non-ophthalmic NPO partner in the first place, in contrast to the other B2N partnerships analyzed here.

empowering people. Network of Siemens Stiftung

The type of support that epN provides ODG and HI Bolivia is strongly characterized by the foundation format of Siemens Stiftung. Thus, in contrast to operational NPOs, epN performs supportive capabilities which require low levels of internal adaptation by the NPO partner. This support includes overarching capabilities that focus on enabling the partners' work (*Awareness Raising and General Advancement*), as well as capabilities along the innovation development process characterized by this supportive nature (*Connections, Data & Reports, Coaching & Support, and Impact Evaluation*). Beyond these, epN is not directly involved in the operations of the partners. However, epN does support ODG and HI Bolivia's operations through *Funding* or *Funding Access*, in line with the basic principle of a foundation.

In comparison with CBM, epN focuses more on cross-cutting issues of business development rather than on topic expertise and content-based collaboration. Thus, of all the NPOs in this analysis, epN is the one least restricted by industry boundaries.

Table 12: Cross-Case Analysis of NPO Capabilities						
Sub-Asset	Pro Uganda	TCCO	ZCfB	CBM	HI Bolivia	epN
Opportunity Identification						
Need Definition						
Connections	x			x		x
Field Visits	x					
Data & Reports						x
Coaching & Support	x			x		x
Requirement Setting			x			
Own Contribution			x			
User Selection & Access	x		x			
Product Integration			x			
User Feedback Gathering			x			
Own Feedback	x		x			
Impact Analysis						
Long-Term Planning						
Strategic Planning		x	x	x	x	
Procurement		x	x		x	
Operations			x		x	
Staffing			x		x	
Training		x	x	x	x	
Multiplication		x	x	x	x	
Supervision		x				
Impact Evaluation					x	x
Reporting		x	x		x	
Partner Involvement		x		x	x	
Government Advocacy		x	x			
Awareness Raising		x	x		x	x
Facilitation Services		x	x			
General Advancement		x	x	x		x
Funding				x		x
Funding Access			x			x
Source: Empirical interviews conducted by author.						

7.2 Roles of NPO Partners

By building on the cross-case evaluation, identifying recurring resource-bundles across cases, and linking them to the overall roles played by NPOs in their partnerships, this section introduces seven prototypical roles in which NPO partners can support the development and implementation of frugal innovation. Each role emphasizes a specific set of assets and capabilities and connects to one or multiple phases of the innovation process. The roles are to be understood as non-exclusive levers through which NPOs accelerate frugal innovation, whereas in practice, NPOs can actuate multiple roles in parallel and can fulfill each role partially or fully. The seven NPO roles—Introducer, Co-Developer, Implementer, Multiplier, Advisor, Promoter, and Funder—are explained below and summarized in Figure 20 and Table 13.

The Introducer

The first way NPOs can accelerate frugal innovation is by playing the role of the Introducer, thereby providing frugal innovators an understanding of the local needs and mindsets and access to the local business environment and relevant stakeholders.

The assets of NPOs in an Introducer role center around their local understanding in the form of *Market Knowledge* and *User Empathy*, coupled with access to local stakeholders in the form of their local *Stakeholder Network* and *Embeddedness*. These assets are used to inform the foreign business partner of local innovation opportunities through *Opportunity Identification* and *Need Definition* and to allow them to access the local market through *Connections* and *Field Visits*. Given the focus on creating an initial understanding of, and a foothold in, the target market, all these capabilities occur in the discovery phase, at the beginning of the innovation process.

Given the relevance of the local context, these NPOs are local actors that are themselves usually active in the target market or are at least well connected to the relevant actors within. They provide the most value to businesses in the very early stages of the innovation development process, when they are still discovering the new market, building up knowledge informing the initial product development or adaptation, and deciding on the market entry strategy.

The Introducer role is exemplified by Pro Uganda, which introduced its partner through field visits to the local market to understand consumer needs and meet relevant stakeholders.

The Co-Developer

A second way NPOs can support frugal innovations is by playing the role of Co-Developer, through which they are actively involved in the development of the innovation and inform the process with insights and skills complementary to those of the business partner.

Similar to NPOs in an Introducer role, co-developing NPOs possess *Market Knowledge* and *User Empathy*, as well as local *Stakeholder Network* and *Embeddedness*, all of which inform them about local needs and help them access potential users of the innovation. In addition to location-dependent assets, these NPOs also possess deep *Technical Expertise* on the subject matter and *Entrepreneurial Expertise* within resource-constrained market settings, which are crucial for their role in co-developing the frugal innovation. Building on these assets, co-developing NPOs provide capabilities during the development phase of the innovation process, such as *Requirement Setting* and *Own Contribution* in the innovation development, *User Selection & Access* and *Product Integration* in the innovation testing, *User Feedback Gathering* coupled with their *Own Feedback* in the innovation adaptation, and *Impact Analysis* and *Long-Term Planning* in the innovation assessment. The Co-Developer role can either be fulfilled actively, with NPOs themselves contributing insights, knowledge, and ideas to the development, or more passively, where NPOs do not provide ideas themselves but host the testing frame in which the business can test and subsequently adapt the innovation.

To be able to meaningfully contribute to the development of a frugal innovation, these NPOs usually operate in the local target market themselves and frequently interact with the end user of the innovation. The businesses interacting with these co-developing NPOs are usually still in an early stage, although they are more mature than businesses interacting with Introducer NPOs. Accordingly, these businesses already have a testable version of their product, upon which the collaborative development process can build.

The role of the Co-Developer is illustrated through the contributions of Pro Uganda and ZCfB, both of which supported the further development of a not-yet marketable product. However, both covered only certain capabilities of the role, highlighting again the practical modifiability of these roles.

The Implementer

Moving further down the innovation development process, NPOs can accelerate frugal innovations as the local Implementer, where the vast majority of the daily operations are conducted by the NPO partner rather than the business, in turn providing the NPO with the resources required to operate.

To take on this leading role in the operations of the innovation, Implementers possess a comprehensive range of relevant assets. First, these cover the knowledge needed to operate the business in the target market, namely the *Market Knowledge*, *User Empathy*, *Technical Expertise*, and *Entrepreneurial Expertise*. Second, Implementers must be well connected in the target market, relying on their *Stakeholder Network*, *Embeddedness*, and *Legitimacy* to operate. Third, and in contrast to the other NPO roles, Implementers require an operating vehicle in the form of their *Legal Entity*, *On-Site Infrastructure*, *Ongoing Programs*, and *Human Resources*, all of which are necessary to undertake the daily operations of the innovation. Based on these assets, the Implementer supports frugal innovation with a range of capabilities, each occurring during the implementation phase of the innovation process. These include the *Strategic Planning*, *Procurement*, and *Operations* of the innovation, for which these NPOs provide the required *Staffing* and *Training*. The Implementer further provides the *Impact Evaluation* and *Reporting*, closing the loop back to the business partner.

Given the Implementer's proximity to the daily operations, these NPOs have a local market presence and are usually already operationally active within the focal area. Often, frugal innovation improves or leverages their incumbent activities, allowing the NPO to complete its own mission more effectively and incentivizing it to account for such a large proportion of the B2N partnership. As such, Implementers are most beneficial to businesses that already have a marketable innovation, for whom partnering with NPOs is a promising growth strategy to expand into new markets without the need to build up their own operations on site.

NPO partners that embody the role of the Implementer are ZCfB and HI Bolivia, both of which are factual on-site operators of the innovation, which was already marketable at the beginning of their B2N collaborations. In both cases, the business partners provide strategic support, product information, and necessary material, but are not involved in the daily operations within the target markets.

The Multiplier

Closely linked to the Implementer is the *Multiplier*, a role in which the NPOs take an intermediary position between the business partner and the—often multiple—implementing entities on site. These NPOs provide knowledge, strategic direction, and products to the implementing entities, while channeling and reporting feedback to the business partner.

Given the Multiplier's role as coordinator between different stakeholders, its most important assets focus on its social capital in the form of its *Stakeholder Network* and *Embeddedness*, as well as the *Legitimacy* it signals to all partners to facilitate between them. In addition, *Scaling Structures* help the NPO multiply the innovation across different markets. In contrast, the Multiplier NPO itself does not necessarily possess knowledge of the target market, end user, or subject in question, although such knowledge allows for a more informed inter-party facilitation. Based on these assets, this NPO type provides different capabilities occurring in the implementation phase of the innovation process, similar to those of the Implementer, but focusing more on enabling activities. As the Multiplier is not directly involved in the daily business of the implementation, its capabilities cover *Strategic Planning* and *Procurement* but not the actual operations. Similarly, Multiplier NPOs engage in the *Training* of staff and the *Multiplication* across different teams, even organizations, but do not provide their own staff to operate the innovation on site. If operations are conducted by a third-party provider, Multiplier NPOs provide the necessary *Supervision* of these operations, along with *Reporting* and *Impact Evaluation* as part of the monitoring of the innovation, linking the operations on site back to the business partner abroad.

Multipliers are usually situated at the node of different stakeholders, either as an umbrella organization spanning independent entities or as part of an international organization with different regional offices. In the case of the latter, Multipliers typically sit at the organization's headquarters or the regional office in closest proximity to the business partner. Similar to Implementers, Multipliers are relevant for businesses with an already marketable product and looking to expand their presence to different markets without growing in proportion.

An illustration of the Multiplier can be found in the examples of TCCO and CBM International, which function as the connective links between the business partner and different implementing entities within one or multiple countries.

The Advisor

Apart from directly supporting the operations of the business partner, NPOs can accelerate frugal innovations by playing more strategic and supportive roles, thereby rendering the activities of the business more effective. One of these roles is that of the *Advisor*, which provides the business partner with data, insights, and coaching, either for a targeted individual or on a more general basis. Depending on the NPO's background, this advice may cover the target market, the focal industry, or the business development.

In the same vein, the area of advice depends on the specific assets of an Advisor NPO, all of which center around knowledge resources. As such, they cover both the local understanding, in the form of *Market Knowledge* and *User Empathy*, and topic expertise in the form of *Technical Expertise* and *Entrepreneurial Expertise*. Informed by these assets, Advisors provide business partners with advice ranging from more unidirectional *Data & Reports* to more interactive and targeted *Coaching & Support* capabilities. While this role can appear along the overall innovation development process, it prevails in the discovery phase, where the knowledge gap of the business partner is typically largest.

Various NPOs employ the Advisor role to support innovations: They have deep expertise and longstanding experience in at least one area of the partner's target market, industry, or social business model, either through their own operations or through regular interactions with relevant stakeholders. However, as Advisors are not themselves operationally active, they are geographically independent of the innovation. On the receiving end, businesses of virtually all types and at all maturity stages can profit from Advisor NPOs, with the benefits being more accentuated the more complementary the areas of expertise of the NPO and the business partner are.

The Advisor role can be found in the work of Pro Uganda, CBM International, and epN of Siemens Stiftung. Incidentally, these NPO partners are not directly involved in the operations of the business partner, so they cannot impart their expertise through direct contributions to the innovation process. While all these NPOs offer advice to their partners, they do so for different areas of expertise and in different formats, ranging from ad-hoc support and passive observations to institutionalized coaching in the form of training events.

The Promoter

Another way that NPOs accelerate the frugal innovation efforts of businesses is through the Promoter role, whereby they enhance the public visibility, political goodwill, and stakeholder collaboration of the frugal innovation and its thematic area in general.

To fulfill this role, NPOs rely on their assets of *Market Knowledge*, *Technical Expertise*, *Stakeholder Network*, and *Embeddedness*, coupled with the trust built through their *Brand Value* and *Legitimacy* to operate. On this basis, Promoter NPOs focus on the integration and enablement capabilities along the overall innovation process. These capabilities include *Partner Involvement* and *Government Advocacy*, through which NPOs involve, lobby with, and coordinate local, regional, national, and international stakeholders to create favorable conditions and relationships for the frugal innovation. Promoter activities also include *Awareness Raising*, through which NPOs enhance the visibility of and trust in the innovation and business partner, leveraging the reach and brand awareness they enjoy themselves among different stakeholders. Finally, NPOs in a Promoter role support the frugal innovation through the *General Advancement* of the focal topic and by coordinating *Facilitation Services* that embed the frugal innovation in a wider network of products, services, and stakeholders in the local market.

Given the Promoter's role as door opener and trusted intermediary, these NPOs often have a dual-level structure, combining local proximity with a wider international presence and known brand. While these NPOs provide value to businesses at all stages of maturity, it is rather the character and maturity level of the industry as a whole that influences the value that Promoters contribute. On the one hand, essential service industries such as healthcare have a higher level of involvement from stakeholders such as governments and NGOs, and therefore a higher need for cross-sector collaboration. On the other hand, the more underdeveloped an industry is in terms of need satisfaction, capacity, and regulations, the more room there is for NPOs to support industry advancement in general.

Examples of Promoter activities can be found in every NPO of this research, with different foci placed on different capabilities. Some NPOs contribute more comprehensively, such as TCCO or ZCfB. On the other hand, NPOs such as epN of Siemens Stiftung focus more narrowly on specific capabilities, such as to promote the visibility of its business partners.

The Funder

The last role through which NPOs can accelerate a frugal innovation is as its Funder, focusing on the financial support of the innovation. This support can occur directly, using the NPO's own financial resources, or indirectly, in which case the NPO facilitates the flow of financial resources from other entities.

NPOs in a Funder role are characterized by their strong *Financial Resources* asset, the basis from which they provide innovations with *Funding* as their main capability. These NPOs are often well-connected among other funders and familiar with financial application processes, as a result of which they also provide innovators with external *Funding Access* complementing their own support. The Funder is an overarching role supporting frugal innovators along the whole innovation development process, ranging from subsidies of market discovery activities to one-off or continuous financial support throughout the innovation development and implementation.

The Funder role can be found in a variety of NPO types, though all characterized by their reliance on financial income from private, corporate, or government contributions. Given the non-operational character of this role, NPOs are geographically independent of the innovation, while the scope of their topic expertise varies depending on the type of NPO. In turn, various businesses profit from Funder NPOs, which holds especially true for more impact-driven rather than profit-driven businesses. To be eligible for financial support, business partners must typically share the same social mission and theory of change as the Funder NPOs, which can range from specific niches to broader areas of impact.

Examples of Funders are epN of Siemens Stiftung and CBM International, both of which provide crucial financial support to their innovation partners. These examples indicate that the Funder role can integrate to a varying degree with other NPO roles and offerings. The financial support can thus range from a standalone NPO lever to being part of a more comprehensive set of NPO support services. In case of the latter, providing partners with financial resources in addition to other assets and capabilities often renders the complementary support more impactful, as business partners have more resources to absorb it effectively.

Summary

The different roles through which NPOs can accelerate frugal innovation are summarized in Table 13 and situated within the framework of NPO resources in Figure 20 below.

Figure 20: Capabilities of the Different NPO Roles

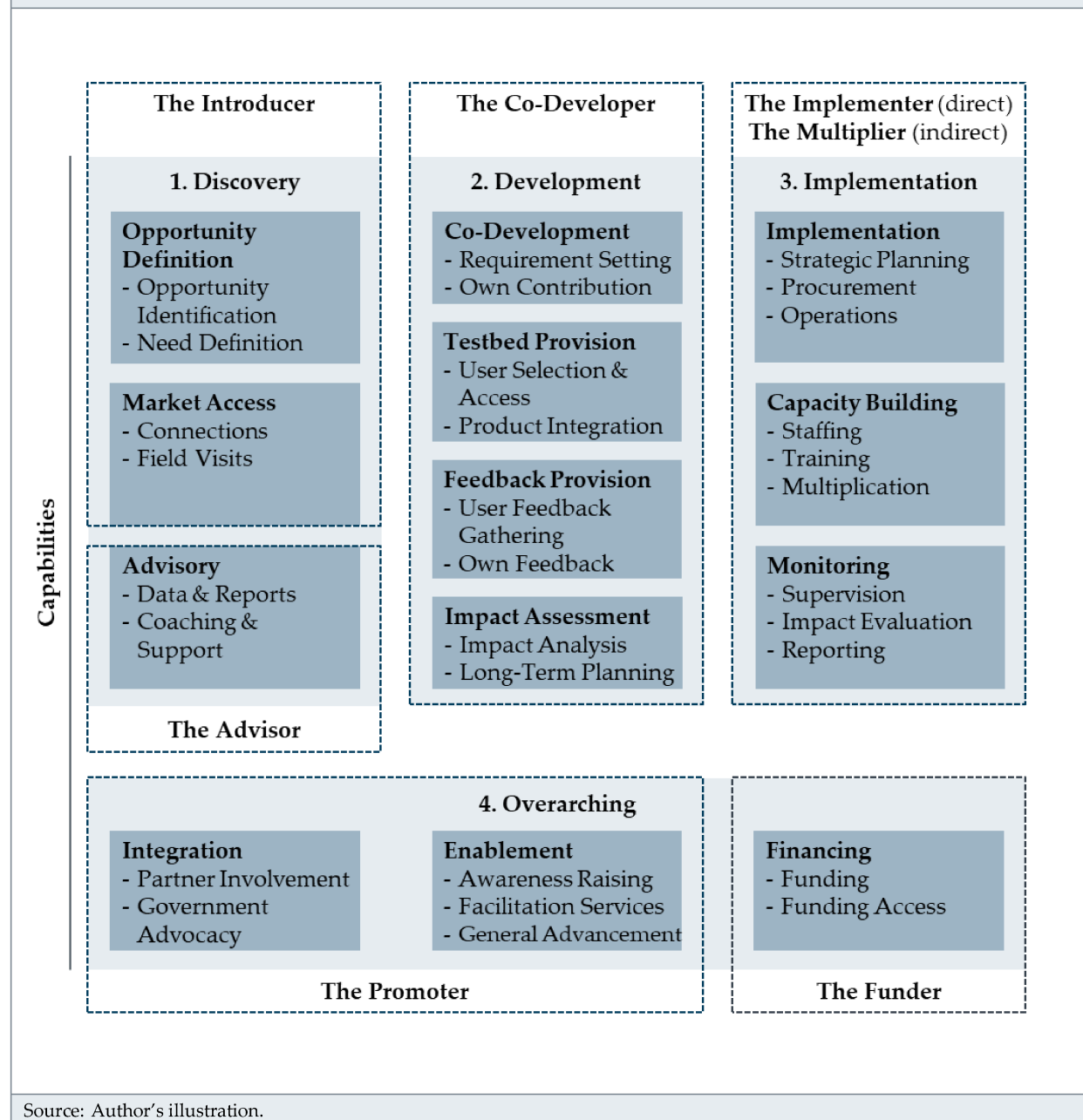


Table 13: Roles of NPO Partners in Accelerating Frugal Innovations

Role		
Introducer	<i>Description:</i> The Introducer provides a soft landing into the target market and introduces the business partner to the local needs and business environment.	
	<i>Phase:</i> Discovery	<i>Examples:</i> Pro Uganda
	<i>Central Assets:</i> • Market Knowledge • User Empathy • Stakeholder Network • Embeddedness	<i>Central Capabilities:</i> • Opportunity Identification • Need Definition • Connections • Field Visits
Co-Developer	<i>Description:</i> The Co-Developer actively contributes to the innovation development process to complement the viewpoint of the business partner.	
	<i>Phase:</i> Development	<i>Examples:</i> Pro Uganda, ZCfB
	<i>Central Assets:</i> • Market Knowledge • User Empathy • Technical Expertise • Entrepreneurial Expertise • Stakeholder Network • Embeddedness	<i>Central Capabilities:</i> • Requirement Setting • Own Contribution • User Selection & Access • Product Integration • User Feedback Gathering • Own Feedback • Impact Analysis • Long-Term Planning
Implementer	<i>Description:</i> The Implementer takes on the daily operations of the innovation in the local market, supported with strategic directions and various resources from the business.	
	<i>Phase:</i> Implementation	<i>Examples:</i> ZCfB, HI Bolivia
	<i>Central Assets:</i> • Market Knowledge • User Empathy • Technical Expertise • Entrepreneurial Expertise • Stakeholder Network • Embeddedness • Legitimacy • Legal Entity • On-Site Infrastructure • Ongoing Programs • Human Resources	<i>Central Capabilities:</i> • Strategic Planning • Procurement • Operations • Training • Staffing • Impact Evaluation • Reporting

Multiplier	Description: The Multiplier facilitates the interaction between the remote business partner and the third-party implementer(s) on the ground.	
	Phase: Implementation	Examples: TCCO, CBM International
	Central Assets: • Stakeholder Network • Embeddedness • Legitimacy • Scaling Structures	Central Capabilities: • Strategic Planning • Procurement • Training • Multiplication • Supervision • Impact Evaluation • Reporting
Advisor	Description: The Advisor provides the business partner with data, coaching, and support either on an individual or a more general basis, covering the target market, the focal industry, or the business development.	
	Phase: Discovery	Examples: Pro Uganda, CBM International, epN / Siemens Stiftung
	Central Assets: • Market Knowledge • User Empathy • Technical Expertise • Entrepreneurial Expertise	Central Capabilities: • Data & Reports • Coaching & Support
Promoter	Description: The Promoter facilitates the connection between the business and external stakeholders to enhance the public visibility, political goodwill, and stakeholder collaboration of the focal innovation and its thematic area in general.	
	Phase: Overarching	Examples: All portrayed NPOs (to a varying degree)
	Central Assets: • Market Knowledge • Technical Expertise • Stakeholder Network • Embeddedness • Brand Value • Legitimacy	Central Capabilities: • Partner Involvement • Government Advocacy • Awareness Raising • Facilitation Services • General Advancement
Funder	Description: The Funder supports frugal innovation through its own financial resources or through access to third-party financial resources.	
	Phase: Overarching	Examples: CBM International, epN / Siemens Stiftung
	Central Assets: • Financial Resources	Central Capabilities: • Funding • Funding Access

Source: Own illustration.

8 Conclusion

This concluding chapter provides an *Answer to the Research Question* (8.1), summarizing the research's main findings. Based on these insights, the thesis derives *Theoretical Implications* (8.2) and *Managerial Implications* (8.3), positioning the results in the broader academic and practical context. The chapter then highlights the thesis's *Limitations and Suggestions for Future Research* (8.4), to help further close the identified research gap. The chapter ends with *Concluding Reflections on the Research* (8.5), reflecting on the findings within a broader context.

8.1 Answer to the Research Question

This thesis inquired how NPOs can deploy their resources to provide market access to Western social enterprise partners and help them develop frugal innovations for emerging markets and developing economies. This research question is answered in two parts, each summarized below. First, the developed framework based on expert interviews outlines *which* NPO resources exist to accelerate frugal innovations in general. Second, four case studies of B2N partnerships on frugal assistive technologies surface the roles NPOs can take, illustrating *how* NPO partners employ these resources in practice.

Framework of NPO Resources to Accelerate Frugal Innovation

This thesis combined theoretical knowledge from the literature on frugal innovation and B2N partnerships in emerging markets with empirical insights from over 30 semi-structured interviews with experts and case representatives. Using QCA, this research developed an empirically adapted framework of NPO resources accelerating frugal innovations developed in B2N partnerships. The thesis distinguishes these resources into the underlying assets and executable capabilities of the NPO partner to then establish six assets and 13 capabilities NPOs can leverage to accelerate frugal innovation.

The assets are NPO endowments possessed independently of the B2N partnership, grouped into three thematic pillars. In addition, the capabilities are NPO activities specifically performed for the B2N partner, grouped along the different phases of the innovation development process. Both types of NPO resources are summarized and illustrated below.

Assets: The NPO's Endowments

Knowledge: The first asset pillar is an NPO's complementary knowledge base, including its *Local Understanding*, itself comprised of *Market Knowledge* and *User Empathy*. Both stem from an NPO's local presence and close interaction with the innovation's end user. The pillar further includes an NPO's *Topic Expertise*, rooted in the sub-assets of *Technical Expertise* of the focal area and *Entrepreneurial Expertise* of operating in resource-constrained markets.

Social Capital: The second asset pillar features an NPO's *Stakeholder Access*, including its *Stakeholder Network* and *Embeddedness*, covering both the knowledge of and close relationships with relevant local, regional, national, and international stakeholders. Furthermore, the pillar comprises the *Trust* placed in an NPO, composed of its *Brand Value* in the general public's perception and its *Legitimacy* to operate in a specific field and market context, both of which facilitate the operations of the frugal innovation with external stakeholders.

Operating Vehicle: The concluding asset pillar covers the incumbent *Structures* of an NPO, consisting of its *Legal Entity*, *On-Site Infrastructure*, and *Scaling Structures* across markets. These structures provide the framework from which the NPO, and by extension its business partner, operate. Complementing these structures are the NPO's *Operating Drivers* including *Ongoing Programs*, *Human Resources*, and *Financial Resources*, enabling the NPO to effectuate its structures and supporting the business partner's operations on site.

Capabilities: The NPO's Activities

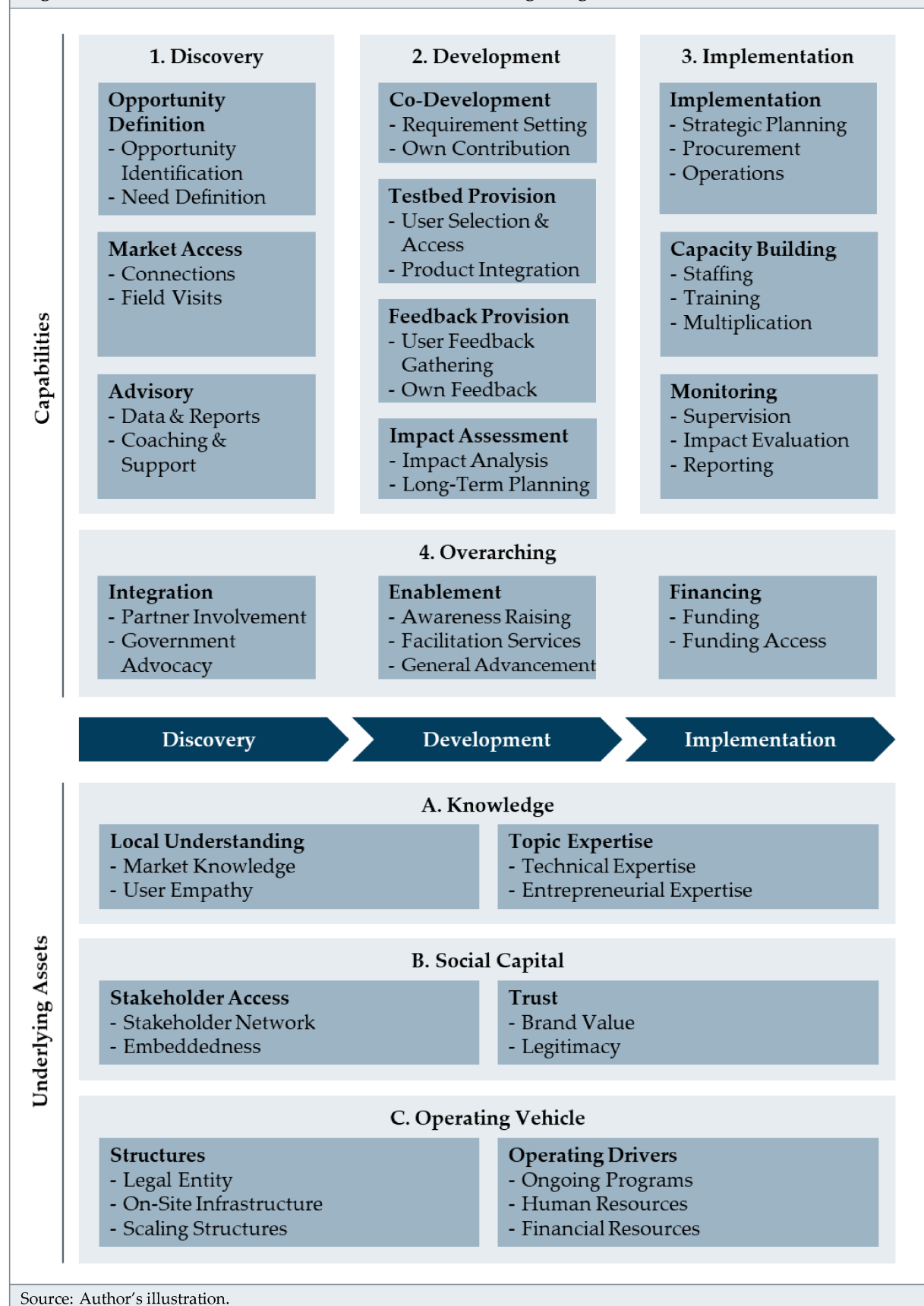
Discovery: In the first phase of the innovation process, the NPO supports the business partner in gaining a deep understanding of and access to local markets and relevant stakeholders. The phase includes *Opportunity Definition*, during which the NPO connects the foreign business partner with the local environment through *Opportunity Identification* and *Need Definition*. Once the innovation opportunity is defined, the NPO can support the *Market Access* of the business partner by providing it with *Connections* and organizing *Field Visits* to discover the market. Beyond facilitating access to the local context, the NPO can provide its business partner with *Advisory* capabilities, comprising *Data & Reports* and *Coaching & Support* activities, both drawing upon their local understanding and topic expertise.

Development: In the second phase of the innovation process, the NPO supports the business partner in developing the frugal innovation through *Co-Development*, where the NPO can contribute indirectly through *Requirement Setting* or directly through its *Own Contribution*. Once the innovation materializes, the NPO can offer a *Testbed Provision*, including the *User Selection & Access* and *Product Integration* into its own operations to test the solution at different stages of maturity. After the testing of the innovation, the NPO can advance the development through *Feedback Provision*, either through *User Feedback Gathering* or the provision of its *Own Feedback*. Enlarging the scope of feedback, the NPO can support the innovation through an *Impact Assessment*, including *Impact Analysis* and *Long-Term Planning* of the innovation, to prevent harmful unintended side-effects or premature discontinuation.

Implementation: Once the development phase concludes, the third phase erects the systems to bring the innovation to market. During this phase, the NPO can support the innovation's *Implementation* on the ground by providing or supporting the *Strategic Planning*, *Procurement*, and *Operations* of the innovation. To ensure these operations run smoothly, the NPO can further support *Capacity Building* on site, ranging from *Staffing* local employees to *Training* them with the required skillset to the *Multiplication* of the operations across different teams and organizations. Once operations are in place, the NPO can contribute to *Monitoring*, including the *Supervision* of the operations provided by third-party entities, the *Impact Evaluation* of the innovation, and the *Reporting* back to the business partner, serving as the business's single point of contact for the operations on the ground.

Overarching: Complementing the phase-specific capabilities, some capabilities support the innovation process more continuously. These include *Integration*, comprised of *Partner Involvement* and *Government Advocacy*, through which the NPO embeds the innovation locally and creates the conditions to eventually exit the partnership. The NPO can further pave the way for the frugal innovation through *Enablement*, comprising *Awareness Raising* around the product and its benefits, *Facilitation Services* to embed the frugal innovation in a wider network of solutions, and the *General Advancement* of the focal topic through coordination with other organizations on agendas and standards nationally, regionally, or globally. Lastly, the NPO partner can also contribute to the *Financing* of frugal innovations, whether through direct *Funding* or the enabling of *Funding Access* to third-party sources.

Figure 21: Overview of NPO Resources Accelerating Frugal Innovations



Case Knowledge Within the Assistive Technology Market

Based on the empirically adapted framework, the thesis analyzed four exemplary B2N partnerships in the realm of frugal ATs, providing solutions that maintain or improve the functioning and independence of people with disabilities, old age, or chronic illnesses. The AT market was chosen because of its strong potential for frugal innovation due to the substantial gap between high demand and insufficient supply in EMDEs and the high reliance on technical products, and because of its high degree of NPO involvement. The case studies thereby featured successful instances of frugal innovations developed or implemented through B2N partnerships in EMDEs.

The first case is Switzerland-based Project Circleg, which develops accessible high-quality prostheses for amputees in low- and middle-income countries. To enter the Ugandan market, they have worked together with the local branch of the German NPO Pro Uganda, which actively treats lower- and upper-limb amputees on site and provides physiotherapeutic follow-up care.

Also focusing on mobility aids, U.S.-based MiracleFeet provides a range of software and hardware solutions to treat the negative impact of untreated clubfoot. For their work in Tanzania, they collaborate with the NPO Tanzania Clubfoot Care Organization, a network of medical and paramedical professionals working on clubfoot across the country.

Shifting to ATs for visual aid, U.K.-based Peek Vision provides a range of eye health software solutions facilitating the delivery of eye care in EMDEs. In Zimbabwe, they collaborate with the NPO Council for the Blind, a leading eye service provider in the country, and CBM, an international NGO focused on disability inclusive development.

The fourth case is Germany-based OneDollarGlasses, a producer of affordable and robust glasses designed for use in low-income regions. For their operations in the Bolivian market, they collaborate extensively with the NPO Hostelling International Bolivia, which offers a range of social projects and volunteering opportunities alongside its core work in the hospitality industry. In addition, ODG is supported by the empowering people.Network of the Siemens Stiftung, which supports social entrepreneurs active in development collaboration by offering services for developing a solid business foundation to scale their social impact.

Prototypical Accelerating Roles of NPOs

Based on the case knowledge, this thesis introduced seven prototypical roles through which NPOs can support the development and implementation of frugal innovations of Western social enterprises. Each role relies on a specific set of assets and capabilities and is of special relevance in one or multiple phases of the innovation development process. As the roles are understood as non-exclusive mechanisms through which NPOs accelerate frugal innovation, NPOs can actuate multiple roles at the same time and fulfill each role in partial or in full.

The first role that NPOs can play to accelerate frugal innovation is that of the *Introducer*, providing frugal innovators with an understanding of the local needs and mindsets, and linking them with the local business environment and relevant stakeholders.

A second role through which NPOs support frugal innovation is through that of the *Co-Developer*, contributing to the development of the innovation and informing the process with insights and skills complementary to the ones of their business partner.

Moving further down the innovation development process, NPOs accelerate frugal innovation by playing the role of the local *Implementer*, where the vast majority of the daily operations are conducted by the NPO instead of the business partner. The business, in turn, provides the NPO with the required resources and strategic directions to operate successfully.

Closely linked to the Implementer is the role of the *Multiplier*, whereby NPOs take an intermediary position between the business partner and the, often multiple, implementing entities on site. In this role, NPOs provide skills, strategic directions, and products to the implementing entities, while channeling feedback and reports back to the business partner as a single point of contact for the local operations.

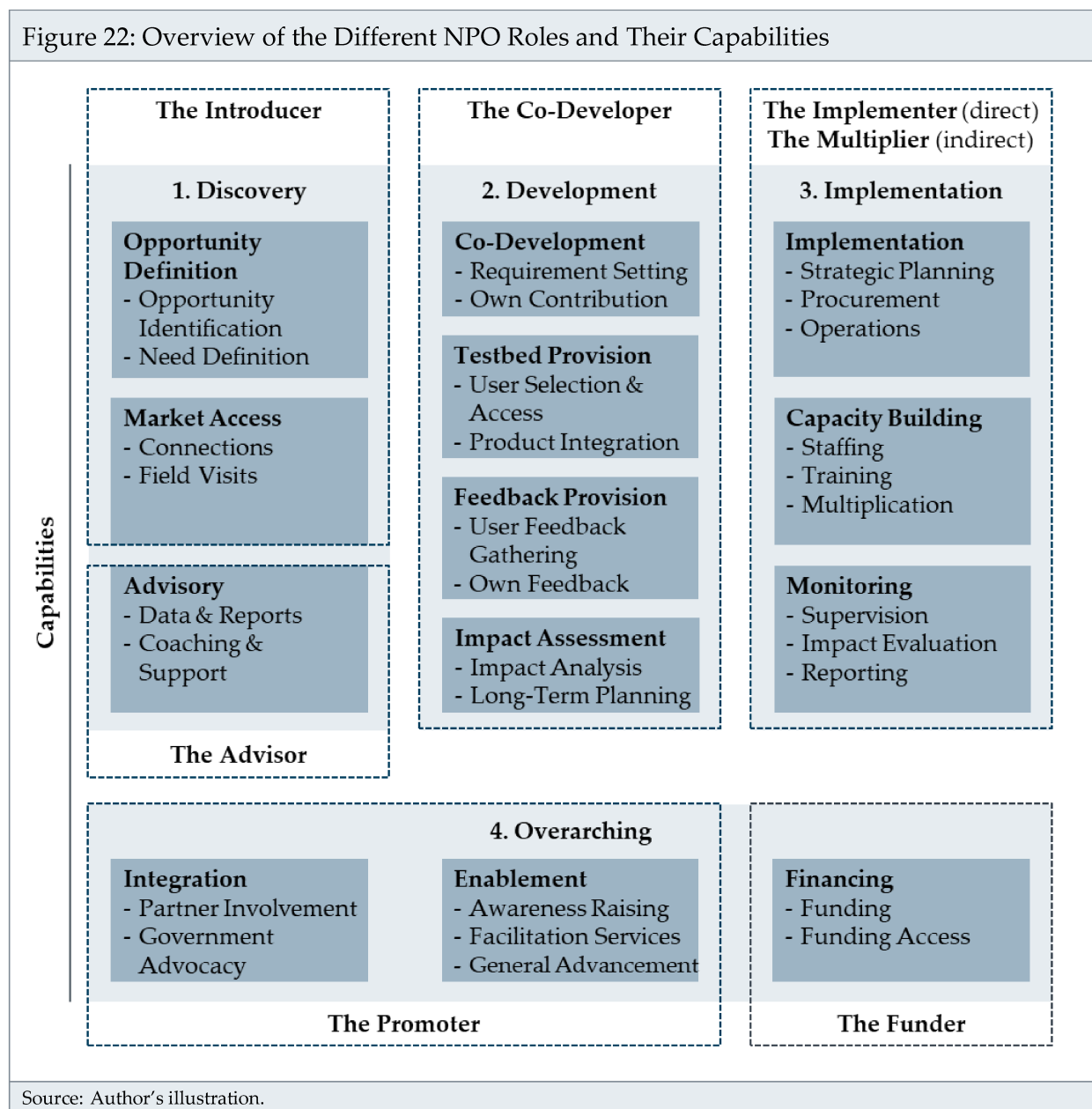
Apart from supporting the operations of the businesses directly, NPOs accelerate frugal innovation through more strategic and supportive roles, rendering the activities of the business partner more effective. One of these roles is the *Advisor*, providing the business partner with data, insights, and coaching either in a one-on-one format or for a broader, even public, audience. Depending on the background of the NPOs, this advice may cover the target market, the focal industry, or the business development.

Another way in which NPOs accelerate the frugal innovation efforts of their business partner is through the role of the *Promoter*, in which NPOs enhance the public visibility, political goodwill, and ease of stakeholder interaction for the frugal innovation, the business partner, and the thematic area in general.

The final role through which NPOs accelerate frugal innovation is as the *Funder*, supporting the innovation financially. This support can occur directly, using the NPOs own financial resources, or indirectly, by facilitating the flow of financial resources from other entities.

The different NPO roles and their associated capabilities are illustrated in Figure 22 below.

Figure 22: Overview of the Different NPO Roles and Their Capabilities



8.2 Theoretical Implications

Building on the above-mentioned results, the thesis derives several theoretical implications for the different academic fields it is based upon, namely the literature on frugal innovation, the literature on B2N partnerships for innovation in EMDEs, and on the theoretical perspective of the relational view.

Literature on Frugal Innovation

Overall, the academic field of frugal innovation remains at an early stage, and hence this research contributes to a better conceptual and practical understanding of this emerging phenomenon. Conceptually, the thesis reviews different literature streams in an attempt to resolve the fuzzy terminology around the concept of frugal innovation. The review includes both antecedent and related literature streams in the fields of general innovation, innovation from and for the BOP and emerging markets, and RCI, to provide a holistic view of this emerging stream of literature. The resulting overview clearly defines, situates, and differentiates frugal innovation from other types of innovation, contributing to a more nuanced understanding of its characteristics and a more precise labeling of different innovation types in subsequent research.

Practically, this exploratory research provides in-depth knowledge on four frugal innovations in the field of AT, which have not been mentioned in the frugal-innovation literature so far. As such, the four case studies contribute to the limited set of well-documented examples of frugal innovation, highlighting the field of AT as a particularly suitable market for frugal solutions.

Literature on Frugal Innovation and B2N Partnerships for Innovation in EMDEs

Enlarging the scope of the literature streams addressed here, this research connects the literature on frugal innovation with the literature on B2N partnerships for innovation in EMDEs, which have so far developed as two parallel but separate streams. By bridging them, the thesis introduces new elements to both streams.

The research complements the literature on B2N partnerships for innovation in EMDEs by examining the specific barriers, requirements, and characteristics that frugal-innovation

objectives imply for such intersectoral alliances. Conversely, this research extends the literature on frugal innovation through the notion of NPOs as a relevant actor and the discussion of their role and contributions in the development, implementation, and diffusion of such innovations. As such, the main contribution to both literature streams is the thesis's framework of NPO resources through which NPOs accelerate frugal innovations together with Western social enterprise partners. These resources consist of assets NPOs possess independently of the alliance, and capabilities NPOs can activate within a specific B2N partnership. In total, the thesis finds six assets and 13 capabilities to be relevant for NPOs to accelerate frugal innovation, as detailed through 14 sub-assets and 30 sub-capabilities.

Based on this framework, the thesis introduces a typology of seven prototypical NPO roles to support the development and implementation of frugal innovations. Each role applies a specific set of assets and capabilities and is of special relevance in one or multiple phases of the innovation development process. This typology is among the first attempts to provide a deeper and more holistic understanding of NPOs within frugal innovation, thus establishing a systematic frame of reference and a common language for future work.

Literature on the Relational View

Lastly, building on the hitherto anecdotal theoretical references in the frugal-innovation literature, this thesis applies the relational view as its guiding reference. Thus, the thesis stretches the relational view beyond its traditional inter-business context to include the realm of inter-organizational B2N partnerships, enlarging the theory to alliances between for-and non-profit entities. This transfer to B2N partnerships subsequently extends the theory in two areas. First, it enlarges the relational view's notion of value, shifting from purely private goods to a combination of private and public goods. Second, it replaces the theory's focus on value (or "rent") appropriation, capture, and distribution, as well as the subsequent effects on the partner's competitive advantages, with a focus on joint value *creation* believed more relevant for this type of alliance. By applying the relational view in this modified manner, the thesis paves the way for its future use in the realm of B2N partnerships.

8.3 Managerial Implications

For both NPOs and businesses considering B2N partnerships for frugal innovation, this thesis has several managerial implications.

Positioning NPOs as Accelerators for Frugal Innovation

To date, the number of B2N partnerships to develop and implement frugal innovations is very small. This research positions NPOs as valuable partners for frugal innovations and highlights their manifold benefits, thus informing both businesses and NPOs about this intersectoral partnership strategy and encouraging both sides to engage more in such alliances.

Providing a Clear Framework for Different NPO-Roles

The thesis's main contribution is a framework describing different roles in which NPOs accelerate frugal innovations created by Western social enterprises. This framework allows NPOs to understand the different levers through which they can accelerate frugal innovations, and, by extension, strive towards their social mission, guiding them on how to employ their limited resources most effectively. Businesses, in turn, benefit from a deeper understanding of how to best leverage B2N partnerships to successfully develop, launch, and implement frugal innovations in EMDEs. This knowledge not only improves their chances of successful market entries and sustained revenue generation, but also of achieving their impact-driven mission. In addition, the framework provides a common language on the array of NPO contributions to the innovation development process, allowing both parties to clearly define and articulate their needs and partnership requirements, thereby improving the mutual selection process.

Highlighting the Required NPO Assets

The framework also reveals the assets required for each NPO role. This categorization allows businesses to define their expectations to NPO partners more clearly, again facilitating the selection process. Simultaneously, these asset requirements guide NPOs in their efforts to build up missing assets to become more suitable and effective B2N partners.

8.4 Limitations and Suggestions for Future Research

The findings of this research must be considered in light of several limitations arising from the scope of the research question, the applied research design, and the available data. This section discusses the implications of these limitations on the thesis's explanatory power and points to possible directions for future research to help close the remaining research gap.

Inclusion of Other Industries

To allow for homogeneity across all cases, all case studies were situated in the AT market within the healthcare industry. This market was chosen due to its strong impact on the recipients' quality of life, its substantial gap between high demand and insufficient supply in low-income countries, relatively high reliance on technical products, and high degree of NPO involvement. The first empirical part of this research indicated that the results are also applicable to comparable industries of basic needs, such as water and sanitation, agriculture, or energy. However, these industries might differ in terms of NPO involvement and potential for frugal innovation. Future research can thus examine other industries to investigate whether differences exist and whether the derived framework remains applicable.

Comparing Successful and Unsuccessful B2N Partnerships

In line with the thesis's exploratory design, this research aimed to consolidate first empirical insights on the role of NPOs in frugal innovation. Probing exemplary cases with strong learning opportunities, it analyzed successful examples both in terms of B2N partnership and frugal innovation development. While these cases could have been complemented with counterexamples, the study did not have access to cases which could be labeled as unsuccessful, most likely because of the narrow research focus and the general sensitivity around failure in innovation efforts. This limitation was reiterated by one expert stating that collaboration with NPO partners "may give a false sense of security, [as it is a] necessary, but not sufficient factor for success" (Välitalo, 27 July 2020). Hence, future research may build on this missing component and compare successful to unsuccessful B2N partnerships for frugal innovation.

Distinction Between Other Forms of RCI

This thesis positions frugal innovation as one type of RCI among related types such as cost innovation, good-enough innovation, or jugaad innovation. Due to the similarity of these concepts, it remains unclear whether the defined framework of NPO resources applies exclusively to frugal innovation and whether and how it might need to be adapted for other forms of RCI. The same holds true for innovations labeled as social innovations designed for low-income countries. To understand the significance of the exact innovation type on B2N partnerships, further research may investigate how the role of NPOs and the relevance of their resources vary across these related forms of innovation.

Distinction Between Different Types of NPOs and Social Enterprises

To analyze the role of B2N partnerships for frugal innovation in practice, this thesis adopts relatively broad definitions of NPOs and social enterprises. The resulting variety in legal forms, focus areas, and operating models results in heterogeneity across cases. Therefore, future studies may differentiate more precisely between the different types of NPO partners, namely along the differentiators used in this thesis to explain the variations in their resource endowments (operational vs. supporting, on-site vs. remote, and national vs. international NPOs). Conversely, future research could better explain how the different types of social enterprises—for profit, not-for-profit, and hybrid forms—influence collaboration with NPO partners.

Extension to Other Aspects of the Relational View

This thesis focused on investigating B2N partnerships from the perspective of the synergy-sensitive resources of NPOs, divided into assets and capabilities. According to the relational view, the guiding theoretical lens of this research, synergy-sensitive resources represent one of four interorganizational dimensions, accompanied by relation-specific assets, knowledge-sharing routines, and effective governance mechanisms. To obtain a more holistic understanding of B2N partnerships in the realm of frugal innovation, future research may complement the findings of this study with the other three dimensions of the relational view.

8.5 Concluding Reflections on the Research

To conclude this research, this last section takes a step back from the imminent research goal and reflects on some of the broader insights and learnings yielded by this thesis.

The Importance of NPOs in EMDEs and in B2N Partnerships

NPOs in EMDEs often bear a different and more encompassing role than their Western counterparts, including a broader spectrum of operational, strategic, and institutional responsibilities. To truly understand their role and sphere of influence, it is imperative to recognize that the label of “non-profit organization” might take on very different proportions in a context characterized by larger institutional voids than those of Western markets.

Relatedly, NPOs were assuming a surprisingly large share of responsibilities within B2N partnerships, often taking on the complete implementation of the innovation on-site, as opposed to supporting on scattered instances along the innovation development process. This ownership also resulted in long-term collaborations, where NPOs partnered with innovators over multiple years, often becoming more independent from the social enterprise over time.

Mission-Driven Partnerships

The close collaboration within B2N partnerships also relates to the strong alignment between the partners’ missions, strategies, and incentives. Organizations would usually collaborate because a partner’s work helped them achieve their own goals in a more efficient, effective, and far-reaching manner. This is not to say that the partnerships were transactional. In some cases, the partnerships even resulted in new alliances or consortia convening an even broader range of stakeholders to increase their shared efforts in a given field. These collaborations occurred despite the potentially competitive nature of the relations between the stakeholders, which were deemphasized in favor of the underlying social mission. Thus, the social aspect of these enterprises was a crucial condition for these mutually beneficial partnerships, and the same constellations are hard to imagine for purely profit-oriented enterprises. Thus, unsurprisingly, the mutual trust between partners was regularly highlighted as a fundamental success factor, if not the keystone.

Partnerships Between Equals

Besides trust, B2N partners placed an astonishing amount of importance on the overall relationship building within the partnership, seeking a shared culture of collaboration where all stakeholders felt comfortable in voicing their inputs. This culture included a mindful handling of potential power imbalances, whether they arose due to the North–South divide or financial dependencies, as well as inclusive decision-making processes and the acknowledgement of each partner’s contribution in both the internal and external communication.

The stakeholders thereby comprised not only the direct B2N partners, but also the beneficiaries of the innovation partnerships, whose voice and participation were strongly encouraged from both partners. According to the interviewees, this marks a radical but much-needed change in the functioning of the development and non-profit sector, which was (and partially still is) dominated by unilateral and centralized decision-making; working *for* but not *with* its beneficiaries. While this development is neither limited nor exclusive to the context of frugal innovation and B2N partnerships, this newly found “user-centricity” of NPOs is certainly a contributing factor to the success of their innovation-centric partnerships.

Different Growth Plans and Exit Strategies of Frugal Innovators

Another surprising finding concerns the targeted growth plans and exit strategies of the frugal innovators. Contrary to more traditional, profit-oriented paths, their growth plans in under-institutionalized and low-margin contexts often involved a long-term and multilateral partnering approach with other NPOs, private and institutional funders, and academic and governmental institutions. This again resulted in a diverse range of exit strategies pursued by the social enterprises. Beyond the option of becoming financially self-sustaining, many innovators either strived for a gradual handover to the NPO partner to drive the innovation independently of the initial innovator, or strived for government adoption, where local or national ministries would integrate the innovation in their healthcare system. In these scenarios, the role of the social enterprise was to aggregate evidence of the innovation’s impact and to orchestrate a broad range of stakeholders to incentivize and legitimize the takeover. In its most extreme form, innovators were striving to deliberately “work themselves out of a job” by fixing the social problem that initially warranted the frugal solution.

Impact-Driven Success Metrics of Frugal Innovators

All social enterprises paid significant tribute to the contributions of their NPO partner, and all involved interviewees considered their B2N partnerships to be successful. However, their notion of success was a broader one than in the traditional understanding of innovation management. First of all, the guiding principle for choosing both their problem to solve and market to address was the achievable impact, not the potential financial revenue. Second, some innovators declined the opportunity for additional projects if the wider conditions of patient care were not met, so as to avoid, for instance, screening patients without the possibility of follow-up treatment. Third, there was consistent focus on the broader societal impact of the innovation, as opposed to only its direct output or outcome. This broader focus not only required a more systemic set of key performance indicators stretching beyond the users' direct interaction with the product, but also led many social enterprises to broaden their focus beyond the physical product to an integrated ecosystem, where the physical product was complemented with new services, applications, or business models. As such, innovators focused on several aspects, from training and local employment to reporting and data analytics, stakeholder management, policy development, and lobbying.

Potential for Institutionalized Matchmaking

In some of the partnerships represented by the case and expert interviews, the selection and matchmaking between the B2N partners was driven by coincidence and opportunistic behavior influenced by existing personal connections. Similarly, many partnerships developed organically, without a preconceived perception of their scope and desired outcome.

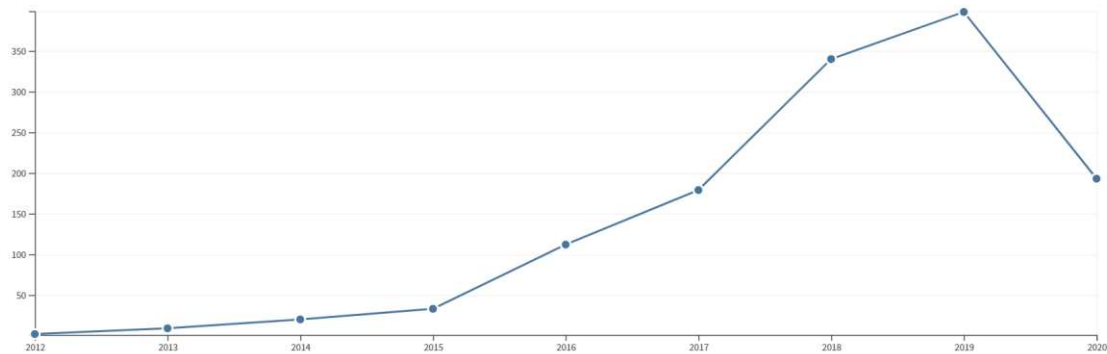
While these partnerships remained valuable and though organic partnership development bears benefits of its own, the approach raises the question of whether other beneficial partnerships have not been realized due to a lack of systematic analysis of potential partners and partnership models. Presumably, such systematic approaches will occur when more social enterprises and NPOs are aware of the option and benefits of B2N partnerships. It thus remains to be seen whether the importance of NPO-partnerships will continue to increase in the future—hopefully supported by the proclamation of the successful instances portrayed in this research.

Appendix

1. Prevalence of “Frugal Innovation” in Academic Research

Figure 23: Prevalence of “Frugal Innovation” in Academic Research

Sum of Times Cited per Year



Source: Web of Science, 2020

Database: Web of Science

Search Term: “Frugal Innovation”

Search Area: Topic (Searches title, abstract, author keywords, and Keywords Plus)

Timespan: 1900–2019, first appeared in 2012

Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.

Total Publications: 216

Date of Search: 06.05.2020

2. Emerging Country Definitions

Table 14: Categorizations of “Emerging Markets”				
Country	IMF (18)	FTSE (24)	MSCI (26)	UNCTAD (38)
Brazil	x	x*	x	x
Hungary	x	x*	x	x
Malaysia	x	x*	x	x
Mexico	x	x*	x	x
South Africa	x	x*	x	x
Thailand	x	x*	x	x
Turkey	x	x*	x	x
Chile	x	x**	x	x
China	x	x**	x	x
Colombia	x	x**	x	x
India	x	x**	x	x
Indonesia	x	x**	x	x
Peru	x	x**	x	x
Philippines	x	x**	x	x
Russia	x	x**	x	x
Poland	x		x	x
Romania	x			x
Bulgaria	x			
Czech Republic		x*	x	x
Taiwan		x*	x	x
Greece		x*	x	
Egypt		x**	x	x
Qatar		x**	x	x
Saudi Arabia		x**	x	x
UAE***		x**	x	x
Pakistan		x**	x	
Kuwait		x**		x
Argentina			x	x
Korea			x	x
Bahrain				x
Croatia				x
Ecuador				x
Hong Kong				x
Kazakhstan				x
Nigeria				x
Oman				x
Serbia				x
Singapore				x
Ukraine				x
Uruguay				x
Venezuela				x
Source: Various sources. *) Advanced Emerging; **) Secondary Emerging; ***) United Arab Emirates				

3. Calculation of BOP Distribution Across Different Income Country Groups

World Bank Data from 2015, at 2011 PPP:

Income Groups (per 2015 standard)	Poverty Headcount Thresholds Per day, at 2011 PPP Results in % of Population and in Million People (2015)		
	< \$1.90 a day	< \$3.20 a day	< \$5.50 a day
High income countries: GNI per capita: >\$12,475	0.8%	0.9%	2.1%
	n.a.	n.a.	n.a.
Upper middle-income countries: GNI per capita: \$4,036–\$12,475	1.7%	7.5%	24.4%
	44.6	194.1	633.7
World	10.0%	26.4%	46.2%
	737.0	1,945.7	3,404.9
Lower middle-income countries: GNI per capita: \$1,026–\$4,035	14.2%	44.3%	74.8%
	411.4	1,284.2	2,166.9
Low-income countries (IPL): GNI per capita: <\$1,025	45.6%	72.9%	90.1%
	296.1	474.0	585.6

- Main source: <http://povertydata.worldbank.org/poverty/home/>
- Level-specific source (not always identical with values from main source):
 - <\$1.90 a day: <https://data.worldbank.org/indicator/SI.POV.DDAY?end=2015&locations=XM-XN-XT-XD-1W&start=2015&view=bar>
 - <\$3.20 a day: <https://data.worldbank.org/indicator/SI.POV.LMIC?end=2015&locations=XM-XN-XT-XD-1W&start=2015&view=bar>
 - <\$5.50 a day: <https://data.worldbank.org/indicator/SI.POV.UMIC?end=2015&locations=XM-XN-XT-XD-1W&start=2015&view=bar>
- Income group source (taken at 2015 levels): <https://data-helpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
- Explanatory source: <http://blogs.worldbank.org/developmenttalk/richer-array-international-poverty-lines>

4. Middle-Class Threshold Calculation

Inflation-adjusted (2002–2020) thresholds based on Hammond et al.

Calculations:

Value 2002 (given)	Value 2005 (given)	Value 2005 (calc.)	Value 2020 (calc.)	Value 2020 (daily)	Value 2020 (daily, rounded)
US\$ 3,000.00	US\$ 3,260.00	US\$ 3,230.38	US\$ 4,369.92	US\$ 11.97	US\$ 12.00
US\$ 20,000.00	US\$ 21,731.00	US\$ 21,535.86	US\$ 29,132.81	US\$ 79.82	US\$ 80.00

Sources:

- 2002 and 2005 Values: Hammond et al. (2007)
- Inflation-adjusted values: U.S. Bureau of Labor Statistics:
https://www.bls.gov/data/inflation_calculator.htm

Data Statement (Hammond et al., 2007, p. 1):

“For convenience, however, BOP income figures used to describe BOP income segments or the BOP and mid-market income cut-offs are measured in 2002 international dollars (purchasing power parity dollars or PPP), since 2002 is the reference year to which the surveys used in this analysis were normalized. The BOP population segment is defined as those with annual incomes up to and including \$3000 per capita per year (2002 PPP). The mid-market population segment up to and including \$3000 per capita per year (2002 PPP). The mid-market population segment is defined as those with annual incomes above \$3,000 and up to and including \$20,000 PPP.

In 2005 international dollars, the cutoff for the BOP and the mid-market population segments are \$3,260 and \$21,731.”

5. Definitions of Disruptive Innovation

Table 15: Definitions of “Disruptive Innovation” and “Catalytic Innovation”			
Author	Year	Source	Definition
<i>Definitions of Disruptive Innovation</i>			
Agarwal et al.	2017	A Systematic Literature Review of Constraint-Based Innovations (p. 6)	“Simple, cheap, small, and easy-to-use products or services that cater to the need of the unserved or underserved market and has the potential to increase revenue by developing an altogether new market”
Christensen et al.	2015	What is Disruptive Innovation (p. 46)	“Entrants that prove disruptive begin by successfully targeting those overlooked segments, gaining a foothold by delivering more-suitable functionality—frequently at a lower price. Incumbents, chasing higher profitability in more-demanding segments, tend not to respond vigorously. Entrants then move upmarket, delivering the performance that incumbents’ mainstream customers require, while preserving the advantages that drove their early success.”
Christensen	2013	The Innovator’s Dilemma: When New Technologies Cause Great Firms to Fail (p. xv)	“Generally, disruptive technologies underperform established products in mainstream markets. But they have other features that a few fringe (and generally new) customers value. Products based on disruptive technologies are typically cheaper, simpler, smaller, and, frequently, more convenient to use.”
Govindarajan et al.	2011	The effects of mainstream and emerging customer orientations on radical and disruptive innovations (p. 122)	“A new product that introduces a different set of performance attributes relative to what already exists, and this set of attributes is initially attractive to an emerging customer segment but unattractive to mainstream customers.”
Hart & Christensen	2002	The great leap. driving innovation from the base of the pyramid (p. 52)	“The product or service must be one that initially isn’t as good as those being used by customers in mainstream markets; as a result, it can take root only in new or less demanding applications among nontraditional customers.”
Christensen et al.	2001	The great disruption (p. 81)	“Disruptive technologies create major new growth in the industries they penetrate - even when they cause traditionally entrenched firms to fail - by allowing less-skilled and less-affluent people to do things previously done only by expensive specialists in centralized, inconvenient locations.”
<i>Definitions of Catalytic Innovation</i>			
Agarwal et al.	2017	A Systematic Literature Review of Constraint-Based Innovations (p. 6)	“Simple, cheap, small, and easy-to-use products or services that cater to the need of the unserved or underserved market and has the potential to increase revenue by developing an altogether new market.”
Brem & Wolfram	2014	Research and development from the bottom up (p. 19)	“An approach that focuses on social change by breaking down existing social and economic structures and creating new market structures which involves new development approaches of systematic, sustainable, and system-shifting kind.”
Christensen et al.	2006	Disruptive innovation for social change (p. 96)	“[...] catalytic innovations can surpass the status quo by providing good-enough solutions to inadequately addressed social problems. Catalytic innovations are a subset of disruptive innovations, distinguished by their primary focus on social change, often on a national scale. [...] With catalytic innovations, however, social change is the primary objective.”
Source: Various authors.			

6. Definitions of Base of the Pyramid Innovation

Table 16: Definitions of “Base-of-the-Pyramid (BOP) Innovation”

Author	Year	Source	Definition
<i>Definitions of BOP Innovation</i>			
von Zedtwitz et al.	2015	A Typology of Reverse Innovation (p. 14)	“Innovation developed in and targeting the large unserved segments of poor people inhabiting emerging economies.”
Prahalad	2012	Bottom of the Pyramid as a Source of Break-through Innovat. (p. 6)	“By focusing managerial attention on creating awareness, access, affordability, and availability (4As), managers can create an exciting environment for innovation.”
Prahalad	2005	The Fortune at the Bottom of the Pyramid - Eradicating Poverty through Profits (p. 1)	“If we stop thinking of the poor as victims or as a burden and start recognizing them as resilient and creative entrepreneurs and value-conscious consumers, a whole new world of opportunity will open up.”
Prahalad and Hart	2002	The Fortune at the Bottom of the Pyramid (p. 1)	“Low-income markets present a prodigious opportunity for the world's wealthiest companies - to seek their fortunes and bring prosperity to the aspiring poor.”
Source: Various authors.			

7. Definitions of Resource-Constrained Innovation

Table 17: Definitions of “Resource-Constrained Innovation”

Author	Year	Source	Definition
<i>Definitions of Resource-Constrained Innovation</i>			
Agarwal et al.	2017	A Systematic Literature Review of Constraint-Based Innovations (p. 3)	“Since most of these approaches are conceived under distinct conditions of scarcity, we refer to them collectively as ‘constraint-based innovations’ henceforth.” [<i>constraint-based innovation</i>]
von Zedtwitz et al.	2015	A typology of reverse innovation (p. 14)	“Innovation developed in emerging economies in a context characterized by lower power of purchase, lower understanding of technology, and lower investment resources” [<i>resource-constrained innovation</i>]
Agnihotri	2015	Low-cost innovation in emerging markets (p. 402)	“Low-cost innovation does not involve any new radical invention, but only innovative ways of using already existing technologies to develop affordable products for masses.” [<i>low-cost innovation</i>]
Zeschky et al.	2014	From Cost to Frugal and Reverse Innovation (p. 20)	“Product and service innovations aimed at resource-constrained customers in emerging markets” [<i>resource-constrained innovation</i>]
Pansera	2013	Frugality, grassroots and inclusiveness: new challenges for mainstream innovation theories (p. 470)	“[...] innovation in the developing world is taking place in a big variety of forms that are often neglected by the mainstream literature because of their unconventional nature.” [<i>below-the-radar-innovation</i>]
Ray & Ray	2010	Resource-constrained innovation for emerging economies (p. 144)	“[...] design and diffuse innovations to effectively tap into local demand in emerging country markets” [<i>resource-constrained innovation</i>]
Srinivas & Sutz 2008	2008	Developing countries and innovation: searching for a new analytical approach (p. 132)	“[...] scarcity as a source of a peculiar and very central type of innovation deserves considerable attention. We can describe this then as scarcity-induced innovations [...]” [<i>scarcity-induced innovation</i>]
Source: Various authors.			

8. Definitions of Frugal Innovation

Table 18: Definitions of “Frugal Innovation”			
Author	Year	Source	Definition
<i>Definitions of Frugal Innovation</i>			
Agarwal et al.	2017	A Systematic Literature Review of Constraint-Based Innovations (p. 6)	“Good-enough, affordable products that suffice the needs of resource-constrained consumers.”
Hossain et al.	2016	Can Frugal Go Global? Diffusion Patterns of Frugal Innovations (p. 133)	“a resource scarce solution (i.e., product, service, process, or business model) that is designed and implemented despite financial, technological, material or other resource constraints, whereby the final outcome is significantly cheaper than competitive offerings (if available) and is good enough to meet the basic needs of customers who would otherwise remain un(der)served.”
Weyrauch & Herstatt	2016	What is frugal innovation? Three defining criteria (p. 2)	“[...] three criteria for frugal innovation: substantial cost reduction, concentration on core functionalities, and optimised performance level. [...] characterise innovations as frugal if they meet all of these three criteria at the same time.”
Agnihotri	2015	Low-cost innovation in emerging markets (p. 401)	“[...] innovative products and services which are developed under conditions of resource constraints. [...] Due to resource constraints, these products are often technologically less advanced compared to the sophisticated counterparts, but are good enough to provide core functionality of the product.”
Radjou & Prabhu	2015	Frugal Innovation: How to Do More with Less (p. xv)	“Frugal innovation is the ability to ‘do more with less’ – that is, to create significantly more business and social value while minimising the use of diminishing resources such as energy, capital and time.”
Brem and Wolfram	2014	Research and development from the bottom up (p. 19)	“A derived management approach, based on jugaad, which focuses on the development, production, and product management of resource-saving products and services for people at the BoP by achieving a sufficient level of taxonomy and avoiding needless costs.”
Cunha et al.	2014	Product innovation in resource-poor environments: Three research streams (p. 206)	“Product innovation when affluent customers are scarce: Rather than departing from the existing products to create adapted low-cost versions, frugal innovation aims to provide the essential functions people seek to satisfy with a given product.”
Radjou & Prabhu	2014	What Frugal Innovators Do (online)	“Frugal innovation is more than a strategy. It denotes a new frame of mind: one that sees resource constraints not as a liability but as an opportunity — and one that favors agility over efficiency.”
Zeschky et al.	2014	From Cost to Frugal and Reverse Innovation (p. 24)	“[...] build on good-enough innovations but feature new applications developed specifically for resource-constrained environments, generating an entirely new value proposition.”
Basu et al.	2013	Frugal innovation: core competencies to address global sustainability (p. 64)	“[...] a design innovation process in which the needs and context of citizens in the developing world are put first in order to develop appropriate, adaptable, affordable, and accessible services and products for emerging markets.”
Rao	2013	How disruptive is frugal? (p. 69)	“The product-based features of a frugal-innovation based on the discussion above are: low price, compact design with a no frills structure, use of limited raw materials or reuse of existing components, ease of use and use of cutting edge technology, where possible, to achieve lower costs.”
Source: Various authors.			

9. Definitions of Co-Creation at the Base of the Pyramid

Table 19: Definitions of “Co-Creation” in the Base of the Pyramid Literature			
Author	Year	Source	Definition
<i>Definitions of Co-Creation at the Base of the Pyramid</i>			
Nahi	2016	Organization & Environment (p. 428)	“[W]ide and deep cocreation at the BOP can be defined as iterative interaction that empowers poor communities and integrates their knowledge and capabilities with those of a company and other actors throughout the process of planning and realizing novel business models and ecosystems.”
Ratcliff & Doshi	2016	Business & Society (p. 272)	“‘[C]o-creation’: early on, firms devote significant time and resources to understanding the needs and specific cultural context of low-income customers in their target market, and then develop an entire strategy of education, distribution, and service to go with a new product or service designed to match these needs.”
Arora & Romijn	2012	Organization (p. 485)	“[C]o-creation of innovative solutions to address poverty [entails] [...] interactive learning in close dialogue and partnership with the poor and other stakeholders.”
Murphy, Perrot, & Rivera-Santos	2012	Journal of Business Research (p. 1705)	“[C]o-creation of new knowledge involving several sectors [is] an iterative process of co-designing solutions, combining and/or transforming the knowledge and cognitive structures of the partners involved, and piloting potential solutions on a small scale.”
Nakata & Weidner	2012	Journal of Product Innovation Management (p. 30)	“Co-creation is the partnering with local communities through all stages of the innovation process so that the outcome is a more appropriate, valuable, and sustainable product. [It] assumes the poor are fully capable of knowing and expressing what they want.”
Dahan, Doh, Oetzel & Yaziji	2010	Long Range Planning (p. 327)	“NGOs and firms contribute complementary capabilities – both intangible assets [...], and tangible resources [...] – along each stage of the value chain and affecting many aspects of the business model.”
Gollakota, Gupta & Bork	2010	Thunderbird International Business Review (p. 365)	“Some firms have found mutually beneficial ways of engaging the people at the BOP not just as consumers but as co-creators of value – as suppliers, distributors, partners, and employees.”
London	2008	Academy of Management Proceedings (p. 3)	Co-creation entails “local co-invention and bottom-up development [which allows] these ventures to combine knowledge developed at the top of the pyramid with the wisdom and expertise found at the bottom in a way that enables co-discovery of new opportunities”
Simanis & Hart	2008	Cornell University, Center for Sustainable Global Enterprise (pp. 2, 3 & 15)	Co-creation “brings corporations into close, personal business partnership with BoP communities; prompts “the company to work in equal partnership with BoP communities”; and is “premised on joint decision making by the corporation and the community.”
Prahalad	2005	Wharton School Publishing (p. 2)	“The vision that is presented in the following pages is the co-creation of a solution to the problem of poverty. The opportunities at the BOP cannot be unlocked if large and small firms, governments, civil society organizations, development agencies, and the poor themselves do not work together with a shared agenda.”
Source: Various authors, summarized by Nahi (2016, pp. 420-421).			

10. NPO Contributions to Enhance Market Access for Businesses (Full Coding List)

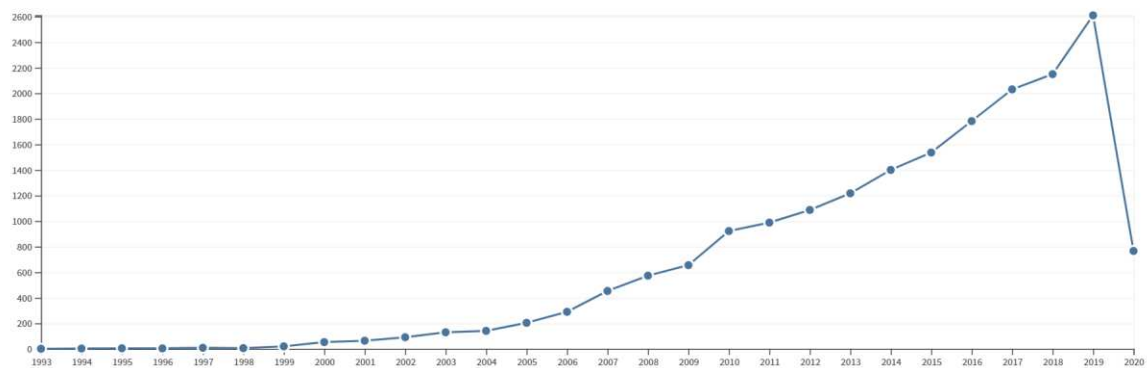
Table 20: NPO Resources to Enhance Market Access for Businesses	
Categories	Sub-Categories
Knowledge and Experience	
Customer Knowledge	Consumer information; Consumer knowledge; Consumer research
	Data collection
	Feedback collection
	Knowledge on community needs; Knowledge on local needs
	Knowledge on consumer behavior
	Knowledge on consumer needs
	Knowledge on local communities
Market Knowledge	Knowledge on community leadership
	Knowledge on competition
	Knowledge on ecosystem
	Knowledge on infrastructural constraints
	Knowledge on institutions; Knowledge on informal institutions
	Knowledge on local business environment
	Knowledge on local customs and practices
	Knowledge on local differences
	Knowledge on local market; Knowledge on market actors
	Knowledge on social and economic context
	Knowledge on social infrastructures
	Knowledge on social trends; Knowledge social issues
Social Business Experience	Political advice
	Experience in social development
	Experience with social business
	Expertise in product development
	Expertise in social issues
	Impact assessment
	Sources of innovation
	Untried approaches
Network	
Brokerage	Brokerage
	Facilitation to local actors
	Partner identification
	Partner selection
	Two-sided relationships
	Understanding of dual contexts
Distribution	Access to distribution channels
	Distribution; Distribution network; Distribution systems
	Distributors; Distribution centers operation
Education	Awareness building

	Behavioral change
	Education
	Post-sale education
	Product demonstration
	Training
Marketing	Piloting
	Promotion
	Social marketing
Network	Access to informal institutions
	Access to knowledge resources
	Access to stakeholders
	Connections
	Contact to local NGOs
	Field access
	Local embeddedness
	Network
	Reach
On-Site Premises	Meeting space
	On-site facilities
	Warehousing
Sourcing	Contacts to suppliers
	Sourcing
	Supply of local resources
Staffing	Procurement of labor
	Recruitment
	Staff
Social Capital	
Legitimacy	Acceptance
	Legitimacy
	Long-term presence
	Political goodwill
Trust	Brand value
	Credibility
	Reputation
	Trust
Source: Budinich (2012); Dahan et al. (2010); Grimm and Gilbert (2019); Hahn and Gold (2014); Jamali and Keshishian (2009); London et al. (2010); London and Hart (2004); Oetzel and Doh (2009); Rivera-Santos and Rufin (2010a); Rondinelli and London (2003); Sánchez and Schmid (2013); Schuster and Holtbrügge (2014); Van den waeyenberg and Hens (2012); Vermeulen et al. (2008); Webb et al. (2010).	

11. Prevalence of “Relational View” in Academic Research

Figure 24: Prevalence of “Relational View” in Academic Research

Sum of Times Cited per Year



Source: Web of Science, 2020

Database: Web of Science

Search Term: “Relational View”

Search Area: Topic (Searches title, abstract, author keywords, and Keywords Plus)

Timespan: 1900–2020, first appeared in 1993

Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.

Total Publications: 577

Date of Search: 06.05.2020

List of Interviews

Table 21: List of Interviews and Interviewees				
Perspective	Organization	Position	Name	Date
Experts: Frugal Innovation Focus				
NPO	InnoFrugal (prev. called Nordic Frugal Innovation Society)	Founder & President	Venkata Gandikota	14.07.2020
NPO	BRAC (incl. Frugal Innovation Forum)	Head of Programme and Enterprise Communication	Sarah-Jane Saltmarsh	30.08.2020
NPO	Hatch CoLab	Head of Ecosystem Development	Lorenzo Niola	13.07.2020
NPO	SELCO Foundation	Program Manager	Shahaab Javeri	30.09.2020
Business	Gradian Health Systems	Communications Manager	Rati Bishnoi	05.08.2020
Business	Gradian Health Systems	Market Strategy Associate	Sofia Stafford	05.08.2020
Business	Hemolytics	Founder	Dr. Jonas Pollard	18.11.2020
Business	Hemolytics	Head of Business Development	Lan Tran	18.11.2020
Business	hiLyte	Co-Founder & CTO	David Lambelet	19.12.2020
External (R&A)	Stanford Design for Extreme Affordability	Lead Professor	Prof Dr. Stuart Coulson	13.08.2020
External (R&A)	Frugal Innovation Hub (Santa Clara University)	Director of Programs and Partnerships	Allan Báez Morales	16.07.2020
External (R&A)	EPFL EssentialTech Centre	Head of Humanitarian Division	Dr. Grégoire Castella	30.04.2021
External (R&A)	Fraunhofer Institute for Systems and Innovation Research (ISI)	Coordinator Innovation Trends and Knowledge Dynamics	Dr. Henning Kroll	06.10.2020
External (R&A)	Centre for Social Innovation	Project Manager (prev.)	Dr. Kaisa Granqvist	03.09.2020

Experts: B2N Focus				
NPO	World Vision International	Global ICT4D Program Manager	Andrew Ogongo	16.03.2021
NPO	Plan Finland (prev.) / Fingo	Senior Specialist on Innovation, Digital Development and Transparency (prev.) / Advisor, Innovation and Development	Mika Väitalo	27.07.2020
NPO	Plan Switzerland	Program Coordinator	Manuel von der Mühlen	26.03.2021
NPO	International Federation of the Red Cross (IFRC)	Senior Officer Floods Resilience	Francisco Ianni	22.04.2021
NPO	World Food Programme (prev.) / NutriPride Foods Africa	Programme Policy Officer (prev.) / Founder	Yutaro Oka	23.11.2020
Business	Zurich Foundation	Climate Change and Partnerships Senior Manager	David Nash	16.04.2021
Business	Dimagi	Director of Customer Success	Erin Quinn	09.04.2021
External (Gov.)	Swissnex India	Head Startup Partnerships	Prateek Khare	14.10.2020
External (Gov.)	Switzerland Global Enterprise	Internationalization Consultant	Philip Morger	18.12.2020
External (Gov.)	Humanitarian Innovation Exchange and Accelerator / Ministry of Foreign Affairs / Swiss Agency for development and cooperation	Project Management Public Outreach Humanitarian Aid and SHA	Susanna Graf	27.05.2021

Case Representatives: Combined Focus				
NPO	Pro Uganda	On-Site Workshop Lead	Dieter Scharwatt	20.07.2021
NPO	Tanzania Clubfoot Care Organization	Program Manager	Emmanuel Kowero	26.05.2021
NPO	Council for the Blind Zimbabwe	Director	Aplos Nyathi	23.07.2021
NPO	Hostelling International Bolivia	President	Max Steiner	15.03.2021
NPO	Siemens Stiftung	Development Cooperation / Head of Unit	Christine Janezic	29.07.2021
NPO	Siemens Stiftung: empowering people.Network	Head of Network	Carola Schwank	12.08.2021
Business	Project Circleg	Co-Founder	Fabian Engel	16.03.2021
Business	MiracleFeet	Director of Program Operations	Amanda Springer	28.04.2021
Business	Peek Vision	Co-Founder & CEO	Dr. Andrew Bastawrous	08.04.2021
Business	Peek Vision	Head of Programme Partnerships	Farhana Rehman-Furs	21.04.2021
Business	OneDollarGlasses	Founder	Martin Aufmuth	09.03.2021
Source: Own illustration. Abbreviations: R = Research; A = Academia; Gov. = Governmental Institution				

All interviews were personally conducted by the author via online video calling.

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Curriculum Vitae

Personal Information

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Education

09/2018 – 02/2023	Ph.D. in Management, Business Innovation Track University of St. Gallen, Institute for Economy and the Environment (IWÖ-HSG)
09/2015 – 01/2018	Master of Arts in Accounting and Finance University of St. Gallen (HSG)
09/2016 – 05/2017	CEMS Master in International Management University of St. Gallen (HSG) & HEC Paris
09/2011 – 02/2015	Bachelor of Arts in International Affairs University of St. Gallen (HSG)
09/2013 – 01/2014	Exchange Semester Tsinghua University, Beijing, China

Professional Experience

01/2022 – present	Vice President Innovation at UE LifeSciences
10/2021 – 01/2022	Consultant at International Finance Corporation, World Bank Group
08/2020 – 06/2021	Consultant at Ashoka
09/2017 – 08/2020	President at Student Impact

Social Engagement

10/2017 – present	Community Champion at Global Shaper Community of the World Economic Forum
11/2019 – present	Speaker at Cambridge Institute for Sustainability Leadership (CISL)

Awards and Fellowships

01/2023	Davos50 Delegate at the World Economic Forum
10/2021 – 09/2022	Mercator Fellow on International Affairs
11/2021	CEMS Alumni of the Year (Junior Category)
05/2018	HSG Impact Award