Combining Frugal Innovation, Inclusive Business, and Scrum for Addressing Low-income Contexts with Sustainability Considerations

Dissertation

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Many small people, in many small places, do many small things, that can alter the face of the world.

African wisdom

I dedicate this dissertation to my beloved husband.

I especially thank my supervisor for guiding me to develop this work. I thank my family, friends, and research colleagues for their support and encouragement.
Abstract

Sustainability and the penetration of new markets beyond developed industries are two topics that are gaining increasing attention both in research and in business practice. As Western industries are becoming saturated, companies are looking for further business alternatives and are focusing on North-South opportunities, among others. Therefore, bottom-of-the-pyramid markets are often mentioned as promising mass markets. However, market access remains a challenge, as bottom-of-the-pyramid contexts are characterized by low incomes, resource constraints, and infrastructural barriers. In addition, sustainable practices are a challenge. Since the introduction of the Sustainable Development Goals by the United Nations, which apply to all countries, companies are required to address aspects of sustainability in their business practices. However, they have to cope with conflicting dimensions inherent to sustainability such as improving economic and social aspects, which are usually accompanied by higher resource demands and environmental degradation.

Previous literature started to address these issues by focusing on innovative approaches such as frugal innovation, social innovation, or resource-constrained innovation. In the last decade, research on frugal innovations has particularly focused on how to address the challenges of low-income and resource-constrained contexts, often with aspects of sustainability in mind. However, to address these low-income contexts, having a suitable innovation is not enough; businesses must actually reach the target group, such as by overcoming accessibility issues in rural areas. Initial research has examined the value chains of frugal innovations and ways to engage the consumer, which also leads to social improvements. Building on this research, this dissertation combines four themes – frugal innovation, sustainability, inclusive business, and Scrum – to illustrate how innovations can address the needs of target groups in bottom-of-the-pyramid contexts and how these innovations can be implemented by engaging target customers.

The first paper illustrates the links between frugal innovation and sustainability based on a new sustainability evaluation framework. All cases considered contribute to sustainability, with social improvements being most notable. New employment and income opportunities are key social improvements. They reflect inclusive business approaches, which are the focus of the second paper. The case examples of the second paper show how frugal innovation can be implemented in accordance with inclusive business, which leads to customer involvement and thus mutually supports frugal innovation. The Inclusive Business Link Model for Frugal Innovation was built to show connections of frugal innovation and inclusive business and to
provide application possibilities. A key finding was that for the cases considered a high level of customer integration can be achieved through frugal innovations with modular designs and is supported by knowledge transfer and partnerships. To address knowledge transfer and partnerships in particular, the last paper applies Scrum as an agile approach at the execution level for inclusive business. In developing the conceptual model Inclusive Business Scrum Approach, inclusive business is considered as the "what" and Scrum as the "how" in engaging low-income consumers.

With regard to all three papers and the four included topics, this dissertation achieves several outcomes and contributes to a broader view of how low-income consumers can be addressed. First, each paper illustrates benefits of combining the concepts that could be valuable when addressing the bottom-of-the-pyramid context. Thereby, the papers build on each other and include previous results. Second, aspects of social sustainability are addressed mainly by combining frugal innovation and inclusive business. Third, each paper develops a model or framework intending to support practical applicability. Finally, an outline is provided for how combining frugal innovation, inclusive business, and Scrum positively could impact partnerships, knowledge transfer, and the empowerment of the target group, which could culminate in an approach that addresses challenges experienced when entering the Bottom of the Pyramid that also considers sustainability. The new management options developed begin at a general level and end at an execution level and thus contribute to holistic perspectives on innovations, approaches, and implementation options for organizations intending to address the Bottom of the Pyramid.
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<tr>
<td>BoP</td>
<td>Bottom of the Pyramid</td>
</tr>
<tr>
<td>DEA</td>
<td>Department of Environmental Affairs</td>
</tr>
<tr>
<td>IBLMFI</td>
<td>Inclusive Business Link Model for Frugal Innovation</td>
</tr>
<tr>
<td>IBSA</td>
<td>Inclusive Business Scrum Approach</td>
</tr>
<tr>
<td>MDGs</td>
<td>Millennium Development Goals</td>
</tr>
<tr>
<td>MNEs</td>
<td>Multinational Enterprises</td>
</tr>
<tr>
<td>SDGs</td>
<td>Sustainable Development Goals</td>
</tr>
<tr>
<td>SME</td>
<td>Small and medium enterprises</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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1 Introduction

Sustainability is not just a global trend or phenomenon but a prerequisite for saving our environment and achieving intergenerational justice. Since the Industrial Revolution, humans have been the greatest influence on global ecology, which has led to statements regarding how the earth has entered a new and more unstable phase in its evolution, the Anthropocene (McNeill & Engelke, 2016; Steffen et al., 2015). This phase is mainly caused by the overconsumption of resources and climate change and requires more environmentally conscious behavior (Steffen et al., 2015). Nevertheless, when one considers sustainability in terms of intragenerational equity, economic and social improvements also play key roles in addition to ecological issues (United Nations [UN], 1987). Among the Sustainable Development Goals (SDGs), the first and most important goal is to reduce poverty. This goal primarily addresses populations living at the Bottom of the Pyramid (BoP; UN, 2015a). In recent years, research has increasingly focused on the BoP, also referred to as the low-income group, and has started to provide recommendations that address this target group (Dembek et al., 2020).

Prahalad can be considered a leading researcher in the field of BoP investigation. He introduced 12 principles of innovation and noted that it is inadequate to simply adapt Western products because functionality requirements and infrastructural issues must be comprehensively considered (Prahalad, 2010). To address the BoP, Hall et al. (2012) emphasized that a domestic focus that includes local innovation may provide more opportunities for low-income target groups. For instance, co-creation approaches involving the BoP are seen as drivers for structurally addressing poverty (Nahi, 2016). This local focus could also positively influence aspects of sustainability. Nevertheless, to really act sustainably remains challenging. Both innovative solutions and processes that support sustainability are required (Rogall, 2012).
Already creating social value remains a challenge because there are several influencing factors (Lashitew et al., 2018) and investment is needed (Knizkov & Arlinghaus, 2019). Solutions and processes, independent of whether they intend to address the BoP, to improve aspects of sustainability, or both, require several aspects for successful implementation. One of Prahalad’s (2010) principles was that, for poor populations, innovations should not only be cheaper than conventional solutions but also be judged according to a new price-performance ratio. There is a need for demand-driven solutions that are also high quality and able to cope with context-related constraints (Puri et al., 2015; Simanis & Hart, 2008; Winterhalter, 2015). Moreover, Simanis and Hart (2008) emphasized that it is considered valuable not only to provide innovative solutions but also to integrate the target group and empower them as business partners, which can be realized through inclusive business (Schoneveld, 2020; United Nations Development Programme [UNDP], 2008). This implementation strategy requires partnerships, knowledge transfer, and network building (Pels & Sheth, 2017; Schuster & Holtbrügge, 2014).

This dissertation regards several cases that illustrate how to address the BoP with adequate innovative solutions and business approaches that consider sustainability and support partnerships as well as knowledge transfer. Therefore, it combines the three concepts frugal innovation, inclusive business, and the agile approach Scrum and considers the concepts within a business context. Frugal innovations are seen as innovative solutions that fulfill the requirements of affordability and an adequate price-performance ratio as well as quality and functionality (Tiwari & Herstatt, 2014; Weyrauch & Herstatt, 2017; Zeschky et al., 2011). Some papers have emphasized the interrelationship between social enterprises and frugal innovations (Bhatti, 2012; Singh et al., 2012) or the contribution of frugal innovation to social sustainability (Khan, 2016; Rosca et al., 2017). Their impact on sustainability will be evaluated in the first paper. Afterwards, inclusive business is combined with frugal innovation to address
the low-income target group intending to foster social improvements. Thereby, the cases of the second research project consider how aspects of collaboration, networks, and knowledge transfer emerge. In order to build deep relationships and knowledge transfer that foster the target group’s integration, Scrum is then introduced as an approach for contexts with dynamic conditions (Dybå & Dingsøyr, 2008; Sillitti et al., 2005), such as the low-income context (Knizkov & Arlinghaus, 2020; Reinhardt et al., 2018). Agile approaches have created new ways of addressing implementation issues and support innovative business models and strategies (Achtenhagen et al., 2013; Chesbrough, 2010). Agile methods are also seen as complementary to sustainability (Obradović et al., 2018). The third paper will also show how partnerships and knowledge transfer can be fostered and address aspects of leadership. Thereby, it situates previous findings and identifies practical approaches for implementation.

In summary, this dissertation illustrates how frugal innovation can be combined with inclusive business to support social sustainability for the target group. This work further shows how inclusive business can be implemented on an operational level based on the Scrum approach. By combining the mentioned concepts, three benefits could be fostered: partnerships, knowledge transfer, and empowering the target group. For instance, to improve collaboration through Scrum supports the building of inclusive businesses and is also beneficial for understanding the target group of a frugal innovation. Therefore, the concepts are interlinked and mutually influence each other. Each paper creates a framework or model that could be applied in practice. Finally, proposals emerge from this research, first those of a general level and thereafter those related to the execution level. These proposals are therefore interesting for future research and especially valuable for organizations that intend to enter low-income markets.

This dissertation is structured as follows. The next subsection outlines the author's contributions to the presented papers. Chapter 2 expands the theoretical background and relevance of the
papers by focusing on further aspects of sustainability, including the BoP, frugal innovation, inclusive business, and Scrum. The following section further reflects on the papers’ methods. Subsequently, in Chapter 4, the three papers are introduced. The discussion section shows the connections between the papers and considers critical thoughts on the topics in Chapter 6. Then, the methodological limitations follow. The dissertation concludes in Chapters 8 to 10 with research implications, managerial implications, and the study’s conclusion.

**Overview of the papers and the author’s contribution**

This work contains three papers that can be found in chapter four. The first one, “Introducing a Sustainability Evaluation Framework based on the Sustainable Development Goals applied to Four Cases of South African Frugal Innovation,” investigates interrelations of frugal innovation and sustainability. The paper introduces a new framework that allows one to quickly assess sustainability while still maintaining the complexity of the SDGs. The framework was tested by analyzing four South African frugal innovations, and it was shown that the innovations mainly contribute to social sustainability. The research for this paper began in 2016 and was conducted by two authors, with me as the first author contributing 60% to the study.

The second work, “How Frugal Innovation and Inclusive Business Are Linked to Tackle Low-income Markets,” examines how frugal innovations influence the design of inclusive businesses. For this purpose, 11 cases from the African context were analyzed, mainly through interviews. The findings from this study include a model considering frugal innovation and inclusive business, and they further show that frugal innovations with modular features support inclusive business approaches and emphasize the importance of partnerships and knowledge transfer. This research started in 2017, and three authors contributed, with me contributing a 75% share.

The third paper, “Boosting Inclusive Businesses’ Opportunities Through the Adoption of Scrum: an Execution Strategy to Enter Low-end Markets,” is a conceptual work that links Scrum to inclusive business approaches. Driven by previous findings, the paper intends to
provide recommendations regarding the implementation of inclusive business at the execution level. For this purpose, I created a conceptual model that applies the Scrum framework to inclusive business. To better link the research to practice, I provided an example of an innovation applied to a low-income context. This study began in 2019 and was conducted by me alone.
<table>
<thead>
<tr>
<th>Number</th>
<th>Original title</th>
<th>Status in the publication process; journal</th>
<th>Percentage full paper</th>
<th>Percentage of contribution</th>
<th>Role in authorship</th>
<th>Key contributions in terms of content</th>
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| 1      | Introducing a Sustainability Evaluation Framework based on the Sustainable Development Goals applied to Four Cases of South African Frugal Innovation | Published; Business Strategy and Development (Special Issue) | 100%                  | 60%                         | First author in co-authorship   | • Literature review for the theoretical background  
• Conceptualization of the methodology and the evaluation framework  
• Conducting and mainly evaluating the interviews  
• Partial elaboration of the results  
• Partial writing of the original draft, support of the review process |
| 2      | How Frugal Innovation and Inclusive Business Are Linked to Tackle Low-income Markets | Accepted; Journal of Small Business Management | 100%                  | 75%                         | First author in co-authorship   | • Literature review for the theoretical background  
• Conceptualization of the methodology  
• Conducting and evaluating the interviews  
• Supported elaboration of the results  
• Mainly writing the original draft, partial ensuring review process |
| 3      | Boosting Inclusive Businesses’ Opportunities Through the Adoption of Scrum: an Execution Strategy to Enter Low-end Markets | Accepted; International Journal of Agile Systems and Management | 100%                  | 100%                        | Single author                   |                                                                                                                                                           |
|        |                                                                                 |                                            |                       |                            |                                  |                                                                                                                                                           |
| Total  |                                                                                 |                                            | 300%                  | 235%                       |                                  |                                                                                                                                                           |

*Table 1. Included papers and my respective contributions*
2 Theoretical background

This section supplements the theoretical backgrounds of the individual papers and illustrates further details on the topics of sustainability, the BoP, frugal innovation, inclusive business, and Scrum. The section ends with the overall contribution of the study and addresses its relevance.

2.1 Defining sustainability

The Brundtland Report (UN, 1987) and the Agenda 21 from the UN Conference on Environment and Development (UN, 1992) are the most well-known sources that have promoted and institutionalized the concept of sustainability (Purvis et al., 2019). The Brundtland Report contains an often-cited definition of sustainability: “*Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs*” (UN, 1987, p. 5 § 3). The quotation reflects the notions of intergenerational and intragenerational equity and thereby the complexity of sustainability. The report encouraged mainstreaming sustainability and its social, environmental, and economic dimensions (Purvis et al., 2019).

On the global-political level, the UNDP introduced the Millennium Development Goals (MDGs) in 2000. Comprising eight goals, the declaration focused on improving health and reducing extreme poverty by 2015 (UNDP, 2018). Then, in 2015, based on several summits and conference, the UN introduced the SDGs (UN, 2015a), which are illustrated in Table 1. Simply put, the SDGs can be seen as an enlargement of the MDGs. Whereas the MDGs focused on developed countries, the SDGs apply to all nations. The SDGs consist of 17 goals comprising 169 targets; this breadth holistically covers the social, economic, and ecological sustainability dimensions. Furthermore, the SDGs are linked to human rights, as they consider, for example,
equality, education, and health and not only the availability of social services but also access to them (Kercher & Mahler, 2015; Sachs, 2012; UNDP, 2018).

<table>
<thead>
<tr>
<th>Goal</th>
<th>SDG</th>
</tr>
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<tbody>
<tr>
<td>G1</td>
<td>End poverty in all its forms everywhere</td>
</tr>
<tr>
<td>G2</td>
<td>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</td>
</tr>
<tr>
<td>G3</td>
<td>Ensure healthy lives and promote wellbeing for all at all ages</td>
</tr>
<tr>
<td>G4</td>
<td>Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</td>
</tr>
<tr>
<td>G5</td>
<td>Achieve gender equality and empower all women and girls</td>
</tr>
<tr>
<td>G6</td>
<td>Ensure availability and sustainable management of water and sanitation for all</td>
</tr>
<tr>
<td>G7</td>
<td>Ensure access to affordable, reliable, sustainable and modern energy for all</td>
</tr>
<tr>
<td>G8</td>
<td>Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</td>
</tr>
<tr>
<td>G9</td>
<td>Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</td>
</tr>
<tr>
<td>G10</td>
<td>Reduce inequality within and among countries</td>
</tr>
<tr>
<td>G11</td>
<td>Make cities and human settlements inclusive, safe, resilient and sustainable</td>
</tr>
<tr>
<td>G12</td>
<td>Ensure sustainable consumption and production patterns</td>
</tr>
<tr>
<td>G13</td>
<td>Take urgent action to combat climate change and its impacts</td>
</tr>
<tr>
<td>G14</td>
<td>Conserve and sustainably use the oceans, seas and marine resources for sustainable development</td>
</tr>
<tr>
<td>G15</td>
<td>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</td>
</tr>
<tr>
<td>G16</td>
<td>Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</td>
</tr>
<tr>
<td>G17</td>
<td>Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development</td>
</tr>
</tbody>
</table>

Table 2. Sustainable Development Goals (UN, 2015b)

On the national level, the Bertelsmann Stiftung and Sustainable Development Solutions Network (2019) set up the fourth edition of the SDG Index and Dashboard report, which comprises 99 indicators used to evaluate and compare progress on the SDGs in all 193 UN member states. The report outlines six SDG transformations to operationalize sustainability, and one of these is education, gender and inequality. Although countries are fostering approaches to achieve more sustainability, the report’s results indicate that no country is on track. Furthermore, high-income countries’ spillover effects from ecological, economic, and security activities hamper other countries’ progress. The findings also illustrate the complexity of the SDGs (International Council for Science & International Social Science Council, 2015).
In recent years, various reports have tried to use the SDGs or grasp their complexity and identify interrelations and conflicts between them (Bali Swain & Yang-Wallentin, 2020; Fonseca et al., 2020; International Council for Science, 2016; 2017; Nilsson et al., 2016).

To achieve the SDGs, extensive changes in all areas of life, the economy, and politics will be needed (Van Niekerk, 2020). The UN calls on all countries and stakeholders to implement the Agenda 2030 (UN, 2015b). The transformation to sustainability requires systemic changes in the way institutions and global systems interact and the enabling of groups and individuals to act more sustainably, which requires a change in values (Scoones et al., 2020) and demands sustainable practices from businesses (Hall et al., 2010; Klein et al., 2021). For instance, regarding sustainability in a business context, Elkington (1997) coined the term “triple bottom line” in 1994. The term refers to balancing social, ecological, and economic impacts. Elkington later emphasized the growth of the sustainability sector as an industry sector and noted that many companies use the triple bottom line as an accounting tool to report success in sustainability efforts and to balance the books. However, the triple bottom line is meant to achieve systemic change for future capitalism; it is not just an accounting tool, as sustainability success should not be measured by profit (Elkington, 2018). Nevertheless, corporate social responsibility seems to positively impact business outcomes (López-Pérez et al., 2018).

Moreover, literature shows various approaches for integrating dimensions of sustainability into business models, such as the Business Model Canvas (Franca et al., 2017; Joyce & Paquin, 2016; Osterwalder & Pigneur, 2010).

The systematic changes, as demanded by Elkington, also include inclusive business approaches for achieving the SDGs that focus on, for example, poverty alleviation, zero hunger, and gender equality (Nahi, 2018; Pouw et al., 2019; Van Niekerk, 2020). These approaches align with the transformations called for by the Bertelsmann Stiftung and Sustainable Development Solutions Network (2019). Specifically, SDG 8 (see Table 2) refers to “inclusive and sustainable
economic growth.” In addition, eradicating poverty is not only the first goal but also the main objective of the whole Agenda 2030. This focus is in line with the UN’s statement that eradicating poverty is the greatest global challenge and a prerequisite for sustainable development (UN, 2015b). Consequently, the BoP population is an important target group that needs to be strengthened by the SDGs, as the BoP is living at the income minimum.

2.2 The BoP as target group

Prahalad (2010) has considered requirements, possibilities, and circumstances of the BoP in his book *The Fortune at the Bottom of the Pyramid*. Already three years prior to the book’s release in 2005, Prahalad and Hart (2002) pointed out that poor population groups are the new source of economic growth. Illustrating the distribution of wealth as a pyramid, the authors stated that four billion people live on less than $1.50 per day; these people form the BoP, also called Tier 4 (Prahalad & Hart, 2002).

The World Bank Group (2018) defined the poverty line as income below $1.90 per day. In 1990, 36% of the world's population lived below this income threshold. In 2015, this figure fortunately fell to 10%. Much of this positive progress has been achieved in East Asia and the Pacific and is influenced by China's economic growth. However, sub-Saharan Africa is still marked by poverty, and the total number of poor people is even increasing due to population growth (see Figure 1). Therefore, poverty eradication efforts focus on sub-Saharan Africa and extreme poverty (World Bank Group, 2018). To include middle-income countries, the World Bank Group (2018) introduced two new poverty lines: $3.20 for lower-middle incomes and $5.50 for higher-middle incomes. In sub-Saharan Africa in 2015, 66.3% of people fell into the lower income bracket and 84.5% had less than $5.50 per day.
Poverty is not only determined by income levels; it also contains aspects related to access to health care, education, and infrastructure (Van Niekerk, 2020). This approach to poverty is called multidimensional poverty, and it shows, for example, that 28.2% of people in sub-Saharan Africa suffer from monetary poverty, have no education, and lack basic infrastructure such as water and sanitation infrastructure (World Bank Group, 2018). For poor population groups in particular, this condition works in two directions: belonging to the "poor" also means having a lack of education, and this lack often keeps people trapped in poverty (Van der Berg, 2008). For instance, considering education and poverty in the African context, two out of five adults are illiterate, and the quality of education remains low (Beegle et al., 2016). The growing working population could be an opportunity to reduce poverty, provided that cognitive, social, and technical skills are promoted because the sub-Saharan workforce is currently the least skilled in the world. Although more children are in school today and governmental expenditure on education has increased in most countries, far fewer than 50% of students complete lower secondary education, and far more girls than boys do not attend school (World Bank Group, 2018).
Education and knowledge transfer are prerequisites for reducing poverty and supporting economic development (Awan et al., 2011). However, products and services that adequately address the needs of the BoP are also needed; frugal innovations are seen as beneficial for this purpose (Agarwal & Brem, 2017; Basu et al., 2013; Pansera, 2018).

2.3 Frugal innovation

The term frugal innovation was first introduced by The Economist (2010). Discussing innovation for low-income consumer groups, The Economist defined frugal innovations as not only affordable but also functional, high-quality solutions that specifically address customers’ needs. Since this introduction, the concept has increasingly received attention, and the definition and research perspectives on frugal innovation have further evolved (Hossain, 2018; Rosca et al., 2018). In order to provide an overview, the next section summarizes some of the literature on frugal innovations by considering aspects of their origin, target markets, and sustainability in addition to their definition.

Initial research examined frugal innovation mainly in relation to the BoP and resource-constrained environments (Agarwal & Brem, 2017). For instance, Zeschky et al. (2011) emphasized that frugal innovations are born out of constraints and are designed to meet the basic needs of their low-income target group. Although these solutions are low cost, they are still “good enough” in that they provide the necessary functionality. Resource scarcity appears to be an important driver, for example, in the development of frugal innovations based on material reuse (Agarwal et al., 2021; Hossain, 2018). However, resource scarcity is not limited to low-income contexts, and literature exploring frugal innovation has also expanded to more developed economies (Kalogerakis et al., 2017; Kroll & Gabriel, 2020). Moreover, frugal innovations can open up new markets or expand from emerging markets into rather developed markets (Hossain, 2020; Neumann et al., 2020). Recent findings indicate a link between target market demands and frugal innovation design (Albert et al., 2020; Neumann et al., 2020).
Furthermore, the source of a frugal innovation is important to know, as innovations originating from multinational enterprises (MNEs) differ from innovations originating from grassroots entrepreneurs (Hossain, 2018). Soni and Krishnan (2014) introduced a broader perspective on frugal innovation comprising the aspects of a frugal mindset, a frugal process, and frugal outcomes. The frugal mindset designates a “way of life”. This mindset can be associated with approaches such as bricolage or improvisation that can also occur within MNEs (Halme et al., 2012). The frugal process describes the way or method of solving problems or creating products, including approaches such as “lean engineering” or “frugal engineering.” The frugal outcome is a product or service such as an appropriate technology or a solution aimed at a specific target group (e.g., the BoP). Recently, Knizkov and Arlinghaus (2020) investigated the frugal process while considering the impacts of resource constraints throughout the value chain to overcome the previous research focus on frugal product definitions. The authors summarize how the frugal process can be the product and its development. It can even address multiple aspects of the value chain and be an outcome, such as an innovative frugal logistics system.

However, the diversity of aspects considered in the definition of frugal innovation seems to have hindered the development of an established research stream (Hossain, 2018). In 2018, Pisoni et al. conducted a review illustrating the development of the definition of frugal innovation. They concluded that the term frugal innovation encompasses product-oriented, market-oriented, and criteria-oriented definitions. The authors also included the criteria-oriented definition of Weyrauch and Herstatt (2017), which forms the basis the definition of frugal innovation in the papers considered in this dissertation. Weyrauch and Herstatt conducted a systematic literature review and interviewed 45 representatives and concluded that frugal innovations mainly comprise substantial cost reductions, a concentration on core functionalities, and optimized performance levels. Substantial cost reductions entail that the innovations have low purchase prices or low costs of ownership from a customer’s perspective,
while the concentration on core functionalities refers to how the innovations focus on essentials, are user friendly, and minimize the use of resources. The performance level has to match the purpose of the innovation, meaning that the performance level of the innovation can be either higher or lower than the performance levels of previous solutions. While keeping costs low, the innovation should be of the highest possible quality and fulfill its purpose. 

Along with the definition of frugal innovation, aspects of sustainability also reoccur in the frugal innovation literature. Because frugal innovations are driven by affordability, simplicity, adaptability, and the use of local resources, they were initially presumed to promote sustainability (Basu et al., 2013; Brem & Ivens, 2013), and they still are depending on the case (Hossain et al., 2021). However, research has showed that frugal innovations are not necessarily sustainable (Rosca et al., 2017; 2018) and that their environmental sustainability outcomes often remain unclear (Albert, 2019). Nevertheless, since frugal innovations often lead to social improvements, they do play a role in sustainable development issues (Khan, 2016). Social improvements often include employment opportunities, and this highlights the link to inclusive business, as inclusive business is about addressing an appropriate innovation to a target group and involving them in the value chain (Arnold, 2017; Hossain et al., 2021; Kahle et al., 2013; Levänen et al., 2016).

2.4 Inclusive business

In 2006, the UNDP launched *The Growing Inclusive Market Initiative* to support and spread awareness about inclusive business. The idea was based on a UN Commission report from 2004, which stated that unleashing the capacity of local entrepreneurship, employment, and economic wealth would improve the situations in developing countries (UNDP, 2004; 2008). The initiative was created to increase understanding of the markets in low-income contexts and to promote private sector actions for these markets by analyzing and illustrating case studies (UNDP, 2008). To illustrate how people can be empowered to promote their inclusiveness as
employees or self-employed persons within the value chains of new solutions, the UNDP defined the term “inclusive business” as follows:

*Inclusive business models include the poor on the demand side as clients and customers, and on the supply side as employees, producers, and business owners at various points in the value chain. They build bridges between business and the poor for mutual benefit.* (UNDP, 2008, p. 2)

The UNDP contributed to the perception of poor population groups as a source of employment and a driving force for economic growth. Often inclusive business seems to occur in the areas of finance, agriculture, and food security (Ménard & Vellema, 2020; Pouw et al., 2019). Ros-Tonen et al. (2019) emphasized that inclusive business literature is mainly concerned with approaches for achieving business goals, such as is evident in the study of Ménard and Vellema (2020). Lashitew and Van Tulder (2020) also noted that larger companies implementing inclusive business practices are especially driven by economically oriented motives. By contrast, the inclusive value chain literature more greatly emphasizes social upgrading and empowerment (Ros-Tonen et al., 2019), as illustrated by, for example, Doherty and Kittipanya-Ngam (2021). As Table 3 shows, inclusive business can lead to advantages for both the poor populations and the companies engaged in markets with underprivileged target groups.
Opportunities of inclusive business models

<table>
<thead>
<tr>
<th>For companies</th>
<th>For poor populations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing innovative products designed to fit the requirements of specific target groups leading to competitive advantages and the opportunity to diffuse to other markets</td>
<td>Innovative and specially tailored products that improve living circumstances by meeting basic needs such as food, water, and energy</td>
</tr>
<tr>
<td>Developing new markets with products and services that improve the living conditions of poor people</td>
<td>Innovative and specially tailored products contribute to increasing the productiveness of poor populations</td>
</tr>
<tr>
<td>Benefitting from local knowledge and connections when employing or partnering with the poor</td>
<td>Engagement as producers, employees, or entrepreneurs contributes to increased income</td>
</tr>
<tr>
<td>Generating profits by serving underserved population groups</td>
<td></td>
</tr>
<tr>
<td>Strengthening the value chain by local procurement and decreasing costs and risks</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Opportunities of inclusive business models (UNDP, 2008)

The UNDP definition is the one used for the individual papers of this dissertation. Schoneveld (2020) conceptually examined the definition of inclusive business and inclusive business models. His study also incorporates the UNDP definition, but he focuses on formulating a definition that considers the following aspects: inclusiveness toward what, inclusiveness of whom, and inclusiveness in what. Furthermore, by focusing on inclusive business models, the author captures points of value proposition, value creation and the delivery system, and the value capture system through the inclusive business, which also fits into the Business Model Canvas (Osterwalder & Pigneur, 2010). Schoneveld (2020) proposes the following definition of inclusive business models: “A type of sustainable business model that seeks to productively engage income-constrained groups in the value chain by providing solutions to neglected problems” (p. 10). This definition is applicable to this dissertation also, as the connections between the aspiration to act sustainably, the inclusion of the target group, and an appropriate solution are inherent to it.

Moreover, Schoneveld recommends the further examination of the role of partnerships in inclusive business models. Other research has already noted many aspects that should be considered in building inclusive business approaches, such as cooperation and knowledge transition. Knowledge sharing is an important driver and enabler of inclusive business approaches (Golja & Požega, 2012; Peerally et al., 2019; Reficco & Márquez, 2012).
Cooperation should strengthen the inclusive business ecosystem and its producers, so partnerships are mainly vertical or even diagonal, and horizontal partnerships are expected with scaling (Danse et al., 2020). Zhu and Sun (2020) address the generative partnership and defined it as a “collaboration between nonprofits and business organizations to create a social value proposition and attract additional collaborations to mutually solve social issues in an inclusive business model” (p. 2). The authors introduced two inclusive business schemata: the generative potential of hybrid partnerships, which develops throughout four stages, and the unexpected opportunity in co-creation. They conclude that partnerships are necessary for inclusive business and that inclusive business is not static but co-evolving, and they emphasize the importance of directedness, heterogeneity, and interactions for generative partnerships.

Engaging disadvantaged people in a market is a critical step in alleviating poverty (Pouw et al., 2019). To include low-income consumer groups can foster social enhancement, which supports more sustainable economic growth and can create a mutually beneficial situation for customers and businesses. The benefits of inclusive business models not only concern profits and income; they also relate to building markets and supply chains and encouraging productivity and empowerment (UNDP, 2008). Nevertheless, there is still a lack of research addressing how to develop inclusive business (Schoneveld, 2020), which would ideally include some general approaches, for example, to support cooperation. Therefore, the agile approach Scrum is used as a framework for implementing inclusive business in different cases and contexts.

2.5 The agile approach Scrum

Agile methods are not new but rather have a long history (Abbas et al., 2008). Larman and Basili (2003) have stated that the first incremental and iterative development processes date to the mid-1950s and are therefore not really “modern” approaches for replacing, for instance, waterfall designs. Today, the agile manifesto is well known for introducing 12 principles of agile software development. These principles can be summarized in four main statements:
individuals and interactions over processes and tools; working software over comprehensive documentation; customer collaboration over contract negotiation; and responding to change over following a plan (Cunningham et al., 2001). To meet these principles, agile approaches try to build trusted customer relationships and act based on iterative cycles to address uncertainties (Sillitti et al., 2005). Scrum is an agile approach because it presumes incorrect assumptions up front and provides techniques for addressing those assumptions via its iterative and incremental character (Beedle et al., 1999). Scrum is also the most popular agile approach in software-related organizations (Brezočnik & Majer, 2016; Digital.ai, 2020; Landaeta et al., 2011; Srivastava et al., 2017).

Inspired by rugby, Takeuchi and Nonaka (1986) used the term “Scrum” to specify a new approach to product development. Based on interviews, the authors summarized six interlinked characteristics that shape the product development approach: built-in instability, self-organizing project teams, overlapping development phases, multilearning, subtle control, and the organizational transfer of learning. Built-in instability means that the management specifies a product or strategic goal; however, it rarely concretizes a work plan. The project team has the freedom to design the processes itself while simultaneously fulfilling the specified requirements. Thus, the team organizes itself to achieve the goal. Although the members of the project team start at different points and have differing timelines, they all have to meet the same deadlines. This results in overlaps, and the team finds a rhythm of group work and acquires knowledge and skills from the beginning. Based on the six interlinked characteristics, a flexible and fast process for product development emerged (Takeuchi & Nonaka, 1986) that is one of the foundations for today’s Scrum, and it was further refined in 1999 (Beedle et al. 1999; Larman & Basili, 2003).

The key document that explains how Scrum works and outlines its most important elements is the *Scrum Guide*. The first version of this guide was introduced in 2010, and the latest version,
in 2020, with the guide evolving through periodic updates (Schwaber & Sutherland, 2020). The 2020 guide in particular is a streamlined version that summarizes some of Scrum’s main aspects:

*In a nutshell, Scrum requires a Scrum Master to foster an environment where:*

* A Product Owner orders the work for a complex problem into a Product Backlog.
* The Scrum Team turns a selection of the work into an Increment of value during a Sprint.
* The Scrum Team and its stakeholders inspect the results and adjust for the next Sprint.

Repeat. (Schwaber & Sutherland, 2020, p. 3)

Scrum is an iterative and incremental approach that is based on empiricism. The most recent version of the guide emphasizes the deliberate incompleteness of the guide; it is incomplete because it is intended to be completed by the people applying it. The *Scrum Guide* reinforces the importance of the Scrum Master's role in supporting the team and emphasizes that the guide’s application is not limited to software contexts (Schwaber & Sutherland, 2017; 2020).

Regarding project management and new product development, Cooper (2014) proposed implementing agile approaches in his previously introduced stage-gate model (Cooper, 1988; Cooper et al., 2002). Sommer et al. (2015) established the Industrial Scrum Framework to illustrate how Scrum can be applied in combination with the stage-gate approach for new product development. Cooper and Sommer (2016) stated that Scrum is a very valuable agile method with respect to physical products and in general to the development of new products that go beyond software structures. Beyond product development, Ciric et al. (2018) summarized benefits of agile methods in the construction and real estate industries, education, and services. Landaeta et al. (2011) examined Scrum outside an information-technology context and emphasized the benefits of learning and knowledge transfer from Scrum projects for organizations. One key benefit of Scrum is knowledge transfer, as the flexibility of Scrum supports a productive learning environment and even the transfer of tacit knowledge (Ionel,
2008). Learning mainly occurs in Scrum meetings and between different teams. Therefore, it can be seen as organizational learning that also provides a strategic advantage (Landaeta et al., 2011). In addition, teamwork is an important benefit of Scrum; although each team member has specific skills, the team as a whole is responsible for a successful development (Schwaber & Sutherland, 2017). Therefore, Scrum supports relationships, trust, and motivation within a team (Pries-Heje & Pries-Heje, 2011). Drawing on the benefits of knowledge transfer and relationship building, Scrum is seen as beneficial in implementing inclusive business practices, as it is based on collaboration.

2.6 Contribution of the investigations and the current relevance of topics

Although research for some of the papers began long ago, the themes are as relevant as ever in research and in practice. One reason why is the global COVID-19 pandemic. Due to this pandemic, the World Bank Group (2020a) expects poverty levels to rise. This rise could affect middle-income countries, more urban people, and more informal services and manufacturing. Climate change is also expected to increase poverty rates, particularly in South Asia and sub-Saharan Africa. Africa is the BoP context examined in this dissertation, as it is valuable for investigating both frugal innovation and inclusive business (Hossain, 2017; Knorringa et al., 2016; UNDP, 2013).

In absolute terms, poverty has not decreased in sub-Saharan Africa. Education and basic infrastructure are also lacking in this region (World Bank Group, 2018). In fact, as a result of the pandemic, African economic activity was expected to decline by 3.3% in 2020, pushing more people into poverty. What is needed (among other things) is economic improvement and empowerment that incorporates aspects of sustainability (World Bank Group, 2020b) and inclusive business approaches (Geaneotes & Mignano, 2020). However, progress on the SDGs has been challenging, and the COVID-19 pandemic is worsening the situation (Barbier & Burgess, 2020). The UN (2020) anticipate that decades of progress on sustainability will be
lost, especially regarding poverty reduction. At least 13 of the 17 SDGs will be affected by the crisis and require a rethinking and intensification of their strategies to achieve a sustainable transformation.

Frugal innovation is one approach for addressing these issues. For instance, Corsini et al. (2020) investigated two cases of frugal innovation that occurred during the COVID-19 pandemic: 3D-printed valves for ventilators and face shields. On the one hand, the authors illustrated how frugal innovations evolved based on a maker movement that responded quickly to challenges by involving its social network. On the other hand, they emphasized how high- and middle-income countries can become resource-constrained contexts requiring frugal solutions due to external influences (e.g., a pandemic). Both results illustrate the relevance of frugal innovation as a response to various challenges and recognize constraints as a driving factor for frugal development (Agarwal et al., 2021). Vesci et al. (2021) added that the successful development of the frugal innovations was driven by engaging end users through rapid iterations and co-creation. Inclusive business and Scrum processes can foster this development, which increases the interest in investigating the connections between frugal innovation, inclusive business, and Scrum in more detail.

Furthermore, a combination of frugal innovation and inclusive business seems to be fruitful approach for social sustainability (Bendul et al., 2017; Pouw et al., 2019). Ros-Tonen et al. (2019) illustrated distinctions and commonalities of inclusive business, inclusive value chains, and inclusive development. They found that the inclusive business literature refers to (frugal) innovation and partnerships and mainly supports the achievement of business goals that can be related to sustainability. This dissertation will illustrate how combining frugal innovation with inclusive business and adding Scrum can be supportive for addressing the low-income contexts and sustainability.
3 Methodology

The methods of the papers comprising this dissertation include case studies as well as qualitative and conceptual research methods. The first two papers use a multiple case study approach, and they investigate real-life phenomena and focus on questions of ‘how’ and ‘why’ (Stake, 1995; Yin, 2009). We collected data in interviews and through other information sources such as reports and websites to triangulate the data sources (Hays, 2004). For both papers, each case was initially evaluated on its own to identify unique characteristics. Then, a cross-case analysis was used to identify similarities and patterns (Eisenhardt, 1989; Hays, 2004).

The first paper’s analysis was done in accordance with the SDGs to address aspects of social, ecological, and economic sustainability. The cases were selected based on purposive sampling, and the interviews used an open-ended questionnaire (Patton, 2002; Teddlie & Yu, 2007). Researchers with different nationalities and academic backgrounds reviewed and retested the case assessments to ensure interrater reliability (Bortz & Döring, 2007).

In the second paper, we built categories for purposive sampling to achieve a sampling of typical cases (Patton, 2002; Ritchie et al., 2003; Teddlie & Yu, 2007). We analyzed the data by developing categories both inductively and deductively (Eisenhardt & Graebner, 2007; Mayring, 2014), following a flexible pattern-matching method (Bouncken et al., 2021). We analyzed all documents using a descriptive coding approach and by conducting a qualitative content analysis with MAXQDA (Mayring, 2014; Saldana, 2009). Based on patterns found across the cases, we developed a conceptual model and theoretical propositions that can serve as a foundation for building testable hypotheses for further research (Bouncken et al., 2021; Eisenhardt & Graebner, 2007).

The last paper is conceptual, as it proposes new relationships between the constructs of inclusive business and Scrum. Thereby, it does not create a fully new approach but intends to
illustrate interrelations among disciplines that are perceived to be fruitful (Gilson & Goldberg, 2015). To do so, the third paper builds a new model that outlines the connections between inclusive business and Scrum. It establishes propositions that could serve as starting points for further investigations and illustrates the outcome of the model (Jaakkola, 2020). Aside from static figures, the last paper also includes two process figures that visualize the model (Jaakkola, 2020; Smithey Fulmer, 2012).
4 Papers

4.1 Publication 1: Introducing a Sustainability Evaluation Framework based on the Sustainable Development Goals applied to Four Cases of South African Frugal Innovation

This is an accepted manuscript of an article published by Wiley in Journal of Business Strategy and Development (Special Issue) in 2018, available online: https://doi.org/10.1002/BSD2.37

Authors: Anne Dressler, Julien Bucher
Status: Published in Business Strategy and Development (Special Issue)
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DOI: https://doi.org/10.1002/bsd2.37

Abstract

Evaluating sustainability based on the Sustainable Development Goals (SDGs) is a complex but purposeful approach with a broad field of application. In order to handle the complexity of the SDGs and achieve flexibility at the same time, this paper introduces a three-step evaluation system based on the SDGs for the assessment of the sustainability of innovations. It was used to assess four cases of South African frugal innovation with the conclusion that all four examined cases were sustainable, indicating an interrelation between the frugality and the sustainability of an innovation. The framework was reviewed and revised several times and tested successfully and so far has proven to be applicable to a wide spectrum of innovations.

Keywords: BoP innovation, Evaluating sustainability, Frugal innovation, South Africa, Sustainable Development Goals
4.1.1 Introduction

Within the next 15 years, the world population will increase by more than one billion people, reaching 8.5 billion in 2030. For 2050, the UN (2017) estimate a population size of even 9.7 billion people. More than half of the growth is expected to occur in Africa, even if the level of fertility decreases in the short run. This development leads to an increased demand for space as well as natural resources, especially (drinking) water and food, further challenging natural resources. Meeting the demand of the growing world population, providing equal living standards and preserving the environment simultaneously are competing objectives that require a commitment to a more sustainable behavior (Rogall, 2012).

In September 2015, the United Nations General Assembly adopted the 2030 Agenda for SDGs including 17 goals and 169 targets for sustainability. The goals intend to build on the MDGs from 2000 and take aim at eliminating poverty and inequality and tackling climate change (UN, 2015b). Sachs (2012) pointed out that objectives of sustainability differ globally within and between societies. The SDGs offer a universal set of objectives to be implemented by all countries, aiming for global welfare for the current and future generations.

Achieving sustainability means rethinking economic growth completely. That is where the concept of frugal innovations comes to mind as it is commonly associated with emerging and developing countries as well as sustainability (Brem & Ivens, 2013; Khan, 2016; Levänen et al., 2016). According to Wohlfahrt et al. (2016), these innovations focus on core functionalities of products and services and are affordable for price-sensitive customer groups. Therefore, especially emerging countries like the BRICS are expected to provide basic context factors for frugal innovations. Frugal innovations are based on essential features exploiting a minimum amount of resources. Ideally, resources are locally available (Rao, 2013). That supports the assumption that frugal innovations contribute to sustainability. If frugal innovations can at least
be called more sustainable than other innovative solutions, they could have a great impact on the economic future.

The evaluation of sustainability requires a transparent approach that can cope with the varying definitions of sustainability at best. The SDGs seem to be a suitable basis because they established a holistic perspective that is widely recognized. Therefore, this paper presents a framework for the evaluation of sustainability, a transparent and adaptable approach based on a review of existing frameworks for the evaluation of sustainability. Furthermore, four frugal innovations from the South African context were assessed. Especially in Africa, the high rate of population growth connected with the demand for sustainable economic development and equity promotes further research regarding frugal innovations.

In the next section, the theoretical framework of the study is presented, addressing sustainability, frugal innovations, and the South African context. This is followed by a description of the methodological approach including the sampling of the cases and subsequently the sustainability evaluation framework is introduced. Afterward, this framework is used to evaluate four cases of frugal innovation, an overall comparison follows resulting in a conclusion and future research implications.

4.1.2 Theoretical background and research context

*Sustainability*

The concept of sustainability itself is multifaceted. Most cited sources for sustainability in scientific papers are the Brundtland Report (UN, 1987) and the Agenda 21 from the UN Conference on Environment & Development (UN, 1992) that required intra- and intergenerational equity. The Brundtland Report established the conjunction and interaction between economic, ecological, and social sustainability.

In order to promote a more sustainable future, sustainability assessment has become an important topic in a wide range of areas (Bond & Morrison-Saunders, 2011; Pintér et al., 2012).
Looking at sustainability from a rather political perspective, contributions of the UN come to the fore. The UNDP initially introduced the MDGs intending to eliminate poverty and improve health and equity (UNDP, 2018). In 2015, the UNDP developed the MDGs into the SDGs in order to make a difference between the MDGs for developing countries and the SDGs for every country. The SDGs also combine economic, environmental, and social issues (Kercher & Mahler, 2015; Sachs, 2012). They are more broad and universal and intend to establish interrelations between single goals (Le Blanc, 2015). Although not legally binding, governments are expected to establish approaches and frameworks fostering the SDGs (UN, n.d.). The Bertelsmann Stiftung and Sustainable Development Solutions Network (2017) set up the SDG Index and Dashboard report comprising 99 indicators used to evaluate and compare the achievement of the SDGs in 157 UN member states.

**Defining frugal innovation and linking sustainability**

The concept of frugal innovations is shaped by various definitions and shows similarities to other approaches (Hossain, 2017; Pisoni et al. 2018). Pisoni et al. (2018) point out that the approach has its roots in emerging markets where these innovations intended to fulfill needs of consumers at the BoP. Originally, in 2005 Prahalad introduced 12 principles of innovation to address the BoP. Among others, he demanded not only lower prices but new price performance to serve poorer population groups. He pointed out that the simple adaptation of Western products will not be sufficient since functionality requirements must be considered comprehensively. Furthermore, he emphasized that product development must consider infrastructural issues (Prahalad, 2010). These requirements resemble the key characteristics that frugal innovations display in their development and features, which is one reason why they are associated with the BoP (Khan, 2016; Pansera & Sarkar, 2016; Wohlfahrt et al., 2016). Illustrating the development of the definition of frugal innovation in the meantime, Pisoni et al. (2018) created a timeline showing the development of frugal innovation concepts. It starts with product-oriented definitions presenting product-based features. In the second-generation
market-oriented and process-oriented foci expand the characterization. To enable a transfer from emerging market contexts to Western industry contexts the third group of definitions sets up criteria to define and distinguish frugal innovation in greater detail.

In this article frugal innovations are defined following the criteria-oriented definition by Weyrauch and Herstatt (2017), who conducted a systematic literature review as well as interviews to create their classification. According to Weyrauch and Herstatt, the main characteristics of frugal innovations are substantial cost reduction, concentration on core functionalities, and optimized performance level. Although, the term frugal innovation becomes more and more known, used and even associated with developing and industrial nations alike (Fraunhofer ISI & Nesta, 2016; Pisoni et al., 2018), this development towards a more general definition of frugal innovation seems detrimental since the concept would lose one of its key features and in consequence emphasize the similarities to other, already established concepts of innovation like low-end disruption (Christensen & Raynor, 2013). Thus, this paper focuses on frugal innovation projects in a developing context that provides products or services for low-income consumer groups.

Especially with the BoP as a target group, frugal innovations are often associated with sustainability. Their features are driven by affordability, simplicity, adaptability, and the use of local resources, which enables these innovations to foster sustainability (Basu et al., 2013). According to a conceptual framework of (Brem & Ivens, 2013), frugal innovations support both sustainability and market performance by reducing input resources, value chain activities as well as negative outcomes regarding sustainability.

Besides conceptual articles, the interrelation of frugal innovation and sustainability has meanwhile also been examined in case studies. For instance, Khan (2016) investigated several cases and emphasized the role of frugal innovation to support social sustainability. Contrarily to research strengthening the connection between frugal innovation and sustainability, Rosca et
al. (2017) underlined that sustainability is no binding feature of frugal innovations. Hyvärinen et al. (2016) illustrated a frugal innovation example of the water sector and pointed out that sustainability evaluation should consider the whole value chain. These different approaches show the need to further investigate potential interrelations in order to identify possible conditions or key contextual factors.

The South African context
So far the conceptualization of frugal innovation is empirically based on Asian countries and their markets (Rao, 2013; Tiwari & Herstatt, 2012), which leaves other emerging regions like Africa and South America and their specific contexts as subjects for research. The authors' focus on Africa follows expressed desiderata in recent articles (Hossain, 2017; Knorringa et al., 2016). As one of the BRICS, South Africa is assumed to have quite comparable context conditions as India and China for frugal innovations and will serve as the chosen setting for this investigation with the goal to contribute to closing the gap on frugal innovation research in the African context.

But it’s not just about the potential role of frugal innovation in South Africa - rather sustainability is of great importance for the country’s future development. Besides fostering economic growth, social issues like health and poverty as well as ecological topics like climate protection remain ongoing challenges (Federal Ministry for Economic Cooperation and Development, 2010-2018). Considering the SDG Index of Bertelsmann Stiftung and Sustainable Development Solutions Network (2017) South Africa holds a score of 61,2 points. Amongst 157 evaluated countries it occupies position 108. The index illustrates that especially poverty and unemployment, health, hunger, poor education, inequality, a lack of energy and clean water, climate issues, and economic development are main issues within the SDG evaluation.

South Africa is aware of the need for more sustainable growth. Based on the requirements of the Brundtland Report the nation wants to achieve economic development and social
enhancement while regarding ecological sustainability as the most important dimension of sustainability. The Department of Environmental Affairs (DEA, 2011) set up the National Strategy for sustainable development to improve systems for integrated planning and implementation, sustain South African ecosystems, use natural resources efficiently, promote the green economy, build sustainable communities, and tackle climate change.

Achieving sustainable growth is a huge challenge for every country. The SDGs can be seen as a guideline to be worked on (Bertelsmann Stiftung and Sustainable Development Solutions Network, 2017). A framework based on the SDGs was used to evaluate South African frugal innovations to gain insights regarding the manner in which these frugal innovations contribute to sustainability and help to fulfill the South African requirements, which in turn may point toward ways to address these challenges in other contexts.

4.1.3 Methodology

The work on and with the introduced framework goes back to December 2015 and was completed, at least for the time being, in March 2018, as shown in more detail in Figure 2.

![Figure 2. Timeline of the research project](image)

At first, two literature reviews (Adams et al., 2007) were conducted, an exploratory one seeking to get a broad insight into the research on frugal innovations and sustainability. The second instrumental literature review focused on empirical approaches regarding the evaluation of the sustainability of frugal innovations, looking for their specific strengths, weaknesses, limitations, and hints at possible improvements of the frameworks.
Based on a detailed analysis of the four studies that evaluated the sustainability of frugal innovations gained from the literature review, a framework to evaluate the sustainability of an innovation was developed.

Investigating innovative approaches in the South African context 11 cases resembling frugal innovation were found (Bremmen, 2014; Innovation Prize for Africa, 2017; SEED, 2017a). Four cases were selected based on their theoretical fit, the availability of sufficient secondary data, and the access to the managers of the innovation projects to generate original primary data. A purposive sampling technique (Teddlie & Yu, 2007) was used because the number of cases documented, available, and accessible did not provide a sufficient basis for valid traditional probabilistic statistical inference (Godambe, 1982). Not using a randomized sampling technique, the results do not contribute much to external validity, but they can provide valid insights about the sustainability of the assessed cases as representations of frugal innovation activities in South Africa. This internal validity can provide insights that contribute to the theory (in this case of frugal innovation), to the understanding of frugal innovation in South Africa and if repeated in other nations they would be valid over a greater realm (Bernard, 2002).

The cases were investigated in a multi-case-study (Yin, 2014). With the founder of every considered frugal innovation a topic guided qualitative interview via Skype or a questionnaire with open-ended questions was conducted (Patton, 2002). Two interviews were guided within another research project, however, fitting parts were extracted and enhanced with further information (Albert et al., 2020). The interviews consider mainly the understanding of frugal innovations, the personal motivation of developing the innovation, impacts on sustainability as well as South African context conditions. To triangulate (Denzin, 2006) the findings, collected secondary data from the official web presences of the considered frugal innovation projects, as well as articles and case studies on them, were gathered. The framework was tested on other
frugal cases before and gone through three review and revision cycles that increased the reliability and improved the wording and procedure of the framework. The assessments of the cases presented in this article were tested and retested by the authors and rated by German as well as South African scholars from different disciplines.

4.1.4 Developing an evaluation framework

A framework for the assessment of the sustainability of innovations needs to factor in the various aspects of sustainability. The three dimensions of social, economic, and ecological sustainability alone are multidisciplinary requiring a holistic approach (Sala et al., 2015). Therefore, as a starting point for the evaluation of sustainability, we first analyzed and compared papers that focused on the evaluation of the sustainability of frugal innovations.

Comparison of four approaches

Researching the specific conjunction between frugal innovations and sustainability evaluation four scientific papers were found. Even though their approaches vary they all include social, economic, and ecological aspects to a certain extent. Levänen et al. (2016), as well as Pansera and Sarkar (2016), imply the SDGs in their method of evaluation. Table 4 illustrates the approaches of the considered papers.

<table>
<thead>
<tr>
<th>Survey/Author</th>
<th>Methods of evaluating sustainability</th>
<th>Findings regarding sustainability</th>
<th>Interpretation and implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate and Grassroot Frugal Innovation: A Comparison of Top-Down and Bottom-Up Strategies (Wohlfahrt et al., 2016)</td>
<td>Assessing economic, environmental, and social dimensions</td>
<td>Especially corporate innovators focus on economic sustainability and want to achieve high profitability Environmental sustainability seems to be a side-effect</td>
<td>Statements concerning economic, social and ecological aspects seem not to be sufficiently detailed.</td>
</tr>
<tr>
<td>Implications of Frugal Innovations on Sustainable Development: Evaluating Water and Energy Innovations (Levänen et al., 2016)</td>
<td>Regarding economic, ecological, and social aspects Consideration of SDGs Set of nine adapted indicators drawn from SDGs for evaluation</td>
<td>Cases are more efficient regarding energy production or water purification than existing solutions and are more climate neutral Socially-oriented entrepreneurs have a stronger focus on sustainability</td>
<td>SDGs are very detailed but had to be adjusted to use them to assess water and energy innovations.</td>
</tr>
<tr>
<td>Crafting Sustainable Development Solutions: Frugal Innovations of Grassroots Entrepreneurs (Pansera &amp; Sakar, 2016)</td>
<td>Consideration of SDGs for every case</td>
<td>Innovations reduce costs of production, enhance productivity and increase incomes Environmental impact evaluated as low More energy and material efficient solutions</td>
<td>SDGs are very detailed. However, it was not possible to evaluate every SDG for every case example.</td>
</tr>
<tr>
<td>Business models for sustainable innovation—an empirical analysis of frugal products and services (Rosca et al., 2016)</td>
<td>Regarding triple bottom line as the basis for evaluating sustainability impacts Considering sustainable business model archetypes (according to Bocken, Short, Rana, &amp; Evans, 2014)</td>
<td>Significant social impact Entrepreneurs and MNC create economic, ecological and social value Local manufacturing important for sustainability</td>
<td>Categorization of social, economic and ecological dimension provided a good outline but no details.</td>
</tr>
</tbody>
</table>

Table 4. Comparison of different surveys evaluating sustainability
The table shows that there is no standardized approach to evaluate sustainability. The articles even point out that it is a challenge to evaluate sustainability with a consistent method matching various examples. Looking at economic, ecological, and social circumstances seems to scratch the surface only. Contrarily, considering all 17 SDGs is precise but the presented cases do not cover each goal. For instance, for one of the cases by Pansera and Sakar (2016), which is about a machine producing affordable sanitary pads, only seven SDGs can be considered properly. Levänen et al. (2016) evaluated sustainability by deriving questions from the SDGs fitting their examples, but these questions can hardly be adapted to other cases of frugal innovations. An approach is needed that is compatible with the various kinds of innovation.

Since the SDGs comprise social, economic, and ecological aspects and moreover try to interrelate them (Le Blanc, 2015), they are the most advanced as well as internationally recognized attempt of a holistic approach to sustainability. Therefore, the evaluation framework was created based on the SDGs in their entirety to allow a holistic assessment of their sustainability (when used ex-post) or potential sustainability (when used ex-ante or concomitant). To keep the complexity and holistic nature of the SDGs and at the same time make the framework accessible for the users and raters, it was split into three steps, inspired by the analytic hierarchy process (Saaty, 1982; 1994). Going from a general assessment of the sustainability innovation in step I to an assessment of the fostered dimensions of sustainability in step II. In addition, these dimensions are linked to specific features of the innovation in this step, followed by step III, an assessment of the impact of these features on specific aspects of sustainability that were derived from the SDGs.

**Step I**

The first step intends to consider all SDGs to meet the goal of a holistic approach. Previous approaches (e.g., Levänen et al. 2016; Pansera & Sakar, 2016) showed that the operationalization has been quite difficult because not every single SDG can be applied to every kind of innovation. Therefore, the authors propose to consider all 17 SDGs from the viewpoint
of being not infringed, providing a clear and comprehensible approach that is usable for various innovations. To assess the infringement, each target was transformed and formulated in the opposite way as shown in Table 5. This makes it possible to decide with a Yes or No whether the target has been violated.

![Case example frugal innovation](image)

*FI: Frugal Innovation

Table 5. Evaluating sustainability (step I)

The intention of step I is to exclude frugal innovations harming the SDGs. As soon as one of the statements is answered with Yes, the innovation cannot be assessed as sustainable. As a result, innovations using resources inefficiently or noxiously can be sorted out immediately and regarded as non-sustainable innovations, e.g., from the perspective of a sustainability scholar. Or the specific drawback has to be exposed and improved or at least counterbalanced further, e.g., from the perspective of an innovation project manager. Notes shall be filled in to explain the decision and the reason behind it. The innovations got to be evaluated in comparison with existing solutions or production patterns.

**Step II**

The second step intends to check the impact on sustainability more detailed. Looking at the SDGs it is difficult to differentiate selectively between the three distinct dimensions (social,
ecological, and economic). For instance, SDG 2: end hunger, achieve food security and improved nutrition and promote sustainable agriculture can be seen from different perspectives. The main target could be improving social circumstances. However, sustainable agriculture concerns besides the ecological also the economic dimension. To overcome the issue of various perspectives that are comprised in all SDGs eight answer categories were specified: Social; economic; ecological; social & economic; social & ecological; economic & ecological; social; economic & ecological; and the option to answer with neutral. The rater can choose the answer neutral if he estimates that the SDG was not infringed in step I but does not perceive a positive impact on any of the three dimensions of sustainability. The notes and explanations from the first step facilitate the judgment in the second step. The rater also specifies which features of the innovation are the reason for the positive influence on sustainability.

Step II intends to assess qualitatively how the innovation contributes positively to sustainability. Therefore, the SDGs are evaluated in their original form. The second step enables to draw conclusions, for instance on which dimension of sustainability the specific case is or is expected to contribute most. It also exposes how many SDGs have been left neutral meaning that they are not infringed, but the specific case does not or is expected to not contribute to these goals in a positive way.

**Step III**
After gaining insights regarding the actual or expected impact on the three dimensions of sustainability in general, in step III the impact of the identified features on specific aspects of sustainability is assessed, focusing on direct effects and improvements compared to the status quo. As stated before these aspects of sustainability were derived from the SDGs. Redundant aspects were combined to reduce their number and keep the assessment manageable. Table 6 shows the final aspects of step III.
4.1.5 Limitations

Each step was developed based on the SDGs to keep them as a key factor in evaluating sustainability. Several drawbacks of the goals regarding comprehension and usability were recognized. Some SDGs contain the term sustainable or sustainability itself. This hampers the development of more consistency in understanding the SDGs and sustainability because it does not contribute to more clarity regarding the concept of sustainability. Most of the SDGs comprise more than one dimension of sustainability which impedes their usability in praxis. Depending on the context, the intention of the potential sustainable solution and the comparison to conventional ideas can lead to different perspectives and interpretations of single SDGs thereby. Furthermore, there is no hint regarding which level of contribution the SDGs tackle. Depending on the decision whether individual, group/community, societal, or even national levels are addressed the interpretations are diverse.

By regarding aspects of sustainability derived from the SDGs a more detailed assessment can be achieved. The close connection to the SDGs ensures their consideration as best as possible, however, it does not guarantee that all possible aspects of sustainability are considered. To evaluate the degree of sustainability and the possible impact further, additional elements could be added to the framework, like an assessment of the ecological footprint.

4.1.6 Introducing the frugal cases

To develop and test the usability of the framework a multiple case study was conducted, and the four investigated cases of South African frugal innovation were evaluated: Moladi building systems, 5 Star Stoves, Mellowcabs, and SavvyLoo.
Hennie Botes founded the Moladi building system in 1986 (Moladi, 2016; Botes, 2017). The system works with plastic forms and a special mortar-mix, called MoladiCHEM. The plastic panels are clipped together, their cavities are fitted with steel reinforcements and the mortar is filled in. Once the walls are dry, the plastic forms are removed and can be used again. There are no restrictions concerning the size or type of the constructed buildings (Coetzer, 2010).

5 Star Stove is based in Cape Town and creates a local bio-energy supply chain. The enterprise buys waste biomass from regional harvesters at a fixed price and presses it into pellets. The pellets are sold to stove users facilitated by a local payment provider. The stoves are assembled in the community and distributed locally by a franchise model (SEED, 2017b).

Mellowcabs are three-wheeled electric vehicles designed for transportation in urban areas. According to founder Neil du Preez (2017), 80% of urban taxi rides are less than four kilometers. Mellowcabs aims to provide an affordable, safe, and environmentally friendly solution for short distance rides with the intention to improve mobility (Court, 2015; Du Preez, 2017).

SavvyLoo is a pilot model of a waterless sanitation system for rural areas and temporary settlements founded by Dr. Dudley Jackson. The desiccating toilet provides an alternative to waterborne or chemical toilets or pit latrines. Furthermore, the system works with a conical disc separating liquids from solids and organic waste is dried to biomass (Jackson, 2017; SEED, n.d.)

4.1.7 Findings

Regarding step I of the sustainability evaluation system none of the cases infringes any of the SDGs. As seen in Table 7, step II revealed that all four cases have or are expected to have a positive impact on social, economic, and ecological sustainability.
Table 7. Sustainability impacts

All cases intend to improve social circumstances by providing solutions for housing, cooking, transport, and sanitation. They consider ecological issues to develop sustainable products and processes like emission-free transport or desiccating sanitation. All of them integrate people locally as employees or franchisees into their value chain or strive to do so.

The extent to which the cases contribute positively to sustainability varies. As can be seen in the figures 3a to 3d, about half of the SDGs were left on neutral, meaning that these goals were not infringed but there is no positive impact of the innovation associated with specific SDGs. Especially for Mellowcabs, it seems that the innovation only has a small positive impact on sustainability compared to other cases. Looking at Mellowcabs and SavvyLoo it gets obvious that the ecological and social influences are the most important ones, economic aspects fade into the background. Contrarily, Moladi building systems and 5 Star Stoves seem to develop a more holistic solution when it comes to sustainability. They tackle social, ecological as well as economic aspects. Ecological sustainability is the most important aspect of 5 Star Stoves as well in comparison to the other cases as in comparison to the other dimensions of sustainability for the innovation itself. Overall, social sustainability has shown to be the most distinctive dimension for the evaluated cases, but only by a small margin (as illustrated in Figure 3).
The results do not allow an interpretation regarding which single aspects of sustainable development drive the three dimensions. E.g., Moladi building systems and 5 Star Stoves contribute to social sustainability to the same extent (as illustrated in Figure 4).

This does not mean that it is about the same kind of social sustainability that is fostered. Therefore, in step III the cases are analyzed in depth regarding their contribution to single aspects of sustainability. This enables a more differentiated consideration which aspects of
sustainability are fulfilled for each case and a more profound comparison between the cases (see Table 8).

<table>
<thead>
<tr>
<th>Aspects of sustainability met by the evaluated cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moladi building systems</td>
</tr>
<tr>
<td>Wealth</td>
</tr>
<tr>
<td>Health</td>
</tr>
<tr>
<td>Working opportunities</td>
</tr>
<tr>
<td>Sustainable use of resources</td>
</tr>
<tr>
<td>Sustainable industry patterns</td>
</tr>
<tr>
<td>Economic growth</td>
</tr>
<tr>
<td>Inclusion</td>
</tr>
</tbody>
</table>

*Table 8. Results of step III for all four cases*

As shown in Table 8 all the assessed cases contribute positively to wealth, health, working opportunities and sustainable use of resources.

4.1.8 Discussion

The regarded cases strongly support the view that frugal innovations are sustainable or at least more sustainable than conventional solutions. Examining whether SDGs are infringed resulted in about half of the goals being considered neutral in terms of influencing sustainability, meaning even though not infringed they are also not fostered by the cases. This supports the idea that it is challenging to evaluate every single SDG, however, to assess whether they infringe any of the SDGs in the first step has proven to be suitable. Step II intends to evaluate social, economic, and ecological aspects of sustainability in more detail. For the evaluated frugal innovations, the greatest impact is on the social dimension. This goes in line with the results of Khan (2016) and Rosca et al. (2017) who emphasized the importance of frugal innovations for social sustainability. Ecological aspects are important as well, especially for 5 Star Stoves and SavvyLoo. The cases tackle economic aspects to a smaller extent. Having analyzed the cases in more detail in step III it became conspicuous that all four innovations foster wealth, health, working opportunities, and sustainable use of resources. Rosca et al. (2017) also stressed that frugal innovations often intend to improve wellbeing and health.
The design and approach of all four innovations showed that they consider specific challenges of the South African context. They implement solutions that are affordable for underprivileged parts of the society, try to improve the employment situation, enhance equality, and address ecological issues. A frugal design seems to be the proper way to implement an appropriate solution thereby. The innovations fulfill the requirements for sustainability of the DEA to some extent. All cases intend to use natural resources efficiently and promote more sustainable communities by improving living conditions in an ecologically friendly way. By using solar energy and turning waste into biofuel Mellowcabs and 5 Star Stoves contribute to the objective of a green economy and have an indirect impact on combating climate change. SavvyLoo has that as well by turning waste into biomass. These results emphasize that the focus of the DEA is on ecological aspects. The South African context displays the importance of social enhancement and economic development.

4.1.9 Conclusion

All four cases foster the social, economic, and ecological dimensions of sustainability and specific aspects of sustainability are addressed by all four cases. The aspects of wealth, health, working opportunities, and sustainable use of resources tackle challenges of the South African context leading to the conclusion that frugal innovation can be a worthwhile approach to address the country's problems. Interestingly, except for ecological aspects like the sustainable use of resources, these are not the sustainability objectives formulated by the country itself. Due to this, future research might attempt to ascertain why there is a gap between the sustainability understanding of the country and the sustainability features of the innovations tackling above all social challenges. According to the DEA, by focusing on ecological aspects they intend to foster growth and ensure social enhancement also. It remains unclear if it is enough to address social and economic aspects in a more indirect way through environmental-friendly approaches.
The introduced framework was appropriate to evaluate the sustainability of the cases. It tries to overcome the drawbacks, displayed in the mentioned previous published studies that utilized the SDGs, keeping their holistic nature regarding the representation of sustainability. Its flexibility also suggests that the framework could be used in a practical context, e.g., by founders or companies wishing to evaluate the sustainability of their innovation and products. The framework enables to evaluate sustainability at different levels of detail. Incorporating even more raters with diverse geographical and cultural backgrounds in future research would create the opportunity to analyze the understanding of sustainability and the SDGs by focusing on their statements in the three steps. This can help to improve the understanding of sustainability. Additional research should also concentrate on further contexts like countries or regions. For instance, evaluating distinctions and similarities between developing and developed countries would contribute to understanding the differing shapes and interpretations of sustainability. Long-term studies monitoring frugal ventures could provide deeper insights regarding how the coming into being, development, and growth of a frugal innovation influences its sustainability. The introduced evaluation framework to assess sustainability can be used to do so.
4.2 Publication 2: How Frugal Innovation and Inclusive Business Are Linked to Tackle Low-income Markets

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Abstract

Frugal innovations purportedly address unmet consumer needs. Inclusive business includes consumers as employees and business owners in the value chain, especially to address challenges in Bottom of the Pyramid contexts. Recent literature has illustrated increasing numbers of cases in which frugal innovations have been implemented based on inclusive business structures. This paper explores how frugal innovation affect the design of inclusive business by analyzing 11 frugal cases implemented in the African context. We derive an Inclusive Business Link Model for Frugal Innovation and propose that frugal innovations with modular features support a deep level of inclusive business integration.

4.2.1 Introduction

Within the next 15 years, the world’s population is estimated to increase by more than one billion people. More than half of this growth is expected to occur in Africa; the continent has the highest rate of population growth (UN, 2017). Evidently, this illustrates Africa’s potential to develop into a mass market for consumer products. However, to benefit from the growing
market opportunities, enterprises must tackle poorer consumer groups as well. With 43% of its population living on $1.9 per day in 2012, Africa has a significant amount of people who suffer under poverty (Beegle et al., 2016) and belong to the so-called BoP (Karnani, 2006; Prahalad & Hart, 2002). These low-income groups have unmet needs and cannot afford conventional solutions, and they, therefore, characterize a vast market niche for many enterprises. To achieve lower prices and address the BoP, several companies have adapted their products and business models; however, many strategies have failed (Simanis & Hart, 2008). According to Christensen et al. (2017), notwithstanding the assumed enormous market opportunities in Africa, multinational players have begun to leave the continent, and investment has decreased. Seemingly, these firms could not cope with ongoing challenges such as unstable economic growth, infrastructural issues, and skills shortage. Nevertheless, the growing African population fosters the question of how companies can benefit from the potential of the mass market at the BoP and possibly help reduce the poverty problem.

To address the BoP, Prahalad (2010) introduced 12 principles of innovation in 2005. Among others, he demanded not only lower prices but a new price-performance ratio to serve poorer population groups. Prahalad noted that the simple adaptation of Western products would not be enough because functionality requirements and context conditions must be considered comprehensively. These requirements resemble the key characteristics that frugal innovations display in their development and features, which is one reason why they are associated with the BoP and why Prahalad is commonly referenced in frugal literature (Albert, 2019; Khan, 2016; Soni & Krishnan, 2014; Tiwari & Herstatt, 2014). Amongst other characteristics, frugal innovations achieve significant cost improvements and therefore address consumers who cannot afford conventional solutions. They are designed in regards to requirements of the specific customers and infrastructural conditions (Tiwari & Herstatt, 2012) and often focus on the BoP as a target market (Brem & Wolfram, 2014). So far, frugal innovations have mainly
been researched in India and China (Hossain, 2017; Rao, 2013), which leaves other emerging regions and their specific contexts as subjects for research. Moreover, the literature recommends to research frugal innovations in the African context more broadly (Hossain, 2017; Knorringa et al., 2016). Especially in Africa, companies struggle to enter markets (Christensen et al., 2017).

Next to offering innovative product solutions, Simanis and Hart (2008) highlight that the BoP should be empowered as business partners and co-investors to engage successfully in the BoP context. In addition, Christensen et al. (2017) have illustrated that “pull” strategies address poor target markets more successfully by developing appropriate business models and creating employment and necessary infrastructure. The engagement of the poorer consumer groups as consumers, producers, and entrepreneurs is known as inclusive business (UNDP, 2008).

The approach of frugal innovation better pursues customer requirements by addressing unmet needs, improving customers’ situation, and providing possibilities for companies to enter new markets. Inclusive business follows the idea of including disadvantaged people in value chains to ideally lead to more self-sufficiency and economic growth. That is why, both ideas, frugal innovation, and inclusive business, include more awareness of these market contexts (CFIA, n.d.; UNDP, 2013). Furthermore, experts demand more research into the ecosystem and the diffusion and commercialization of frugal innovation (Pisoni et al., 2018). Considering both frugal innovation and inclusive business and their increasing relevance for African markets, the question arises as to whether and how empirical evidence can be identified that supports this assumed symbiotic connection between the two concepts. Reflecting existing literature, some papers considered frugal innovation cases that contributed to inclusive business (Arnold, 2017; Hossain, 2020; Khan, 2016; Knorringa et al., 2016; Levänen et al., 2016; Pansera, 2014; Rosca et al., 2017). However, the cases do not investigate the connection between both concepts in detail. To investigate this interrelation, there must be the intention to examine whether there are
reoccurring patterns and interdependencies when both concepts converge. Therefore, this study analyses 11 frugal innovations that have been established in the African context and identifies inclusive business approaches, with the question of how frugal innovations affect the design of inclusive business in low-income markets.

Our study contributes to research by enhancing the understandings of the approaches, their designs, and possible impacts regarding the interrelations of both concepts. Moreover, we expand the existing research by proposing two models: A first model that illustrates the depth and variety of inclusive business integration with an inclusive business integration stair model. And a second one that incorporates frugal innovation features and how they address typical contextual challenges when combined with the different levels of inclusive business integration. At the same time, we broaden the literature on the social sustainability of frugal innovation and identify another characteristic of frugal innovation, modularity, that is proposed to be beneficial to achieve a deep inclusive business integration. Thus, we also contribute to creating a greater awareness of inclusive business structures and theorize their potential for Western and local companies to implement frugal solutions. In practice, our results could be useful as management options for various organizations that want to address low-income markets, as they could design their business models for their frugal innovations based on our inclusive business integration stair model and consider our Inclusiveness Business Link Model for Frugal Innovation (IBLMFI).

This paper is structured as follows. First, the relevant literature is reviewed, focusing on frugal innovation and inclusive business. Subsequently, we illustrate the methodological approach, and the presentation of the results follows. The subsequent cross-case comparison emphasizes the main results and draws theoretical derivations. Finally, implications and future research are presented.
4.2.2 Literature review

Defining frugal innovation

Frugal innovation itself is a wide approach comprising diverse definitions, features, and various terms used as synonyms (Hossain, 2017; Pisoni et al., 2018). For instance, Tiwari and Herstatt (2014) defined frugal innovations as new or significantly improved products, services, processes, or methods that are affordable and provide an adequate quality level. Another perspective is the view of Soni and Krishnan (2014), who presented the assumption that frugal innovation includes a frugal mindset, a frugal process, and frugal outcomes.

Illustrating the development of the definition of frugal innovation in the meantime, Pisoni et al. (2018) created a timeline showing the development of frugal innovation concepts. It starts with product-oriented definitions presenting product-based features. For instance, when Rao (2013) elaborates on features of frugal innovation products, he defines frugal innovations as low-cost, having a compact and functional design, made with reused materials, and characterized by the use of limited raw materials, and the use of modern technology. Tiwari and Herstatt (2012) also formulated a product-oriented definition. They define frugal innovations as solutions intending to reduce the total cost of ownership while simultaneously achieving acceptable standards of quality. Therefore, according to Tiwari and Herstatt, frugal innovations aim to reduce the use of resources in the whole value chain.

Brem and Wolfram (2014) distinguished between the different kinds of innovations in emerging markets. They conducted a systematic literature review to define and compare the approaches of nine innovation types, including frugal innovation. The authors summarized that frugal innovations are product orientated and aim to reduce costs by using frugal methods. Regarding sustainability, frugal solutions partially address ecological concerns. Furthermore, they emphasized that the focus of frugal innovation is the BoP consumer as a target market. This is why Pisoni et al. (2018) perceived their definition as belonging to the next level of market-orientation definitions.
The third group of definitions sets up criteria to define and distinguish frugal innovation in greater detail, for instance the definition by Weyrauch and Herstatt (2017). They conducted a systematic literature review and interviewed 45 experts to determine criteria that innovation should meet to be frugal. The authors’ concluded that frugal innovations mainly comprise the achievement of substantial cost reductions, concentration on core functionalities, and optimized performance level. Substantial cost reduction means that the innovations have low purchase prices or low costs of ownership from a customer’s perspective, while the concentration on core functionalities means that the innovations focus on essentials, are user-friendly, and minimize the use of resources. The performance level has to match the purpose of innovation, meaning that the innovation can be either higher or lower than the performance levels of previous solutions. While keeping costs low, the innovation should be of as high quality as possible and fulfill its purpose (Weyrauch & Herstatt, 2017).

Von Janda et al. (2020) developed a conceptualization and operationalization of product frugality and summed up four dimensions for frugal products: cost of consumption, sustainability, simplicity, and basic quality. Despite their holistic approach and perspective, we favor the definition of Weyrauch and Herstatt (2017), which dispenses with the characteristic of sustainability. Von Janda et al. (2020) see sustainability as inherent in frugal innovation; however, other authors view sustainability rather as a possibility or side-effect (Hossain, 2020; Rosca et al., 2016; Weyrauch & Herstatt, 2017) or point out that ecological impacts are not exactly clear when reviewing the literature (Albert, 2019). For this reason, we will define innovation as frugal without the explicit reference to sustainability if the following characteristics are given: substantial cost reduction, concentration on core functionalities, and optimized performance level (Weyrauch & Herstatt 2017). Nevertheless, as the literature shows a contribution to sustainability when frugal innovations implement inclusive business (Arnold,
2017; Dressler & Bucher, 2018; Khan, 2016; Levänen et al., 2016), we will contribute to examining these relationships in more detail.

Frugal innovation can be developed locally as smaller initiatives (mainly called grassroots initiatives), by small and medium enterprises (SME) or MNEs. So far, there seems to be a stronger focus on MNEs as frugal innovators in the literature, as it is an opportunity for them to enter new and often low-income markets. Knowledge and technology transfer plays an important role thereby (Pisoni et al., 2018). For instance, frugal innovations by MNEs can succeed with their high-tech and sophisticated nature. Whereas grassroots initiatives appear to be rather low-tech and naïve and tend to solve problems with locally available resources, their approaches differ from conventional Western methods (Hossain, 2018; 2020; Pisoni et al., 2018).

Overall, it becomes clear that frugal innovations require new forms of business models and collaborations. Existing models are unsuitable to really understand frugal innovation (Hossain 2018), and SMEs are considered rarely. This investigation aims to further illuminate and illustrate a business approach that considers various organizational types and seems to be fruitful when connected to frugal innovation: Inclusive business.

_Inclusive business_

According to the UNDP (2004; 2008), unleashing the capacity of local entrepreneurship, employment, and economic wealth will improve the situations in developing countries. Inclusive business contributes to economic development in less privileged regions. It is not, however, considered charity; it provides the poor with an opportunity to fulfill basic needs, gain income, and benefit from economic growth based on their own labor (UNDP, 2013). Therefore, the term “inclusive business” is defined as follows:

_Inclusive business models include the poor on the demand side as clients and customers, and on the supply side as employees, producers, and business owners at various points in the_
value chain. They build bridges between business and the poor for mutual benefit. (UNDP 2008, p. 2)

By defining the approach of inclusive business and illustrating the concept with various case studies, the UNDP contributed to the perception of poor population groups as a driving force for economic growth. To address this target group adequately, it should be considered as a source of employment and entrepreneurial activities. Engaging disadvantaged people within a market is a critical step in alleviating poverty. On the one hand, the people are the consumers, and on the other hand, many are integrated into the value chain as employees or self-employed persons. The benefits of inclusive business models are not only about profits and income; they are also about building markets and supply chains as well as encouraging productivity and empowerment. For instance, companies can take advantage of local knowledge by addressing their target group more appropriately (UNDP, 2008).

In its report, the UNDP (2008) presents many case studies addressing the shortcomings of basic services such as the food and water supply, health care, and sanitation. Most cases illustrate how MNEs enter low-income markets, and some cases also describe non-profit organizations or cooperation with non-profit organizations. They all have in common that they strive for profit and social effectiveness, but also for financial sustainability and scaling potential. Even non-profit organizations intend to achieve self-sustainability, as this is their way of increasing their reach and impact. Mostly, when MNEs are considered, their primary intention is to enter new markets. When exploiting new markets, especially low-income ones, innovators should also consider that it is not just a matter of distributing a single product or service. In most cases, they need to analyze what the problem of the potential market is and what it really needs before building a new market around those needs (UNDP, 2008). Some solutions are then sold in the developed markets, leading to reverse innovations (Von Zedtwitz et al., 2015). Also, building stakeholder relationships plays an important role (Schrader et al., 2012) and can be a basis for
the design of the value chain and to learn to know the customer and his needs (Schuster & Holtbrügge, 2014).

In 2013, the Initiative for Growing Inclusive Markets published a report focusing on Africa. Therein, they analyzed 43 cases with the intention to illustrate how inclusive business cope with challenges in the African context and to offer recommendations on how to build a supportive ecosystem. The report focused on four main issues: information, incentives, investment, and implementation support (UNDP, 2013). In the African context, market data is often absent, and there is a lack of expertise in regard to how inclusive business can best be implemented. The costs of founding a business are high and lacking regulations worsen the circumstances. Poor social and environmental circumstances also have a negative impact. The continent is meeting its limit of ecological resilience (African Development Bank, 2015). Hossain (2018) emphasized that environmental aspects such as resource scarcity, weak institutions, and underdeveloped infrastructure can prove to be both obstacles or success factors of frugal innovation. This is why Africa is assumed to be a suitable research context for this investigation, regarding frugal innovations that are perceived as an opportunity to tackle pressing needs and intending to examine how innovators address challenges by implementing inclusive business approaches.

**Literature regarding frugal innovation and inclusive business**

In literature, frugal innovation is associated with inclusive innovation frequently (Basu et al., 2013; Bhatti, 2012; Knorringa et al., 2016; Tiwari & Herstatt, 2014), but inclusiveness itself is a broad approach that involves more than inclusive business. According to Heeks et al. (2013), when defining inclusive innovation, two aspects should be considered. The first is the question of which excluded group is the focus of the intended innovation, and the second question asks how this excluded group can become included. Inclusive business approaches resemble the authors understanding of involving underprivileged groups in the development of innovation, whereas various steps of the value chain are feasible. Regarding frugal innovations, Heeks et
al. (2014) indicated that frugal innovations have more of a focus on product and process than on the consumer, and thus they perceived inclusiveness as a by-product of frugal innovations. Furthermore, inclusive innovation does not refer to the means by which “the development and implementation of new ideas which aspire to create opportunities that enhance social and economic wellbeing for disenfranchised members of society” (George et al., 2012, p. 663) is to be achieved. Thus, inclusive innovation can be frugal but does not have to.

Then again, research on frugal innovations has highlighted that frugal solutions are more than customized solutions. Research on the links between frugal innovations and inclusive business mentions, in particular, the creation of employment opportunities as one aspect of the social sustainability of frugal innovations. For instance, Arnold (2017); Dressler and Bucher (2018); Khan (2016); Levänen et al. (2016); and Rosca et al. (2016) examined relationships between frugal innovations and sustainability by analyzing various case examples. All authors illustrated cases that contributed to employment and increased income. Rosca et al. (2016) also analyzed how business models were shaped. The authors suggested that value chain activities include local sourcing, local production, and local distribution systems.

Especially from the viewpoint of social sustainability, frugal innovation has an important role (Albert, 2019; Dressler & Bucher, 2018), but the focus is more on improving social conditions by satisfying basic needs (Khan, 2016; Pansera & Sarkar, 2016). To our best knowledge, the aspect of better living conditions through employment opportunities is recognized and mentioned, but not investigated in greater detail.

Arnold (2017) concluded that the early involvement of people at the BoP positively affects market entry of frugal innovation, as it contributes to social change and weakens social exclusion. The inclusion of the poor in the formal economy and the perception of them not only as consumers but also as producers and suppliers leads to socioeconomic development and provides sources of income (Kahle et al., 2013). Simultaneously, it should be considered that
the positive effect is not only social change in terms of income but also investing in stronger social ties. Especially in low-income contexts or regions with strong cultural ties, as in the African context, the importance of social capital and social embeddedness should not be underestimated. Social interactions provide access to various resources such as money, pieces of advice, and information (Arnold, 2017; Dana et al., 2020; Masiello & Izzo, 2019; Pels & Sheth, 2017).

Regarding impacts on inclusiveness and inclusive business development, Knorringa et al. (2016) summarized that advocates assume the occurrence of synergy effects caused by frugal innovations for companies and low-income population groups, whereas critics can imagine that frugal innovations contribute to labor exploitation and growing income inequality. They concluded that more empirical research is necessary to investigate the true effects of frugal innovations on underprivileged people, especially in Africa and Latin America.

As Hossain emphasized (2017; 2018), we need to rethink existing business models when it comes to frugal innovation. Inter alia, to reach their target group, the frugal innovators are recommended to create partnerships and entrepreneurial ecosystems (Banerjee & Leimer, 2012). Researching inclusive business, an ecosystem was also demanded by Pels and Sheth (2017) as well as Reficco and Márquez (2012), who analyzed nine inclusive networks operating at the BoP. The authors noted that innovators should live in their target groups' environment to jointly develop a business model based on long-term relationships, education, empowerment, and skill transfer. We, therefore, believe that such an ecosystem could also be valuable for both frugal innovation and inclusive business, or a combination of both.

To sum up, within the existing literature, intersections between frugal innovations and inclusive businesses are recognized already. However, a detailed investigation of this relationship of both concepts is still missing. Our research poses the question of whether and how frugal innovations are only a by-product regarding inclusiveness (Heeks et al., 2014). Or, conversely, whether
inclusive business is just one of the recognized social effects of frugal innovation (Kahn, 2016; Pansera & Sarkar, 2016).

Considering the prerequisites and success factors when entering low-income markets, there seem to be overlapping factors in both concepts, such as to build cooperation (Golja & Požega, 2012; Rosca et al., 2017; Schrader et al., 2012; Schuster & Holtbrügge, 2014), ecosystems (Banerjee & Leimer, 2012; Pels & Sheth, 2017; Reficco & Márquez, 2012), and knowledge transfer (Pisoni et al., 2018; Reficco & Márquez, 2012). That is why we believe that including frugal innovation can be beneficial to renew business approaches as inclusive ones. Moreover, institutional and infrastructural challenges may prove to be a driver for successful frugal innovation (Hossain, 2018), as they are a common problem in the context of inclusive business and low-income markets (Reinhardt et al., 2018; UNDP, 2008; 2013). We intend to investigate whether there are recurring reasons, patterns, and interdependencies when both concepts converge.

4.2.3 Methods

Research approach and sampling

We followed the case study research strategy suggested by Eisenhardt (1989) and Yin (2009). The case study research strategy is especially suitable where the boundaries between the research object and its context are not clearly evident and can, therefore, not be predefined ex-ante (Yin, 2009). In order to apply an appropriate research method, we employ a multiple case study approach. In addition, the use of multiple case studies allows for stronger robustness and analytical generalization than evidence from single case studies (Gibbert et al., 2008). In addition, this method is particularly suitable for answering questions on ‘how’ and ‘why’ events occur in a rather unexplored research field (Eisenhardt & Graebner, 2007), as is the case for the interaction between frugal innovation and inclusive business research. Such a knowledge base favors an explorative study for theory building and deriving first hypotheses for further
research. The present study, however, is not solely explorative, but also applies ‘explanation building’ techniques to find possible explanations for causal forces. Case studies offer the necessary proximity to theoretical concepts and data needed to interpret findings (Yin, 2009). In order to address our research question and to identify appropriate case studies, we set up the following criteria for a purposive (theoretical driven) sampling (Patton, 2002; Teddlie & Yu, 2007):

- **Focus on B2C innovation with Africa as at least one target region**, as we intended to focus on a region where inclusive business took place (UNDP, 2013) and which appeared attractive as a research context for frugal innovation (Knorringa et al., 2016).

- **Criteria of frugality presented by Weyrauch and Herstatt (2017) fulfilled**, since these three criteria are based on a systematic literature review and seem to capture the characteristics well.

- **The innovation is operationally active**, with the intention of including examples that are operationally active in the market and, for example, excluding pure research projects.

- We included all innovators, no matter if it was an MNE, SME, or grassroot initiative with the intention of not limiting our research to certain types of organizations, as previously seemed to be the case (Pisoni et al., 2018).

To acquire useful empirical data and identify suitable case studies of frugal innovation, we searched a databank, including 223 examples of frugal innovation collected and provided by the University of St. Gallen.

The final sample included 66 frugal innovations in the African context. We sent e-mails to all organizations and asked whether they created employment or self-employment opportunities.

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1 While presenting the results, the terms “entrepreneur” and “self-employed person” are not distinguished because some of the interviewees defined their local partners as entrepreneurs, while others spoke of self-employment. Regarding the kinds of inclusive business, the term “self-employed person” is used to avoid associations with
Amongst others, 12 respondents stated that they have created employment or self-employment one way or another and agreed to participate in interviews. This led to a sampling of typical cases regarding the research topics of frugal innovation and inclusive business (Patton, 2002). For the evaluation of the cases, we excluded one case because it became clear that the innovation had not been put into practice; therefore, 11 cases were to be considered in the final sample.

Data collection
We conducted problem-centric interviews with at least one representative from each participating organization. An interview guideline was developed based on initial theoretical based categories organizations’ innovation, organizational structures, and inclusive business (Patton, 2002; Witzel, 2000). Due to the geographic distance between interviewers and interviewees, 10 interviews were conducted using telephone, Skype, or WhatsApp call. One interview was completed face to face. Interviews were all recorded and subsequently transcribed (Bohnsack, 2007). We enriched and triangulated this data with a short questionnaire to each case firm and with secondary data (partly indicated by references we used in the cases study reports) from the web presence of the case study firms (altogether 21 text pages of transcripts), as well as reports, videos, articles, and case studies on their frugal innovations (altogether 72 text pages of transcripts) (Flick, 2011; Patton, 2002). Table 9 provides an overview of the cases and details on the interview data sources used for this study.
<table>
<thead>
<tr>
<th>Organization</th>
<th>Form</th>
<th>Country of origin</th>
<th>Target region in Africa</th>
<th>Interviewee</th>
<th>Duration (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Software Developer</td>
<td>Start-up</td>
<td>France</td>
<td>Algeria, Tanzania, Ivory Coast, Senegal</td>
<td>A.1: CTO A.2: Student assistant</td>
<td>31:00</td>
</tr>
<tr>
<td>B: Cooking Stove Company</td>
<td>SME</td>
<td>Kenya</td>
<td>Kenya, Ruanda &amp; Uganda</td>
<td>B: Sustainability Director</td>
<td>31:51</td>
</tr>
<tr>
<td>C: Recycling Organization</td>
<td>Non-profit</td>
<td>South Africa</td>
<td>South Africa</td>
<td>C: Director/ Project Manager</td>
<td>38:36</td>
</tr>
<tr>
<td>D: Solar Tools Developer</td>
<td>Social enterprise</td>
<td>Finland</td>
<td>Kenya, Tanzania</td>
<td>D: Executive Chairman</td>
<td>38:00</td>
</tr>
<tr>
<td>E: 3D Limbs Provider</td>
<td>Non-profit</td>
<td>USA</td>
<td>South Sudan</td>
<td>E: Media &amp; Project Coordinator</td>
<td>28:16</td>
</tr>
<tr>
<td>F: Recharge Service Provider</td>
<td>For profit, limit. liability</td>
<td>USA</td>
<td>Rwanda, Kenya, Burundi</td>
<td>F: Co-founder, CEO</td>
<td>50:37</td>
</tr>
<tr>
<td>G: Education Company</td>
<td>Non-profit</td>
<td>USA</td>
<td>Rwanda, Ethiopia</td>
<td>G: Legal Counsel</td>
<td>29:00</td>
</tr>
<tr>
<td>H: Eyeglasses Company</td>
<td>Non-profit (in Germany)</td>
<td>Germany</td>
<td>Malawi, Uganda and Burkina Faso</td>
<td>H: One of the co-founders</td>
<td>28:42</td>
</tr>
<tr>
<td>I: Biogas Plant Developer</td>
<td>AG</td>
<td>Germany</td>
<td>Kenya</td>
<td>I: Head of International Business Development Biogas</td>
<td>51:00</td>
</tr>
<tr>
<td>J: Solar Energy Provider</td>
<td>AG</td>
<td>Germany</td>
<td>Ghana, Rwanda and Somaliland</td>
<td>J: CEO</td>
<td>38:00</td>
</tr>
</tbody>
</table>

Table 9. Cases and data sources
Data analysis

First, we focus on examining and describing individual cases and then using a cross-case analysis to identify patterns over multiple cases. The case studies are mainly based on interview data, which was analyzed with a qualitative content analysis in a combination of deductive and inductive category development in a mixed procedure (Mayring, 2014, p. 104; as another example for a mixed procedure, see Albert et al., 2020). We started to analyze the interviews deductively on the basis of initial theoretical based categories that we had established based on our literature research, and then augmented them with inductive categories built from the empirical data (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Strauss, 1991; Yin, 2009). Finally, theoretical inferences were drawn based on pattern recognition from the cross-case study analysis, and a conceptual framework is proposed according to the abductive reasoning inherent in the case study research strategy for multiple case study research designs (Yin, 2009).

To analyze the data with a qualitative content analysis, we used MAXQDA (Kuckartz, 1996; Mayring, 2014). We analyzed all documents using a descriptive coding approach (Saldana, 2009). We reiterated the analysis several times until we were able to elucidate final categories that were the foundation for the interpretation, cross-case comparison, and theoretical derivations (Yin, 2009).

4.2.4 Results

An overview of the case studies is provided in Table 10, where the considered cases are briefly described regarding their frugal innovation, inclusive business approaches, and structures of the organizations.
<table>
<thead>
<tr>
<th>Case Description</th>
<th>Frugal Key Features (Following Weyrauch and Herstatt 2017)</th>
<th>Inclusive Business Approach</th>
<th>Role of Frugal Innovation</th>
<th>Aspects of the Business Model</th>
<th>Financing of the Organization</th>
<th>Cooperation/Partnerships</th>
<th>Knowledge Transfer</th>
<th>Long-Term Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Software Developer</td>
<td>Software for stable internet connection (connectivity platform) - Solution free of charge initially, internet expenditure reduced - Focus on transferring essential information - Internet access even in rural areas</td>
<td>Mainly indirect empowerment</td>
<td>Partners use frugal innovation as business base or to improve own business</td>
<td>Shared revenue approach</td>
<td>Mainly received initial investment</td>
<td>Local mobile operators</td>
<td>Unclear</td>
<td></td>
</tr>
<tr>
<td>B: Cooking Stove Company</td>
<td>Energy-efficient cooking stove - Design reduces smoke expenditure and needs less energy - Adaptation to specific local cooking traditions</td>
<td>Rather indirect empowerment</td>
<td>Customers use frugal innovation as business base or to improve own business</td>
<td>Focus on lean management and outsourcing</td>
<td>Fully self-financed by selling stoves</td>
<td>Shared workshops with other companies</td>
<td>Expertise</td>
<td>Yes</td>
</tr>
<tr>
<td>C: Recycling Organization</td>
<td>PET bottles that are filled with plastic waste can be used for construction - Low-cost construction system that recycles waste - Lego-method: PET bottle-blocks are removable &amp; reusable - High insulation value, dry, fireproof, unshakable buildings</td>
<td>Trained professionals</td>
<td>Training to work with frugal innovation</td>
<td>Depending on target region/country</td>
<td>Financing based on donations</td>
<td>Network between communities, engineers, local businesses</td>
<td>Expertise, Behavioral training</td>
<td>Yes</td>
</tr>
<tr>
<td>D: Solar Tools Developer</td>
<td>Tool to turn solar energy into heat to operate cooking devices - Affordable tool for roasting, baking &amp; dehydrating with significant efficiency improvement - No fuel needed: reduced cost &amp; health improvement</td>
<td>Self-employed persons &amp; indirect empowerment, self-sufficient</td>
<td>Assembling frugal innovation, using frugal innovation for business</td>
<td>Focusing on cooperation &amp; corporate sponsorship</td>
<td>Mainly received initial investment and revenue out of other projects</td>
<td>Partnerships to create local businesses and raise awareness</td>
<td>Expertise</td>
<td>Yes</td>
</tr>
<tr>
<td>E: 3D Limbs Provider</td>
<td>3D printed prosthetic limbs and prosthetics in a box for refugees and victims of war - Prosthetic limbs cost less than 100 $, usually donated - Easily adjustable in a couple of hours - Adapted to needs: e.g., 5 fingers or 2 fingers</td>
<td>Trained professionals</td>
<td>Producing frugal innovation without organizations ongoing support</td>
<td>Combination of for-profit and not-for-profit approach</td>
<td>Combination of donations + revenue: selling content</td>
<td>Mainly with donors</td>
<td>Expertise</td>
<td>Yes</td>
</tr>
<tr>
<td>F: Recharge Service Provider</td>
<td>Pedal generator and complementary devices to ensure energy access</td>
<td>Self-employed persons, self-sufficient</td>
<td>Operating frugal innovation</td>
<td>Donations and two-part tariff model</td>
<td>Combination of donations + revenue: selling recharge service</td>
<td>Donors and other organizations (e.g., NGOs)</td>
<td>Expertise</td>
<td>Yes</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------</td>
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<td>--------------------------------------------</td>
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</tr>
<tr>
<td>G: Education Company</td>
<td>Special education laptops for children</td>
<td>Mainly trained professionals and some employees</td>
<td>Training people to work with frugal innovation</td>
<td>Donations</td>
<td>Financing based on donations</td>
<td>Donors, local organizations and universities</td>
<td>Expertise</td>
<td>Yes</td>
</tr>
<tr>
<td>H: Eyeglasses Company</td>
<td>Affordable and locally producible eyeglasses</td>
<td>Self-employed persons and employees, self-sufficient</td>
<td>Assembling and selling frugal innovation, using frugal innovation as business base</td>
<td>Depending on target region/country</td>
<td>Combination of donations + revenue: selling glasses</td>
<td>Other organizations, government</td>
<td>Expertise</td>
<td>Yes</td>
</tr>
<tr>
<td>I: Biogas Plant Developer</td>
<td>Affordable micro biogas plant, assembled locally</td>
<td>Mainly self-employed persons, self-sufficient</td>
<td>Operating whole value chain for frugal innovation</td>
<td>Franchise approach</td>
<td>Fully self-financed: selling material to franchisees</td>
<td>Creamery industry, government</td>
<td>Expertise</td>
<td>Yes, new web presence</td>
</tr>
<tr>
<td>J: Solar Energy Provider</td>
<td>Solar powered kiosk shop to offer products and access to energy</td>
<td>Mainly self-employed persons, self-sufficient</td>
<td>Operating frugal innovation</td>
<td>Franchise approach</td>
<td>Fully self-financed: fixed percentage of kiosk operators’ profit</td>
<td>Often with large corporations</td>
<td>Expertise, business skills</td>
<td>Yes, new corporate structure</td>
</tr>
</tbody>
</table>
| K: Cooking Bag Company | Portable and non-electric slow cooker | - Cooking bags are subsidized to affordable price  
- Food cooks in its own heat after short boiling, no additional energy needed | Self-employed persons, self-sufficient | Selling frugal innovation, using frugal innovation as business base | Distribution by self-employed women | Combination of donations + revenue: selling cooking bags | Partnerships to create awareness (large corporations) & with others (e.g., to enable banking) | Business skills | Yes |

*Table 10. Comparison of inclusive business approaches, organizational structures, and the role of frugal innovations*
In contrast to the picture outlined in the preexisting literature so far, not all of our considered cases have implemented inclusive business structures in the originally defined manner above. We found more heterogeneity in the approaches how frugal innovation and inclusive business are combined: Although all of them concentrate on offering more to the target group than just product solutions, some approaches show rather indirect support for local development by indirect empowerment or training people to be professionals (illustrated in Table 10). For instance, the Software Developer operates within several cooperation that can result in numerous new employment opportunities if it is successful. However, it cannot be stated that the organization creates work opportunities from their services; it is more of an indirect contribution. The same applies to the Cooking Stove Company; the design of their ovens supports the business development of potential customers. Their self-employed manufacturers are part of their outsourcing approach. The Recycling Organization, the 3D Limbs Provider, and the Education Company have contributed to enhanced prospects for people by training them as professionals. Trainees can operate their own projects afterwards and have the possibility to earn money from this option. In other cases of frugal innovation, inclusive business approaches are fostered more directly and are more aligned with the concepts elaborated in the theoretical discourse. They, in fact, intentionally use inclusive business structures as a business approach in their target markets. In the following section we will present four cases that exemplify the heterogeneity in the approaches towards combining frugal innovation with inclusive business (see also Table 10) and at the same time start to derive an initial pattern we have identified: The 3D Limbs Provider places the main emphasis on training the target group, while the Recycling Organization extends the training approach to empower people to build something from their new expertise. The Recharge Service Provider sets up self-employment structures as the target group sells the service, and the Biogas Plant Developer
hands over the entire value chain. We elaborate in more detail on these cases in the following paragraphs:

3D Limbs Provider, level 1 of inclusive business integration

The 3D Limbs Provider intends to create accessible technology and deploy that technology for humanitarian purposes. To help refugees and victims of war, the organization started to 3D print prosthetic limbs in South Sudan. One prosthetic arm costs less than $100. However, the 3D arms were donated to people because it would have been too expensive for them to buy the prosthesis. It takes only a couple of hours to fit the arm. To print the limbs, they set up a lab in South Sudan and trained local people in 3D printing and fitting the prosthetics. Thereby, they cooperated with a doctor who trained people in an informal nursing program (Interviewee E, 2017a; 2017b; 3D Limbs Provider, 2016). The project coordinator summarized the project purpose and history as follows:

They started 3D printing arms for these kids, victims of war, with the intent to set up a lab where they could print these arms and where they could fit victims of war with these arms. And then also teach some of the locals you know how to 3D print the arms, how to fit the arms. So that when Mick left there was kind of a sustainable lab and a process that was set up that the locals could learn themselves and help their own people with. (Interviewee E, 2017a)

The 3D Limbs Provider did not pay locals for their work in the lab. The purpose of the organization was to provide knowledge-based on Confucius’ wisdom, “Give a man a fish and you feed him for a day, teach a man to fish, and you feed him for a lifetime” with the intention to enable locals to help each other even after the project is finished. The business model of the 3D Limbs Provider has a for-profit and a not-for-profit arm. The organizations foundation supports the initiatives with donations from sponsors and partners. Additionally, they sell the content they created within their projects (Interviewee E, 2017a; 2017b).
By 3D printing in South Sudan, the 3D Limbs Provider faced some challenges. There was a lack of energy, and they even started to print at night-time due to the heat. To optimize their product and approach, the organization created prosthetics in a box. The boxes contain basic plastic parts and 3D printed parts that can be easily fitted to an arm. To assemble the pieces, people on-site just need hot water, so it works without energy. People in South Sudan still support disadvantaged people by putting the arms together (Interviewee E, 2017 b).

**Recycling Organization, level 2 of inclusive business integration**

The Recycling Organization uses the Latin American innovation Ecobricks to create environmental awareness, promote recycling behavior, and empower people to start their own projects and initiatives. Ecobricks are PET bottles filled with compressed and non-recyclable plastic waste. The organization sets up community projects to construct different buildings out of the PET bottles. Therefore, they cooperate with communities and NGOs and sell them their training programs to develop Ecobricks. In South Africa, recycling is a complex challenge because of infrastructural constraints that hinder the provision of free-of-charge recycling. The organizations’ project manager explained: “There are a few different business models but the main one is you’ve developed three skills development programs where we basically sell these training programs to the governmental clients or to NGO’s or to corporates.” (Interviewee C, 2017)

Additionally, the organization offers a three-step training program to train artisans as well. They intend to equip them with skills and enable them to create their own projects. The training programs create opportunities to become self-employed as micro-builders with Ecobricks. Nevertheless, a potential graduate has to have some entrepreneurial spirit and be proactive to make money from it, such as by acquiring governmental projects. Municipal approval and generating funds are necessary; because, for instance, to build a house, they need funds for the other parts like the floor or windows (Interviewee C, 2017; Recycling Organization, 2017).
The Recycling Organization not only intends to protect the environment and influence people’s behavior, but they also want to support early childhood development to improve education. They built a preschool in Port Elizabeth out of Ecobricks, which is their flagship project (Interviewee C, 2017; Recycling Organization, 2015).

*Recharge Service Provider, level 3 of inclusive business integration*

To provide affordable energy for off-grid areas, the Recharge Service Provider developed a pedal generator, which is run by human energy. The organization operates in Rwanda, Kenya, and Burundi. The device is portable, which means that a person can pedal everywhere and recharge USB-charging devices at all times. To complement the pedal generator, the organization works with a solar panel and a recharging system as well (Interviewee F, 2017; Recharge Service Provider, 2016).

To achieve significant savings for people, the organization decided to work with a two-part tariff model. Within a target community, they subsidize households with lamps and establish a recharge station, and people have to pay for recharging the lamps. This recharge service is done by a local entrepreneur who was acquired by the organization. They run the pedal generator to recharge and provide energy access to the whole village. The recharge operators are self-employed and decide independently how they design their business, such as door-to-door distribution. Some entrepreneurs support around 300 to 400 customers, which results in a self-sufficient business. (Interviewee F, 2017; Recharge Service Provider, 2016). Especially regarding self-sufficiency, the co-founder stated: “That entrepreneur is spending 100% of the time on that business. Sometimes they have earned enough money to buy another system from us and then they set up in another area.” (Interviewee F, 2017)

The entrepreneurs charge their customers $0.20 per recharge, and the Recharge Service Provider receives the half of it. However, the revenue is not enough for the organization to manage their operations in a self-financed manner since people in the communities recharge their devices just one to two times per month and spend their remaining savings on food.
Therefore, the organization is dependent on donations additionally (Interviewee F, 2017). By 2018, the Recharge Service Provider has established 1000 micro-enterprises that supply more than 600,000 households with energy (Recharge Service Provider, 2018).

**Biogas Plant Developer, level 4 of inclusive business integration**

The Biogas Plant Developer developed an easy to install biogas plant that is operated with cow dung and water and is located in Kenya. The biogas is preserved in a gas bag or can be used all at once to run a cooking stove without further fuel costs. Leftover bio slurry can be used as organic fertilizer to increase harvest and thus improve the health of cows and their milk production. The plant is so small that it can be transported to its destination by a motorbike and assembled on-site (Interviewee I, 2017; Biogas Plant Developer, n.d.). Besides the fact that people needed a product that could be transported easily, affordability was another main issue as the interviewee emphasized:

> What are farmers able to spend for such a unit? And we found out that it couldn’t be more than in dollars roughly six hundred dollars. Why? Because the only thing what a farmer has as a big value is a cow. And the value of one cow is roughly between, it’s depending from the quality of the livestock, is between four hundred and six hundred dollars. So, we had the end customer price. (Interviewee I, 2017)

In addition, the Biogas Plant Developer discovered that they needed to create a solution that integrated people in the value chain locally. Consequently, the company implemented a business resembling a franchise model: they acquire people who are willing to invest in their own companies, draft a contract with them, and hand over the entire value chain. These local entrepreneurs are allowed to assemble the plant and distribute it locally. The Biogas Plant Developer also provides the workshop and equips local people with the necessary expertise and business skills. There is no franchise fee for this system. As many resources as possible are sourced on-site, while all else is exclusively purchased from the Biogas Plant Developer,
ensuring their revenue. And they only employ one person for on-site operations and training, which keeps their structures lean and flexible (Interviewee I, 2017).

The Biogas Plant Developer decided to hand over nearly the entire value chain to local entrepreneurs because they are the experts in their own countries and shall be motivated to take advantage of this business opportunity. Moreover, by handing over the value chain, the Biogas Plant Developer obtains enough official support. Their key to a successful project is to establish structures in which all parties benefit. The company’s representative emphasized:

*It’s a free system and that is what we want to motivate because if I would employ as company all this people in Kenya nobody is interested to push the system or this business in a strong way. So but if there are local people involved and as more they sell as more they are able to earn - that’s a good motivation. And they are the experts in their own country, we are not the experts.* (Interviewee I, 2017)

The Biogas Plant Developer cooperated with the government and the creamery industry as well. This industry promotes the biogas plant as an opportunity to triple the income within a year through improved milk production based on organic fertilizers. The creamery employs more than 50 people who consult the farmers (Interviewee I, 2017).

### 4.2.5 Cross case analysis

A comparison of the cases reveals that there is no specific organizational form. Among the six organizations, there is a high proportion of socially oriented non-profit organizations. The other organizations are start-ups, SMEs, and larger AGs, which can be considered as for-profit companies. The cases do not focus on a specific industry or specific products. However, it is noticeable that four of the cases developed products that are strongly interrelated with cooking and four cases have tried to improve issues of energy access, which resembles findings of the UNDP (2013) and some previous cases in the frugal innovation literature (Hossain, 2017; Levänen et al., 2016). The organizations are active in various countries, particularly in sub-
Saharan Africa, which is consistent with the case findings of UNDP (2013). The UNDP (2013) has already shown that inclusive business takes place in different places, but preferably in countries that are more stable and growing economically or that encourage inclusive business, such as Kenya or South Africa.

To achieve their goals, some of the organizations chose to follow well-known business models and implemented franchise approaches, shared revenue systems, or two-part tariff models. Others have chosen more innovative approaches and are establishing, for example, combined business models or models based on cooperation, as also mentioned by Pels and Sheth (2017), who recommended network-based approaches to address low-income markets.

Based on their business model and value chain, the Cooking Stove Company, the Biogas Plant Developer, and the Solar Energy Provider are fully self-financed organizations. All of the other organizations integrate investors or sponsors to a varying degree to set up their financing model, which is quite common for inclusive business and BoP approaches (Arnold, 2017; UNDP, 2013).

Within the business models, cooperation seems to be an important aspect for all of the organizations. For instance, the Biogas Plant Developer cooperates with the creamery industry to sell more biogas plants. Above all, the organizations foster collaborations to receive acceptance locally, identify and address real needs of their target group, and benefit from governmental support. The interviewee from the Software Developer explained their main benefit out of cooperation as follows:

*We don’t want to impose our technology or to make it as if we said one size fits all. We have really something that has to be adapted to the local market. So, we know that all of the countries have different needs, of course there are some commonalities and common structures and so on, but the solution has to be customized by local partners.* (Interviewee A.1, 2017)
To finance the projects and businesses locally, microloans, rentals or donations are common. Afterward, most of the people become self-sufficient from the business approaches, but for others, a larger amount of their own initiative is necessary. For instance, trainees of the Recycling Organization and the 3D Limbs Provider are not paid; however, they have the opportunity to develop a project on their own out of the competencies and knowledge they have acquired. Compared with this, the Solar Tools Developer created an entirely new revenue stream for baking and roasting business with projects that run self-sustainably. Some of the Recharge Service Provider’s entrepreneurs have enough customers to expand their business. The Eyeglasses Company’s employees receive a fixed wage to cover their everyday costs. The Solar Energy Provider’s shop operators earn enough revenue to make their living out of it. This also applies to the franchisees of the Biogas Plant Developer and entrepreneurs of the Cooking Bag Company.

As an indicator of success and economic viability of frugal innovation and inclusive business integration, we used the survival of the organizations over at least three years. Between 2017 and 2020 we considered almost all cases as operationally active and alive. Some of them even expanded their offerings and/or markets and continued with their inclusive approaches.

4.2.6 Inclusive business integration stair model

Comparing the cases with regards to their inclusive business approach and the design of their frugal innovations, a pattern emerges that the extent of inclusive business integration resembles a stair that is influenced by frugal innovation (Figure 5).
Figure 5. Inclusive business integration stair model

The stair, which represents the depth of integration of inclusive business approaches, illustrates that knowledge transfer is the first level and is a prerequisite therefore. In all cases considered, there was a strong focus on training people, especially in working with the frugal innovation and assembling or maintaining the innovation. Regarding the 3D Limbs Provider, they focused on educating people in 3D printing and providing basic medical knowledge from a doctor to care for victims of war. They aimed to build self-sustaining projects. Priority is given to the transfer of expertise, which seems an important factor for the implementation of projects. The impact of knowledge transfer and training was already mentioned in literature, for example Reficco and Márquez (2012) emphasized the importance of skill transfer, especially when it comes to learning by doing and tacit knowledge. For some of the organizations that create self-employment structures and seem to achieve a higher level of integration, also business training plays an important role. For instance, the Cooking Bag Company supports its entrepreneurs mainly with entrepreneurial skills, such as financial literacy. Also, some organizations have
gone one step further by building a continuous relationship as the CEO of the Solar Energy Provider emphasized:

*For us, training is absolute the key. And it's not just one-time training but we constantly train them, we constantly guide them, coach them, mentor them, supervise them you know. It’s a very very close relationship that we have with the shop owners or the operators.*

(Interviewee J, 2017)

The second level shows the preliminary stage of inclusive business, called (indirect) empowerment. Here, the target group is reinforced by frugal innovation. This is achieved through the innovation itself and the transfer of expertise. However, an own initiative of the target group remains necessary to build something from it. It is more or less a starting point or an enabler. A typical case example is the Recycling Organization. They train people to become professionals in order to use frugal innovation and thus implement projects independently. The Cooking Stove Company is assumed to affect indirect empowerment or self-employment that develops from more efficient cooking with stoves.

The last two levels of the stair relate to the value chain. There are various ways to integrate the target group in the value chain, depending naturally on the innovation itself. The Solar Energy Provider, the Eyeglasses Company, and the Solar Tools Developer employ people locally. The Eyeglasses Company offers different job roles like producers, salespeople, and managers. People are employed based on local conditions, and some become self-employed, too. Especially, it appears that these levels are based on self-employment structures mainly. As some of the interviewees stated, building self-employment structures means to delegate responsibility to the target group, while simultaneously enabling people to earn more money with this business model. This will encourage motivation to keep the business running and make more effort for success, which on the other side will ensure ongoing revenues for the organization, respectively, the frugal innovation behind it. Securing a regular income is one of the driving factors for social
improvement (Schrader et al., 2012), and this approach makes use of social networks, too (Dana et al., 2020; Masiello & Izzo, 2019).

Level 3 of the stair illustrates sales. The target group sells the frugal innovation or operates it and sells the service. For instance, the Recharge Service Provider recruited several people in villages to become entrepreneurs and run the recharging service. In the meantime, the organization supports about 100 entrepreneurs in Kenya. In the Cooking Bag Company, women start their own business with cooking bags by selling the bags or selling food out of the bag.

On the fourth level, a kind of franchise approach is implemented. The target group takes over further parts of the value chain, as mentioned by Rosca et al. (2017). Besides selling or operating the product, they also assemble and/or maintain it. This can extend up to the fulfillment of the entire production value chain. For example, the Biogas Plant Developer established a franchise model. The partners on-site fulfill the entire value chain. They do not have to pay a franchise fee, and the Biogas Plant Developer benefits from their sales by selling more material to them. Changing and further developing the value chain meets Reinhardt et al. (2018) requirements, who call for specific or new distribution channels that create access for consumers (Kahle et al., 2013), as well as overall solutions.

On this last level, the connection with frugal innovation becomes clear. Only companies that design the frugal innovation based on a modular structure can achieve the highest extent of inclusive business integration. For instance, considering the Recharge Service Provider, the organization achieves level 3 of the stair. In order to hand over further parts of the value chain, they would have to structure their recharging device in a way that a local production or composition becomes possible. Then the organization could hand over more production steps and achieve a deeper integration. We propose that this is the linking factor between frugal design and a business model based on inclusive business structures. Table 11 illustrates the extent of inclusive business integration for all cases.
<table>
<thead>
<tr>
<th>Organization</th>
<th>Depth of inclusive business (level on the stair)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Software Developer</td>
<td>None, solely indirect empowerment</td>
<td>No explicit knowledge transfer; indirect empowerment for partners using the solution</td>
</tr>
<tr>
<td>E: 3D Limbs Provider</td>
<td>1. Prerequisite: Knowledge transfer</td>
<td>Knowledge transfer: Expertise; indirect empowerment for target group by training them in 3D printing</td>
</tr>
<tr>
<td>G: Education Company</td>
<td>In the transition from level 1 to level 2</td>
<td>Knowledge transfer: Expertise; target group receives training in educational skills and some become teachers</td>
</tr>
<tr>
<td>B: Cooking Stove Company</td>
<td>2. Preliminary level: Empowerment</td>
<td>Knowledge transfer: Expertise; indirect empowerment for partners using the solution</td>
</tr>
<tr>
<td>C: Recycling Organization</td>
<td>2. Preliminary level: Empowerment</td>
<td>Knowledge transfer: Expertise; indirect empowerment for target group by training them as professionals and enabling them to set up own projects</td>
</tr>
<tr>
<td>F: Recharge Service Provider</td>
<td>3. Sales</td>
<td>Knowledge transfer: Expertise; target group provides recharge service by operating the frugal innovation based on a self-employment structure</td>
</tr>
<tr>
<td>K: Cooking Bag Company</td>
<td>3. Sales</td>
<td>Knowledge transfer: Business skills, target sell the bags or food out of the bag based on a self-employment structure</td>
</tr>
<tr>
<td>D. Solar Tools Developer</td>
<td>4. Franchise approach</td>
<td>Knowledge transfer: Expertise; target group assembles and maintains the innovation and they operate it to sell food to their customers based on a self-employment structure</td>
</tr>
<tr>
<td>H: Eyeglasses Company</td>
<td>4. Franchise approach</td>
<td>Knowledge transfer: Expertise and partly business skills; target group assembles and sells the innovation, some people run shops; depending on the country, the model is set up with self-employment structures</td>
</tr>
<tr>
<td>I: Biogas Plant Developer</td>
<td>4. Franchise approach</td>
<td>Knowledge transfer: Expertise and business skills; target group fulfills the whole value chain in self-employment structures</td>
</tr>
<tr>
<td>J: Solar Energy Provider</td>
<td>4. Franchise approach</td>
<td>Knowledge transfer: Expertise and business skills; target group operates and maintains the frugal innovation based on self-employment structures</td>
</tr>
</tbody>
</table>

*Table 11. Overview of results regarding the depth of inclusive business integration*
4.2.7 Development of propositions

Based on our results and the inclusive business integration stair model shown in Figure 5, we develop several propositions. Firstly, it appears as a consistent pattern from our case studies that knowledge transfer and training are a key factor for inclusive business integration in frugal innovation. This finding is in line with previous literature by Pisoni et al. (2018), Reinhard et al. (2018), Rosca et al. (2017), and Schrader et al. (2012). However, through the combination of both solutions, knowledge transfer is not only about using frugal innovation but more about training people on how to produce or create something out of or with frugal innovation. Also, training in business skills is necessary to support people to run their own businesses. Thus, to create inclusive business with frugal innovations, training, and knowledge transfer become prerequisites, leading to the proposition:

P1: The more appropriate knowledge transfer around frugal innovation is created, the better inclusive business structures can be built.

As shown in the inclusive business integration stair model, the next level is to empower the target group through frugal innovation. Here, people can use the innovation to make something out of it. However, to achieve an inclusive business approach as originally defined in the literature, our findings suggest that there needs to be more integration than just the ability to develop ideas from the innovation. Therefore, we propose based on the patterns from some of our cases that a tighter coupling can be achieved by transferring responsibility for sales and/or operations to the target group. It seems that by selling the solution or selling a service locally, people become employed and earn an income, which is a first step towards economic inclusion (Kahle et al., 2013; UNDP, 2013). Therefore, we developed the following proposition:

P2: The more frugal innovations are conceived for sales, respectively, operating the business, the better they can be coupled with inclusive business structures.

Organizations in our analysis that achieve at least level three of the inclusive business integration stair model approach inclusive business structures based on self-employment
strategies. Thereby, they create at least partial refinancing revenue out of their business approaches. In particular, the case of the Recharge Service Provider, the Biogas Plant Developer, and the Solar Energy Provider represent three for-profit organizations that entered low-income markets with specifically designed frugal innovations and inclusive business approaches. The business models resemble franchise approaches, but without a franchise fee. A possible reason for their business approach could be that it offers them better opportunities to scale up and refinance their investments. The income in the target group increases and makes a positive contribution to purchasing power. The locals have recognized their advantages and are motivated to strive for a good performance to secure their current income. As UNDP (2013) summarized, the benefits of inclusive business are not only rising incomes but also improved productivity and greater self-confidence. This produces win-win outcomes and ensures the revenues as well as the long-term survival of the organization. Therefore, we suggest in the third proposition:

\[ P3: \text{The more responsibility the local people are entrusted with, for instance through self-employment, the greater their motivation to secure ongoing revenues and keep the businesses running.} \]

The last level of the inclusive business integration stair model suggests that the target group is not only responsible for sales or operations, but takes over even more parts of the value chain. To achieve such deep integration, however, frugal innovation itself needs a design that makes this possible. We call it modular design, which means that the innovation is designed in a way that it can be assembled or maintained on-site. The Biogas Plant Developer's solution and the Eyeglasses Company from our cases are highly consistent with this conception since they both use such a modular design. This approach is further developed in the next proposition:

\[ P4: \text{The more modular the design of frugal innovations is, the more adaptable the value chain becomes, which fosters a very close connection to inclusive business.} \]

Furthermore, we identified reciprocal effects in our case studies. One key feature of frugal innovation is significant cost improvement. By offering solutions a low-income target group
can afford, people at the BoP gain in first place access to products and services that meet their (sometimes urgent) needs. This can also be supported by an inclusive business approach. For instance, the Solar Tools Developer intentionally produces locally to keep the frugal innovation affordable. The Biogas Plant Developer establishes a value chain that is operated completely locally, to keep their business model as lean as possible. Considering this perspective, inclusive business strategies can also contribute to the frugality of innovation. Therefore, we propose the following proposition:

\[ P5: \text{The stronger the link between inclusive business and frugal innovation in the value chain, the more affordable the innovation.} \]

Specifically, regarding business approaches, it is notable that local cooperation seems to be important for all considered organizations in our cases. This strategy appears to be a key factor for implementing a frugal innovation, especially in emergent markets. Partnerships help to address the target market by providing local knowledge, acceptance, and also official support. The approach of inclusive business can also be seen as cooperation, which is formulated in the final proposition:

\[ P6: \text{The stronger the inclusive business partnerships, the better the access to the new market and local implementation of the frugal innovation.} \]

### 4.2.8 Discussion

With our investigation, we aimed to examine how frugal innovation affect the design of inclusive business in low-income markets and whether there are patterns of integration between frugal innovation and inclusive business. To illustrate interrelations based on our results, we have derived a conceptual link model, we called IBLMFI.

**Inclusive Business Link Model for Frugal Innovation (IBLMFI)**

The IBLMFI further develops our theoretical propositions into a comprehensive framework that summarizes the relationships between our core concepts, following the case study approach by Yin (2009). For organizations that intend to penetrate low-income markets in the African
context, we identified several challenges: different and probably challenging laws, bureaucracy and regulations, a lack of market information, infrastructural issues as well as low purchasing power. We propose that combining frugal innovation and inclusive business could be a fruitful approach to tackle these obstacles, as illustrated in Figure 6.

Figure 6. Inclusive Business Link Model for Frugal Innovation

In this framework, we theorize that implementing frugal innovation has potential as a promising approach to address low purchasing power and infrastructure problems. The core characteristics of frugal innovation design – significant costs improvements, concentration on core functionalities, and optimized performance level (Weyrauch & Herstatt, 2017) - eases infrastructural constraints and retains affordable solutions for the target group (Hossain, 2018; Lehner et al., 2018; Pisoni et al., 2018; Weyrauch & Herstatt, 2017).

Applying an inclusive business approach could potentially create awareness and attention in the context of the target market. As proposed above, this could be a first step towards building partnerships and a network that might be important for coping with laws and regulations and
gathering relevant market information (Golja & Požega, 2012; Reinhardt et al., 2018; Schuster & Holtbrügge, 2014). Moreover, according to our framework, a modular structure of frugal innovation would be a prerequisite to achieving a deep inclusive business integration that enables a continuous purchasing power based on the employment of the target group. The modular structure comprises the concentration on the core functionality, the optimized performance level, and supports a high degree of inclusive business integration, considering as many parts of the value chain as possible. In this way, a deep integration of people on-site potentially becomes possible, leading to inclusive ecosystems (Pels & Sheth, 2017; Reficco & Márquez, 2012). Finally, our framework would suggest that promoting self-sufficiency and local economic development ensures recurrent revenue since customers earn an income, and local people have a self-interest in supporting the business, as illustrated in UNDP cases (2013), too.

4.2.9 Research implications

We contribute to research by broadening the understanding of both frugal innovation and inclusive business and by illustrating possible interrelations. As demanded by Hossain (2017; 2018), new business models are necessary to implement frugal innovation. Establishing inclusive business structures seem to be a valuable approach that supports and is supported by frugal innovation. Our study contributes to a more holistic view of how inclusive business structures can be created, as demanded by Reficco and Márquez (2012). Schrader et al. (2012) mentioned case examples in which the target group was included in the value chain. However, our study adds to this research stream by introducing different levels for this purpose. We consider aspects such as how to design the involvement of the target group, as well as challenges and initial factors that might influence the ultimate success of the frugal innovation and the inclusive business approach. We also illustrated frugal innovation cases that contribute to our understanding of how to overcome challenges described by UNDP (2013). With regard
to the frugal innovation literature, we add the focus on improving social sustainability and economic development directly by building employment opportunities, which deepens the investigation of Khan (2016). With the feature of a modular structure of frugal innovation, we add another aspect that could support the distinction between different types of frugal innovation and their advantages and purpose.

4.2.10 Managerial implications

Regarding managerial contributions, companies could consider combining frugal innovation and inclusive business approaches when they intend to enter markets with customers who have low purchasing power and other types of disadvantages. As almost all of the cases considered are active for an extended time period and continue to create inclusive businesses, this might be seen as some indication of the potential in combining both approaches. Frugally designed solutions address unmet customer needs. Local cooperation can create awareness and help to cope with laws and regulations as well as to improve access to market information. Integrating local entrepreneurs may be a particularly robust possibility for capturing new revenue streams and improving living circumstances. This is in line with Schrader et al. (2012), who noted that companies attach great importance to building local, national, and international stakeholder relationships when entering BoP markets. Cooperation seems to be a key factor and a basis to address customer needs, market conditions, gain access to local resources, and even to cope with institutional environments (Arnold, 2017; Golja & Požega, 2012; Schuster & Holtbrügge, 2014). Similarities can also be found in the study by De Massis et al. (2018), who examined German Mittelstand and emphasized the importance of partnerships and focus on target context in terms of embeddedness and customer understanding. Considering for example the Biogas Plant Developer, who initially belonged to German Mittelstand, the organization transferred its approach of a strong customer focus and relationship strategy to enter low-income markets with frugal innovation. We propose that to achieve deep local value chain integration, frugal
innovations require modular design features, as suggested in our model IBLMFI. Our findings might be applicable to different types of organizations, ranging from (global) MNEs, socially-oriented organizations to local initiatives, SMEs, and grassroots innovators. MNEs, in particular, could take our findings into account when creating business structures or cooperate with local SMEs for low-income markets, not only with the aim of developing new revenue streams but also to contribute to social welfare. For social organizations, SMEs and smaller initiatives, it might be particularly interesting to focus on cooperation in order to scale their activities with the support of partners. In summary, the targeted combination of frugal innovation and inclusive business could be beneficial to a wide range of different types of organizations.

4.2.11 Concluding remarks and future research

This investigation contributes to an enhanced understanding of how and why frugal innovation could support the design of inclusive business and vice versa. Using the insights from our case studies in the African context, we derived propositions and theorize about the relationships and effects when both concepts coincide. We found that implementing frugal innovation by inclusive business approaches can reach different levels of integration. We developed a descriptive framework called “inclusive business integration stair model” that categorized the extent of inclusive business integration with frugal innovation. Thus, we proposed knowledge transfer as a prerequisite. This means not only applying external knowledge about the target group/market but also incorporating new innovative approaches and building up own knowledge and perhaps own market-specific organizational culture (Hervas-Oliver et al., 2016; Reinhardt et al., 2018; Withers et al., 2011). Moreover, our study suggests that inclusive business structures based on self-employment seem to be consistent with ensuring ongoing revenue streams. In particular frugal innovations of modular design were consistent in our data with a tightly linked inclusive business approach, including various aspects of the value chain.
Furthermore, we also propose reciprocal effects. A characteristic of frugal innovation can support the implementation of inclusive business, and inclusive business structures can foster the customer-specific design and realization of frugal solutions.

This research has several limitations that could be a starting point for future research. It analyzed 11 cases in the African context and one should be aware that each organization is shaped by unique circumstances, and context conditions. For example, the organizations are active in different countries, and our research did not take regional or national differences into account. As we have case studies that only cover one or two countries and case studies that operate in several countries, we suspect that the results are not related to specific regions. However, we cannot exclude country-specific influences. For this reason, the generalizability of our results is bound to the research setting (Eisenhardt, 1989). Nevertheless, we derived theoretical propositions that generalize from the empirical cases to the theory but not to further empirical settings per se. Therefore, future research should further explore these propositions empirically also in other BoP contexts, ideally with larger data sets.

Furthermore, only the viewpoints of the innovators and their organizations were included. It would be interesting to include the perspectives of the people who benefit from frugal innovations or inclusive businesses. This could also be important to discuss the thoughts of Knorringa et al. (2016), who mentioned that frugal innovation could also lead to income inequalities and labor exploitation. Our research focused only on contributions to inclusive business and did not consider assessing power dynamics that might occur and could also have negative impacts on locals (Pansera, 2018).

A comparison between frugal innovations based on inclusive business structures and frugal innovations that do not use inclusive business would be valuable to gain deeper knowledge regarding mutual influences and advantages. Moreover, additional research can concentrate on the propositions and the IBLMFI set up. For instance, it would be beneficial to examine the
financial contribution of inclusive business structures on the final costs of frugal products in more detail. Lastly, future research should examine the modular features of frugal innovation in detail and how they can be shaped beneficially.
4.3 Publication 3: Boosting Inclusive Businesses’ Opportunities Through the Adoption of Scrum: an Execution Strategy to Enter Low-end Markets

This is an accepted manuscript of an article in production by Inderscience Publishers in Journal of Agile Systems and Management, forthcoming


Authors: Anne Lange
Status: Forthcoming in International Journal of Agile Systems and Management

Abstract

As consumer markets in Western industries are saturated, the Bottom of the Pyramid has become increasingly important as a future mass market. Nevertheless, it remains difficult to adequately address the needs of low-income consumers. Approaches such as inclusive business have become more significant in both the literature and in practice. However, it is still unclear how inclusive business structures can be designed. Given the importance of networks based on local partnerships and knowledge transfer as key factors for success, this research proposes taking an agile approach to frame inclusive business approaches. Based on the Scrum framework, this study creates a conceptual model: the Inclusive Business Scrum Approach. Referring to the execution level, the model illustrates how inclusive business can emerge. It thus not only helps to address the “how” of inclusive business, but it also considers topics related to the heterogeneity of partners and the composition of the team.
4.3.1 Introduction

To follow past successes and growth, companies need to constantly reinvent and innovate their business strategies and be open to new opportunities (Achtenhagen et al., 2013; Chesbrough, 2010). The mass markets at the BoP (Prahalad, 2010; Prahalad & Hart, 2002) appear to be a promising alternative (Hart & London, 2005). An increasing number of companies and global players seem to consider the BoP as a significant market opportunity for affordable products. They have quickly tapped into the market with single-sachet packed shampoo or soaps and other consumer goods. This tactic initially increased revenue; however, in the long run, these consumption-based strategies fail because they do not understand the BoP’s real needs and do not attempt to reduce poverty (Simanis & Hart, 2008).

Considering, for instance, the African context, despite attractive growth potential, the reality of business opportunities does not quite match expectations (Christensen et al., 2017). Notwithstanding the assumed significant market opportunities in Africa, multinational players have begun to leave the continent, and investment has decreased. These challenges have arisen as a result of several factors that hinder market development, including ongoing corruption, lack of infrastructure, skills shortage, and a small middle class (Christensen et al., 2017).

Additionally, Karnani (2006) has indicated that many companies overestimate the purchasing power of poor people, and he perceives the market to be quite small and not highly profitable. Simanis and Hart (2008) have suggested that new ways of thinking are needed to move away from the perception of the BoP as a mass market (also called BoP 1.0) towards the second generation of corporate BoP strategies. They have argued that the BoP should be empowered as business partners and co-inventors based on deep listening and dialogue. Engaging the BoP
as consumers, producers, and entrepreneurs is known as inclusive business (Schoneveld, 2020; UNDP, 2008). Inclusive business seems to be a solution that not only contributes to social improvements through tailor-made products and income opportunities, but it also gives companies the chance to gain competitive advantages through local knowledge and local value chains (UNDP, 2008). However, it is still unclear how an inclusive business approach can be established and link mainly western-oriented organizations with their target group (Schoneveld, 2020). What useful strategies, approaches and daily actions could build an inclusive business between the parties? Although some studies and reports have described successful cases (Arnold, 2017; Khan, 2016; Levänen et al., 2016; Rosca et al., 2017), there are still no recommendations that go into more detail about how this can be done and that could serve as a guide for companies.

This research provides a concept that shows how target groups of low-income consumers in different contexts can be integrated into an inclusive business approach using a targeted and adaptable framework. The challenge of including local target groups seems demanding enough in itself. Simultaneously, the context of unfamiliar market environments, a high number of customers, and further barriers such as infrastructural issues present dynamic and complex conditions (Reinhardt et al., 2018). These prerequisites are suitable for agile approaches, which are now used in several industries for similar reasons (Hasan et al., 2007; Iskanius et al., 2006; Lemieux et al., 2012): in order to meet the different challenges of market environments and customer demands. Thus, to achieve the “how” of inclusive business, this paper applies the well-known agile method Scrum. It shows that the agile framework supports key factors of inclusive business approaches: Ecosystems, cooperation, and knowledge transfer. In addition, it addresses the heterogeneity of the partners as well as team composition regarding stability, and it provides an example of how such a project for inclusive business could be established.
Thus, this paper aims to create a guideline for organizations that want to enter the BoP, hereafter referred to as the low-income market. It is explorative, as it appears to be the first such model. The paper is structured as follows. In the next section, the concepts of inclusive business and the agile framework Scrum are elaborated in more detail. The conceptual model is then illustrated, first on a general level and second in more detail using a project-based approach and considering a practical example of a possible implementation. Based on the model, propositions are derived. Finally, the conclusion addresses the implications and future research ideas.

4.3.2 Theoretical background

Inclusive business

Regarding low-income contexts, some companies and local entrepreneurs have overcome obstacles and succeeded in markets such as the African one. Successful innovators develop an appropriate business model, create employment within the whole value chain, and build the necessary infrastructure (Christensen et al., 2017). Business models not only provide an understanding of their target group as customers but also integrate them into the value chain as employees and entrepreneurs, following the idea of inclusive business. With a focus on low-income consumer groups, this strategy fosters social enhancement, which supports more sustainable economic growth and can create a mutually beneficial situation for customers and businesses (UNDP, 2008). With various case studies, the UNDP has contributed to the perception of poor population groups as a driving force of economic growth. Most cases illustrate how MNEs enter low-income markets with an innovative solution (UNDP, 2008; Von Zedtwitz et al., 2015).

In the meantime, inclusive business has gained attention in both policy and practice, driving development agencies to promote the provision of innovative solutions and financing by private companies, including sustainability considerations (Pouw et al., 2019). Simultaneously, research on inclusive business issues has different schools of thought as the review of Ros-
Tonen et al. (2019) pointed out. The authors investigated terms with the prefix “inclusive” and concluded that inclusive business literature is mainly concerned with approaches to achieve business goals. Inclusive value chain literature emphasizes imbalances more and focuses on social upgrading and empowerment. Whereas inclusive development theories reject economic approaches. They are based in social science and promote social and environmental progress. Schoneveld (2020) also conceptually examined the definition of inclusive business and inclusive business models. He incorporated aspects of inclusiveness towards what; inclusiveness of whom; and inclusiveness in what and proposed to define inclusive business as “A type of sustainable business model that seeks to productively engage income-constrained groups in the value chain by providing solutions to neglected problems.” (Schoneveld, 2020, p. 10). His approach is aligned with the understanding that underlies this paper. Independently of the way inclusive business is defined, entering a new market is always a challenge, even for well-established and experienced organizations. Especially when it comes to low-income contexts, various barriers can arise. The UNDP (2008) has summarized some main constraints: the market information is limited, as companies are not familiar with the target group; businesses have to deal with the regulatory environment because laws are unclear or contracts are not enforced; and the physical infrastructure can also be a challenge, e.g., due to the lack of electricity. Companies should be aware that members of their target group lack knowledge and skills, and they may need to train them. Additionally, access to financial services can be a barrier for producers and consumers. Furthermore, due to a high number of customers, low-end markets are characterized by increased dynamics and ambiguity (Reinhardt et al., 2018; Simanis & Hart, 2006). Previous research on inclusive business and similar concepts has first emphasized key factors that should be fostered to address barriers. For instance, Pels and Sheth (2017) have established a conceptual framework to describe how business strategies can be designed to address low-
income consumers in emerging markets. They conclude that inclusive ecosystems are one important strategy. Since inclusive ecosystems concern specific issues, they follow an opportunity; they are bottom-up approaches because non-market participants play a crucial role in ecosystem design. Moreover, when doing business in developing countries, companies should bear in mind that a large part of the market activity takes place in the informal economy and is based on social ties (London & Hart, 2004). Therefore, an inclusive business approach should aim to build an ecosystem as a frame for the joint development of a business model. This ecosystem is based on relationships that lead to partnerships (Pels & Sheth, 2017).

Schrader et al. (2012) have compared seven case examples to analyze how MNEs design business strategies to enter BoP markets. Among other aspects, the authors note that all companies attach great importance to building local, national, and international stakeholder relationships. Schuster and Holtbrügge (2014) have noted that partnerships are the basis for the value chain in terms of structure and design. The authors argue that cooperation with governmental partners, business partners, and civil society partners supports addressing customer needs, market conditions, and institutional environments, e.g., to cope with restrictive conditions. Often partnerships emerge between the private sector and non-governmental organizations and are structured as social enterprise by horizontal and vertical alliances (Danse et al., 2020). Cooperation is a basis for gaining access to local resources and developing purposeful solutions for the target group. A corporation should build new capabilities and develop suitable solutions together with local partners (Golja & Požega, 2012; Hart & London, 2005; Schuster & Holtbrügge, 2014). Furthermore, cooperation within specific regional clusters can be a driver for collective learning (Tambosi et al., 2019). Inclusive approaches are often based on education, empowerment, and skills transfer. And especially tacit knowledge exchange, such as learning by doing, plays an important role. Concerning problem-solving,
joint learning approaches and discovering new resource combinations are crucial (Reficco & Márquez, 2012; Schuster & Holtbrügge, 2014).

To summarize, an inclusive business approach should be established based on an inclusive ecosystem and network. Partnerships and knowledge transfer are thus important drivers and enablers. So far, however, it is unclear how to create a bond between the mostly Western organizations and local customers that meets the requirements of an ecosystem based on partnership and knowledge transfer.

*Agile methods and the roots of Scrum*

Regarding deep customer understanding and involvement, agile approaches seem to be one step ahead of other business or project strategies. As Abbas et al. (2008) have noted, agile methods are not new; they have a long history. Larman and Basili (2003) have stated that the first incremental and iterative development processes date to the mid-1950s. Agile approaches try to build trusted customer relationships and act based on iterative cycles to deal with uncertainties (Dybå & Dingsøyr, 2008; Sillitti et al., 2005). By addressing structural changes and dynamics in the business environment, agility reflects the strategic level (Iskanius et al., 2006). This research aims at a more operational level to address, for example, a lack of methods to improve agility in non-software environments (Hasan et al., 2007) and has therefore opted for Scrum as one agile approach.

Scrum is not a method but rather a framework that strives to solve highly complex problems and productively deliver products with the highest possible value. Thus, the descriptions in the *Scrum Guide* clarify that there is no restriction on software development (Schwaber & Sutherland, 2017; 2020). Regarding the agile methods used, the majority of software-related organizations apply Scrum (Brezočnik & Majer, 2016; Digital.ai, 2020; Landaeta et al., 2011; Srivastava et al., 2017). Nevertheless, other agile methods can also be valuable depending on specific circumstances, requirements, and the desired outcome (Brezočnik & Majer, 2016; Saleh et al., 2017). However, for the purpose of this investigation, Scrum seems to be the most
fitting agile framework. Especially with physical products and, in general, the development of new products beyond software structures, Scrum is perceived to be a highly valuable agile approach (Cooper & Sommer, 2016). In addition, requirement changes and uncertainties can be addressed more easily than with other agile methods (Hamed & Abushama, 2013; Srivastava et al., 2017).

Sutherland and Schwaber developed Scrum based on an article of Takeuchi and Nonaka (1986) and further refined the approach in a publication in 1999 (Beedle et al., 1999; Larman & Basili, 2003). Takeuchi and Nonaka (1986) stated that, in product development, a project team must meet specific requirements to achieve the goal, but it is free to self-organize in its process design. Learning in the team and in the organization plays an important role in this process. The collaboration and process of the team’s work is guided by a “sprint” (Figure 7).

![Figure 7. Scrum sprint [Illustration based on Schwaber and Sutherland (2017; 2020)]](image)

To realize an iterative process and schedule time points for inspecting the progress, a Scrum sprint is a predefined period of a maximum of four weeks. The sprint team consists of three roles: the Product Owner, the Scrum Master, and the Development Team. The clear definition of the roles within the team is another advantage of Scrum compared to other agile methods (Saleh et al., 2017; Srivastava et al., 2017). The Product Owner can be seen as the point of intersection with the customer; therefore, he formulates customer requirements for the product (Schwaber & Sutherland, 2017; 2020). The Scrum Master ensures that the process works as
defined in the Scrum framework. He supports the entire team in working productively and creating added value. The Scrum Master facilitates the process, coaches the team, and removes impediments (Bäcklander, 2019; Bass, 2014). The Development Team includes the professionals who develop and deliver the product, and it determines the process of how functionality is built. It is self-organizing and cross-functional. Although each team member has specific skills, the team as a whole is responsible to deliver the product (Schwaber & Sutherland, 2017; 2020).

A longitudinal case study of a distributed project team that applied Scrum has shown that it could build relationships and networks within and for a team. It gives a team a common language, can build trust, and promotes energy and motivation (Pries-Heje & Pries-Heje, 2011). Teamwork is one of the most important characteristics, and for this reason, Scrum is perceived as beneficial for inclusive business approaches.

4.3.3 Conceptual model: Inclusive Business Scrum Approach

To illustrate the Inclusive Business Scrum Approach (IBSA) conceptual model, this research shows how Scrum can serve as a connecting element to establish an inclusive ecosystem around the incoming organization and local consumers. It thus illustrates how to design a collaborative Scrum process between the specified participants who intend to enter a low-income market.

Scrum as a tie between partners

As described above, key drivers to enter the market successfully are collaboration, knowledge transfer, and achieving ecosystems. As shown in Figure 8, the main advantages of the Scrum framework appropriately address the inclusive business key factors. When entering a low-income market, inclusive business is the “what” and Scrum is the “how”.
Furthermore, Figure 9 provides more detail and illustrates the design of Scrum to build an inclusive business and how the “how” can be achieved. It illustrates how the IBSA combines all elements of Scrum and applies them to inclusive business contexts.

**Goal of the incoming organization:** Building inclusive business to enter a low-income market

As the figure illustrates, the Scrum team is cross-functional, both in terms of its origins and its expertise. With the intention of building an ecosystem, members of the incoming organization who have knowledge of the solution work closely with local partners. Some of them are involved in the Scrum team, for example as business partners. However, the model also suggests including further (external) partners such as investors, proponents, or decision makers. With the intention of creating a balance between the organization and its stakeholders with
mutual influences and benefits, the stakeholders can be considered partners (Soriano et al., 2012). They bring expertise regarding local conditions and influence product requirements. Based on the requirements, the work is broken down into manageable parts that can be completed in a sprint, which is guided by a sprint goal. User stories can thereby facilitate the concretization of the specifications (Wang et al., 2014). The Scrum team works within the sprint on the user stories, organizing its work independently with a focus on achieving the sprint goal. A sprint planning concretely decides what happens in the sprint. The team works in close collaboration on the tasks and discusses next steps and issues in daily meetings. Finally, the sprint closes with a review with the stakeholders to inspect whether the requirements were fulfilled, followed by a retrospective to inspect and adapt team collaboration. The “inspect and adapt” idea is the basis of the iterative approach, which aims to reduce errors and costs by adapting to uncertain environments (Ionel, 2008; Nonaka & Takeuchi, 1995; Pittman, 1993). This can be helpful in the target market, as well as with considering customer needs properly and identifying and overcoming uncertainties.

As the model illustrates, the IBSA facilitates an inclusive ecosystem based on knowledge transfer and social embeddedness. On the one hand, the close cooperation of the team supports team loyalty, social affiliation, and mutual knowledge transfer (Alguezaui & Filieri, 2014; Hannola et al., 2013). This happens in the sprint, for example via the daily meetings (Whitworth & Biddle, 2007). In addition, meetings such as retrospectives that focus on intra-team topics support continuous learning (Chau & Maurer, 2004; Streule et al., 2016). The focus of the Scrum team is self-control and peer review (Takeuchi & Nonaka, 1986). Trial and error processes lead development and promote tacit knowledge transfer, and team members are in close contact with their environment and external information, which fosters an intensive learning curve (Ionel, 2008). On the other hand, regular reviews ensure a close link with team-external partners as well. This supports empowering the local participants and contributes to
strong social embeddedness, as locals fulfill an active role (Annosi et al., 2016). Thus, social embedding evolves not only within the team, but also between the team and external partners.

*Application example: the market entry process*

Regarding low-end markets and reports on approaches to inclusive business, many case studies are based on innovation concepts that address customer needs and enter a target market (Brem & Wolfram, 2014; Hossain, 2017). In order to focus on the question of how to implement inclusive business, the IBSA is applied to the phases of a market entry, as illustrated in Figure 10. There are three main project phases that represent the steps required to enter a new market on a more strategic level. Each main phase has three sub-phases that both address the challenges described by UNDP (2008) and illustrate the steps that are likely to be taken in implementing an inclusive business.
Figure 10. Project phases of market entry and example questions for EinDollarBrille e.V.
The IBSA is implemented on the execution level of the project. In each sub-phase, a different number of Scrum sprints are recommended to complete the work and end it. Figure 10 shows examples of possible sprint goals for each phase. The approach resembles the Industrial Scrum Framework of Sommer et al. (2015), which is based on Cooper's (2014) recommendations to implement agile approaches in the stage-gate model for project management and new product development (Cooper, 1988; Cooper et al., 2002). However, it focuses on market entry phases rather than product development. At the end of each sprint, a review checks what has been done and what needs to be adjusted to prepare the following sprint. At the end of a sub-phase, a more extensive review is recommended; it is a checkpoint before entering the next phase. The retrospective is used to continuously improve cooperation and work processes. Sommer et al. (2015) have recommended a Scrum team composed of representatives of the main departments (e.g., sales and production). The figure also provides examples of the composition of the Scrum team, which can be changed according to the specific needs of the project phase.

Moreover, Figure 10 contains a low-end innovation example to illustrate how the IBSA could be exemplarily implemented in practice: EinDollarBrille e.V. Low-end innovation seem to be appropriate, as these innovation recommend market entry based on continuous iteration to gather information, identify and test possible solutions, and address ambiguities (Reinhardt et al., 2018). The case example, EinDollarBrille e.V., has provided lightweight and flexible glasses to developing countries since 2012. The glasses are not only affordable but also locally producible without electricity. To produce and sell on-site, EinDollarBrille e.V. employs local people (EinDollarBrille e.V., 2019). To enter a new market, the organization established a trial-and-error approach, as various steps must be considered. Based on representative interviews (Chen, 2017 and Schubert, 2018), the figure shows that the steps of the organization resemble the project phases recommended for the IBSA to achieve adaptability. An example question is presented for each phase and could be used in this or a similar way as the basis of a sprint goal.
In a first step of the project, partners must be acquired, i.e., partners to build up the inclusive business structure rather than investors only. For instance, the government must accept EinDollarBrille e.V., which must also receive various permissions. Support from the Ministry of Health, for example, is an important lever, as it can act as a multiplier (Schubert, 2018).

Regarding the first phase of the project, the entrant must become familiar with the market and its regulations and constraints. EinDollarBrille e.V. emphasizes that it is a recurring challenge to establish organizations in target countries due to various legal requirements, customs, and tax systems. Furthermore, the organization relies on climate conditions because the economies of its target markets are mainly based on agriculture, and after long periods of drought, people do not have enough money to buy eyeglasses (Chen, 2017).

In the next step, organizations such as EinDollarBrille e.V. need to adapt the business model to the local conditions. EinDollarBrille e.V. prefers to set up shops. Nevertheless, to approach rural areas, outreach campaigns can be necessary, and fixing a target price for the glasses and negotiating wages with potential employees is often complicated (Chen, 2017; Schubert, 2018). To achieve implementation, the entering organization needs employees and business partners who are adequately trained. The case example, EinDollarBrille e.V., has established different jobs, such as managers, producers, and opticians. In some countries, they even build production sites where the glasses are bent. People are recruited by newspaper advertisements or direct messaging approaches and all business partners and employees must complete specific trainings. Meanwhile, the organization has even established a one-year training program for opticians (Chen, 2017; EinDollarBrille e.V., 2019; Schubert, 2018). The last step of implementation is the market launch, which, depending on the innovation, may start with the assembly and sale of the product. It is expected that further issues and challenges arise later, and the IBSA could also address these.
For each (sub-)project phase, both the goal of the phase and its requirements should be clear. These requirements can be concretized by user stories and are then fulfilled in the sprints. A user story illustrates the functionality and its value to a user or customer and has the following structure: As [user], I want [target], so [reason] (Cohn, 2004). For the illustrated application example, the user stories could look as follows:

Example A  As a producer, I want to receive new parts as soon as possible so that the on-going assembly is guaranteed.

Example B  As an independent business partner, I need to know the legal requirements in order to adapt my business practices.

Example A concerns issues that can arise during the assembly of an innovation. All parts should be available, and transport to the producer must be possible. For instance, if EinDollarBrille e.V. establishes a production site to prepare the glasses, this should be considered. Example B assumes that people recruited as inclusive business partners need to be trained regarding legal requirements and subsequent business practices; for EinDollarBrille e.V., this could be a shop owner.

To summarize with regard to the low-end innovation example of EinDollarBrille e.V., the iterative character of the IBSA supports the organization’s trial-and-error approach. Sprints will help the organization structure its work packages within the project phases, reviewing the work already completed and eventually adapting the next steps based on the results achieved so far. The organization could apply the IBSA to each market, and due to its iterative character, it is specific enough to be adapted to various circumstances easily.

4.3.4 Challenges

Although the model shows that Scrum can be transferred to the inclusive business approach, some topics remain unclear and require further elaboration: the meaning of scalability, the “Definition of Done,” and the team composition with regard to stability.
First, regarding scalability, the practical example intends to show that the scalability of an innovation in an inclusive business context can be promoted using Scrum. In this context, scalability means implementing an all-day procedure with Scrum to enter a new and uncertain market and introduce an innovation there. In fact, the conceptual model is based on the hypothesis that an on-site Scrum team should enter the market or a specific region. A scaling of the approach would also mean that more Scrum teams might be needed, and questions of scaling Scrum might arise, as Scrum seems to be more suitable for small organizations or projects (Wińska & Dąbrowski, 2020). Typical challenges in software projects arise when the teams are distributed or when virtual and knowledge management as well as communication flows need to be managed (Lous et al., 2017). They require a suitable scaling framework (Dikert et al., 2016; Wińska & Dąbrowski, 2020), which could be valuable when the organization wants to spread its business in terms of offerings and geographic reach (Goyal et al., 2015).

Second, Scrum recommends that the team establishes a Definition of Done to assess when the work and therefore an incremental step are finished (Schwaber & Sutherland, 2017). In contrast to the software context, in non-software-projects, it seems to be difficult to find such a Definition of Done because there is not always a finished feature after every sprint. Cooper and Sommer (2016) have recommended defining a completed sprint based on a product’s concept or a prototype. For the IBSA and the example of a market entry, it is conceivable to articulate the Definition of Done at the beginning of a project sub-phase for all upcoming sprints to clarify when a sprint can be considered done.

Third, the different project phases require specific expertise. It is therefore assumed that the team composition will change, at least for the three main project phases (see Figure 10). Changes in team composition always affect productivity and collaboration in one way or another as teams pass different phases of the team-building processes (e.g., Tuckman, 1965). The *Scrum Guide* itself contains only recommendations regarding the time size and
recommends a team model pursuing flexibility, creativity, and productivity to enable the team to build a product on its own (Schwaber & Sutherland, 2017). Other Scrum-related statements suggest long-lasting teams to improve their throughput, predictability, and collective identity (Flemm, 2019). This is based on research recommending that teams work together for two to four years to achieve high performance (Katz, 1982). On the other hand, in product development in uncertain environments, team stability is not necessarily an important factor for team learning. When new team members bring new ideas and thoughts, it may be more beneficial to approach uncertainties creatively (Akgün & Lynn, 2002; Katz, 1982). Therefore, the IBSA clearly recommends that the team composition should be adapted to the project’s needs (Sethi, 2000).

4.3.5 Summary of key facts and propositions

The IBSA aims to present a straightforward guide for organizations seeking to enter low-income markets. To establish the approach, some aspects are explained in more detail as they seem to be particularly important for the IBSA. Accordingly, propositions are drawn to aid future research.

By its very nature, the Scrum approach works based on the involvement of stakeholders in order to receive regular feedback and improve adaptability. Partners can be integrated to build a Scrum team from participants from the organization and local representatives. Partners can also be external supporters, those in need of the solution, or interfaces with other resources (e.g., financial or legal). On-site partners provide strong social ties within the market. They know local structures and can assess the impacts of different approaches. On the one hand, this is the basis for building a social ecosystem, and on the other hand, it is key to addressing the target group appropriately, as it helps identify their needs, create awareness regarding the product, and consider the challenges of the local environment. Therefore, different partners with
different backgrounds and skills are needed to address at least the market-typical constraints. This leads to the following proposition:

**P1: Within the IBSA, the more heterogeneous the expertise of the partners involved, the better the various requirements of the target market can be addressed.**

At the same time, applying the IBSA fosters continuous knowledge transfer through cross-functional development teams. It is assumed that, in the context of inclusive business and Scrum, both knowledge transfer and sharing play a role. Knowledge transfer can take the form of codification, which the recipient drives by conveying knowledge from documents and the like. Knowledge transfer can also be a personalization process between people. This personalization then becomes knowledge sharing as a unidirectional or bidirectional process (Tangaraja et al., 2016). However, knowledge transfer should not be seen as one-sided. An organization transfers knowledge about the innovation and possibly business skills to local partners. This can be seen as an opportunity to address a lack of education (Awan et al., 2011). However, the locals transfer their knowledge of their business environment to the innovator. In this way, the needs of the target group and market influences can be taken into account more effectively. In order to achieve this, it is necessary to establish a suitable team structure, including the expertise required to complete individual steps in the market entry phase. An appropriate cross-functional structure is essential to achieve communication, integration, and cooperation as a basis for the use of core competencies (Jin-Hai et al., 2003). This may also mean that the composition of the team members must be adjusted over time to ensure both the fulfillment of project requirements and the necessary knowledge transfer. And it can be a trial-and-error approach to find appropriate team compositions for the different project phases. Therefore, the members of the Scrum team should be able to cope with changing team structures and be open to their advantages, such as new knowledge inputs, as illustrated in the following proposition:
P2: The more openly the Scrum team can handle changing team structures, the better it will be able to take advantage of this flexibility to meet dynamic requirements. Furthermore, the Scrum approach can only flourish if team members are open to its iterative character, which focuses on learning based on empiricism and experience. This means that team members should be open to sharing their own knowledge and to communicating honestly and transparently. Based on their own culture, for instance, it is conceivable that it may be difficult for team members to share their thoughts and ideas directly (Brett et al., 2006; Matveev & Milter, 2004). This can mean that the members of a Scrum team must overcome their own value systems in order to actively participate in the Scrum team. This can be important for self-organization and the open exchange of individual knowledge. These aspects are the basis of social embeddedness and thus for the desired inclusive ecosystem, as the following proposition illustrates:

P3: The more open-mindedly Scrum team members act on behalf of the Scrum team’s values, the easier it will be for the incoming organization to achieve an inclusive ecosystem.

For both P2 and P3, the Scrum Master could play an important role. It can be a challenge for the team to deal with changing structures, and productivity losses are conceivable (Li et al., 2018). It may be helpful to think of a core team with stable team members, which would also keep the loss of knowledge as low as possible. In addition, it may be necessary to coach the team in communication, collaboration, and Scrum values, as well as in intercultural competencies. Although the team is self-organizing, it is not without a leader; team members take leading roles (Hoda et al., 2012), and the Scrum Master occupies the role of a servant leader, change agent, and coach (Berczuk & Lv, 2010; Holtzhausen & De Klerk, 2018; Schwaber & Sutherland, 2020). Therefore, the Scrum Master should also be open to cultural differences and know how to address them (Lisak & Erez, 2015; Matveev & Milter, 2004). This can also mean that the Scrum master must intervene in conflict situations and should also have an impact on changes in the team composition (Brett et al., 2006).
4.3.6 Conclusion

The IBSA addresses the involvement of low-income consumers as partners in an inclusive business approach. Inclusive business thus represents the “what”, while Scrum represents the “how”. By illustrating the latter, the model can give various recommendations on an executional level.

1. Since low-income markets are characterized by various constraints and can be considered fundamentally different from Western markets, organizations are advised to follow trial-and-error processes if they want to enter them (Simanis & Hart, 2006). Agile methods, and in this example Scrum, are particularly useful when applied in highly dynamic contexts (Dybå & Dingsøyr, 2008).

2. The IBSA provides a framework for designing the market entry process at the execution level and can be applied to different contexts. Ambiguity occurs here due to the different circumstances of the market context, and at least country-specific characteristics that need to be taken into account (Lappeman et al., 2019). Regarding the African context, for example, market participants should be aware of the different country and regional profiles and the cultural forms to which they must adapt (Adogame, 2007; George et al., 2016).

3. Regarding the implementation of inclusive business, it is helpful to acquire partners as early as possible, as they are needed from the very beginning of market entry. The heterogeneity of partners and the team seems to play a vital role here. Regarding social enterprises, Goyal et al. (2015) have emphasized that non-traditional partnerships with various groups are necessary. Also Danse et al. (2020) recommended horizontal and vertical partnerships. Different and appropriate expertise is required both to execute the individual project steps and for an appropriate transfer of knowledge.

4. As the IBSA aims to build self-organizing teams, it will not only support knowledge transfer, but also enable local partners to take an active role in the business approach and value chain.
This helps lift them from the level of the customer to that of an important collaborator (Hoda et al., 2012). Various advantages, such as local knowledge and existing networks, can be used to fruitfully support inclusive ecosystems.

5. In addition to the heterogeneity of the partners, the organization should be aware that it tends to work with dynamic and culturally diverse teams, and it should consider the challenges that this might pose (Cheng et al., 2012). The Scrum Master is expected to take on an important role to help the team overcome instability and cultural barriers. Moreover, the purpose of the Scrum Master is both to serve the team and to design the IBSA process to fit its context (Cockburn & Highsmith, 2001).

In summary, the IBSA is a promising model that proposes a framework to successfully engage the target group and establish an inclusive business execution strategy for entering low-income markets.

4.3.7 Research implications

The conceptual model applies a framework that was originally used for software development in a business context in developing countries. Although Scrum is also used in other management contexts, such as agile project management (Ciric et al., 2018; Conforto et al., 2014), it is, to the best of the author’s knowledge, the first model that specifically addresses the challenges of low-income markets and inclusive business. The conceptual model illustrates how to implement the approach on an operational level, as requested by Schoneveld (2020). The IBSA thus contributes to the management literature in these business areas.

Previous literature has focused mainly on the design of innovations for low-income areas and seems to neglect the development of implementation strategies. The combination with an agile approach facilitates innovative business models and strategies (Achtenhagen et al., 2013; Chesbrough, 2010). It also supports research on treating low-income consumers not as victims of poverty but as conscious consumers and self-interested entrepreneurs who need to be
addressed in ways other than charity (Goyal et al., 2014; Peredo et al., 2018; Prahalad, 2010). Thus, the model contributes to the findings of Ros-Tonen et al. (2019) regarding empowerment by inclusive value chains; these value chains could be studied in more detail. Furthermore, the strong focus on knowledge transfer within the model illustrates that the knowledge-driven economy and enterprise research (Alguezaui & Filieri, 2014) could be deepened for low-end markets even.

4.3.8 Managerial implications

Regarding managerial implications, companies constantly seek business strategies that can succeed in low-income markets. This is particularly true for Western companies that are less familiar with local conditions. Research approaches or reports already exist that recommend some strategic ideas (Christensen et al., 2017; Hart & London, 2005). However, a strong focus on the way of target group involvement that could be applied to various contexts is still missing. This research proposes using Scrum as an executional framework to apply an inclusive business approach in combination with context-specific solutions, e.g., low-end innovation. Including agile methods such as Scrum can be key to a successful collaboration on-site without building completely new structures by applying existing approaches to other circumstances. The IBSA provides a guideline for the different project phases to build inclusive business. It gives examples of team composition, how to define Sprint goals, and how to apply user stories. It also illustrates problems that are likely to arise, such as the Definition of Done or changing team compositions.

Previously investigated non-information-technology companies typically implemented Scrum approaches in the more technical phase: development and testing (Cooper & Sommer, 2016; 2018); the IBSA extends this and covers the steps of market entry so that it can be applied to new product development, market entry, or a combination of both. It could also be combined with approaches such as decentralized manufacturing and could be a business model that
supports the local and customer-oriented production side (Rauch et al., 2017). Finally, the IBSA is not only recommended for Western companies; local companies or bottom-up initiatives can also apply it. In the African context in particular, inclusive business is also driven by SMEs (Danse et al, 2020; UNDP, 2013).

4.3.9 Limitations and future research ideas

This research is conceptual in nature, and therefore no empirical data is provided. Adding empirical data is considered a next step based on the model introduced. Nevertheless, the research illustrates a case example in which the new model could address the given challenges. It must be noted that the application options in this case study should be seen as future idea, since the case is not representative and the interviews considered were not based on the topic of an implemented IBSA. It would be valuable to implement the model and observe whether it proves to be successful and to identify further challenges with it, as those presented so far may not be complete.

Statements regarding the Development Team are still on a rather general level. Although the research addresses aspects of team instability and cultural differences, it did not consider in detail what kinds of cultural differences could have an impact. Furthermore, three to nine Developing Team members are recommended for Scrum (Schwaber & Sutherland, 2017). So far, it is still unclear whether this recommendation should also apply to the IBSA to keep the team in good working order, or whether the focus should emphasize involving all necessary partners rather than a maximum group size.

The conclusion highlights that the Scrum Master is expected to play an important role in designing the process and also has a major impact on the team. The model only recommends building a cross-functional team that can be changed but does not investigate who should assume which role within the IBSA. Thus far, it remains unclear whether the Scrum Master should be a member of the innovative organization, since the person in this role should be highly
familiar with the Scrum process (Schwaber & Sutherland, 2017; 2020). However, it is also possible that a local partner might be better suited to the role, as he or she could build better connections to local partners. A similar principle applies to the Product Owner.

Regarding the case example, it is also important to consider that the operational steps the organization takes may already resemble an agile approach, as they were improved on a trial-and-error basis. In this case, the implementation of the IBSA may not bring further strong benefits, but it does provide a guideline. Nevertheless, it can be a beneficial approach for organizations entering this field for the first time, or for those trying to find processes that help them learn more quickly from past mistakes.
5 Discussion

Based on the included papers, this dissertation addresses several issues that outline a broad area of tension. Each of the individual papers combines two research’s concepts and generates results, theses, and input for the following paper. The initial and thus underlying starting point of the research was the BoP, which we considered in the African context. To adequately address this low-income context, there is a need for both demand-driven solutions such as frugal innovations and approaches to including the target group such as inclusive business, which could support ecosystems at the BoP that ideally contribute to sustainability (Dembek et al., 2020; Lashitew et al., 2018). Frugal innovations are needs specific and also focus on applicability in the target context. Moreover, they are not limited to low-income contexts but can rather occur anywhere where circumstances require a frugal solution (Corsini et al., 2020; Vesci et al., 2021). It should be noted that innovations do not always have to be called "frugal" (see also the critical considerations in Section 6.1), as there are numerous similar innovative approaches that may be appropriate depending on their design and purpose, such as inclusive innovation, reverse innovation, and grassroot and bricolage approaches (Agarwal & Brem, 2012; Halme et al., 2012; Peerally et al., 2019; Sarkar & Pansera, 2016; Von Zedtwitz et al., 2015; Zeschky et al., 2014).

However, even if the target group could be successfully served by a frugal innovation, there are still other barriers in addressing the target group’s context and sustainability. Figure 11 illustrates how the concepts considered are related and what benefits their integration supports (displayed in gray). To address the low-income context, frugal innovation appears to be the adequate solution. In order to actually reach the target group, the findings propose a process that combines inclusive business as the “what” and Scrum as the “how”. The benefits and interrelationships of combining frugal innovation, inclusive business and Scrum are outlined in more detail below.
5.1 Social sustainability

Frugal innovations are one way of developing innovations with sustainability in mind. However, the literature now suggests that frugal innovations are not necessarily sustainable (Albert, 2019; Gandenberger et al., 2020; Hossain, 2020; Rosca et al., 2017) like some initial investigations assumed (e.g., Brem & Ivens, 2013). In most cases, they lead to social improvements, which was the main contribution that frugal cases revealed in the first publication, and which other investigations also found (Khan, 2016; Khan & Melkas, 2020; Rosca et al., 2017). Among the direct improvements to living conditions resulting from the purpose of the innovation (for instance wealth and health outcomes), the frugal cases considered in the South African context all contributed socially by creating and supporting employment and income opportunities. This result was a starting point for the second publication of this dissertation, which considered inclusive business approaches in more detail. By designing inclusive business approaches, a contribution to living conditions can be achieved (mainly by providing sources of income), which supports social sustainability in particular. Economic aspects can also be improved, as new businesses arise or more businesses are supported. Whether ecological sustainability can be achieved remains unclear, as this was not individually assessed in this dissertation.

Figure 11. Effects resulting from combining the concepts to address the BoP
5.2 Partnerships

Although the field of research on the BoP has developed considerably over the past two decades, a research gap still exists regarding research on mutual value creation and collaboration, as partnerships were largely only considered in the early years of BoP research (Dembek et al., 2020). Strategic approaches should focus on locally appropriate solutions, bottom-up co-invention, and the diversity of partners (Schrader et al., 2012; Schuster & Holtbrügge, 2014). The papers of this dissertation also underline the importance of collaboration (compare proposition six in the second paper and proposition one in the third paper). Regarding the relationship between frugal innovation and inclusive business, the second paper highlights that the frugal innovation cases with modular designs are especially able to achieve deep inclusive business integration, meaning the target group is integrated in as many stages of the value chain as possible. Thereby, locals are not only seen as a target group but as partners, which can also be encouraged by the Scrum approach (Hoda et al., 2012). For the organization that intends to penetrate the market, collaboration can be helpful in accessing the market (Schuster & Holtbrügge, 2014) and for understanding customer needs and market requirements in depth (Golja & Požega, 2012). Thereby, Scrum can be very supportive because its main purpose is to achieve stakeholder collaboration and because it therefore builds on teamwork and networks (Pries-Heje & Pries-Heje, 2011).

5.3 Knowledge transfer

As the second paper in particular illustrates, another key benefit is mutual knowledge transfer. The investigation emphasized that knowledge transfer is a prerequisite for all integration stages of inclusive business (which is also captured in the first proposition of the second paper). By contrast, Schanz et al. (2011) noted that separate business units should be established in the target market if technological knowledge is not at risk. The authors supported the establishment of integrated approaches for securing core business advantages. The results of this dissertation
suggest that knowledge transfer is one of the main drivers for building long-term business units when the market context is considered. This result supports the theoretical considerations of the final paper, which aimed to create proposals for implementing inclusive business practices that strongly support knowledge transfer. Scrum is especially known for being supportive of continuous learning and tacit knowledge transfer (Chau & Maurer, 2004; Ionel, 2008; Streule et al., 2016) because close collaboration leads to social affiliation, loyalty, and knowledge transfer (Alguezai & Filieri, 2014; Hannola et al., 2013).

5.4 Empowering the target group

Companies should also take into account that, in developing countries, a large portion of market activity occurs in the informal economy based on social ties. Companies need a deep understanding of the local environment and social embeddedness (Dana et al., 2020; London & Hart, 2004; Masiello & Izzo, 2019). Inclusive business accounts for these factors, as it aims to integrate the target group. In combination with frugal innovation, deep integration into the value chain can ideally be achieved. The results of the second paper also suggest that giving responsibility to the locals increases their motivation to run the businesses (e.g., this assumption is shown in the third proposition in the second paper). In addition, giving as much responsibility as possible to people on-site was another reason for using Scrum on the executional level. A Scrum team organizes itself based on self-control, trial-and-error approaches, and peer review, all of which strengthen the team’s role as an important collaborator (Hoda et al., 2012; Schwaber & Sutherland, 2017; Takeuchi & Nonaka, 1986).

5.5 Context challenges

The abovementioned benefits are interlinked and support to successfully address the target context – also regarding potential challenges. The three papers consider the barriers outlined by the UNDP, which include limited market information, ineffective regulatory environments,
inadequate physical infrastructure, missing knowledge and skills, and restricted access to financial products and services (UNDP, 2008). Combining the concepts of frugal innovation, inclusive business, and Scrum contributes to address these challenges in a promising way. The design of a frugal innovation can help overcome infrastructural constraints. The collaborative idea of inclusive business helps one gain access to markets and market information and also supports the finding of partners who can help one understand and address regulatory frameworks or gain financial services (Schuster & Holtbrügge, 2014). Moreover, a frugal innovation can be a financial product (Meagher, 2018). Infrastructural issues can be addressed by inclusive business designs that, for example, improve supply and accessibility of the innovation for the target group. Also Scrum as a framework is suggested for applying inclusive business approaches in combination with context-specific solutions. Thereby, Scrum serves as a guide on an executional level for building fruitful relationships and supporting knowledge transfer, which in turn are prerequisites for inclusive business.
6 Critical considerations and additional thoughts

With respect to the concepts and ideas included in this dissertation, there are some additional and critical thoughts. Although these thoughts were not considered when we conducted the research projects themselves, they should be considered, and they may also help direct future research. Without claiming to be exhaustive, the following subsections summarize some critical aspects on frugal innovation; approaches at the BoP and especially their relation to sustainability; and the interrelation of Scrum to other existing leadership approaches.

6.1 Definition and contributions of frugal innovation

In addition to the question of whether frugal innovations are really sustainable or not, they have garnered other criticisms. In particular, Pansera (2018) questions their role in alleviating poverty. The author argues that the benefits of frugal innovations with respect to addressing resource scarcity and fulfilling unmet needs are based on socially constructed poverty, which can be solved through consumption. He criticizes how the literature on frugal innovations does not scrutinize the real causes of poverty or policy backgrounds and how the literature on the winners and losers following frugal innovations is limited. Knorringa et al. (2016) even raise the possibility that frugal innovation may intensify capitalist exploitation in low-income areas. They call for more empirical studies focusing on the outcomes of local economic development and power relations in general, as the authors assume there are positive and negative effects of frugal innovation. The first and second paper in this dissertation focused on positive outcomes (mostly related to aspects of social sustainability) and evaluating cases more deeply or over the long run would be valuable. Similarly, comparing cases that have failed in terms of (social) improvement would help provide a more holistic view.

The various definitions of frugal innovation are also problematic, as they complicate research (Hossain, 2018) and make it difficult to assess whether cases are frugal or not. Considering
innovations in the low-income context, Reinhardt et al. (2018) introduced the concept of low-end innovation. They intended to form a framework around five research streams (disruptive innovation, strategic low-end innovation, resource-constrained innovation, BoP innovation, and low-end encroachment and reverse innovation). The authors based their definition on the willingness to pay, which serves as the common measure. Additionally, the authors summarized three further criteria for low-end innovation: additional constraints, high market volume, and high ambiguity. The criteria also seem to capture the drivers of frugal innovation well. This is also the reason why the term low-end innovation was used instead of frugal innovation in the last paper.

6.2 Sustainability of initiatives at the BoP and inclusive business

Landrum (2020) intended to explain why poverty has not been alleviated. To do so, she conducted a critical discourse analysis and compared business and non-business literature in relation to the BoP and subsistence market contexts. She concluded that the business literature is rooted in Western economic-oriented perspectives that perceive the BoP as consisting of broken and corrupt communities in need of repair. These perspectives result in approaches that try to alleviate poverty through consumption and formal economies but ultimately lead to even more problems, such as resource depletion and inequalities. Hall et al. (2012) had already stated that entrepreneurship policies that focus on traditional economic performance indicators may lead to BoP initiatives with destructive outcomes. Furthermore, co-creation in low-income contexts, which is mainly used as a marketing gateway to enter local communities, does not necessarily generate social value and may even intensify inequalities (Knizkov & Arlinghaus, 2019). Landrum (2020) emphasized that, in contrast to the business literature, the non-business literature presents subsistence markets as the epitome of sustainability and is defined by empowerment, abundance, and a good life. In addition to preserving traditional lifestyles and an informal economy, these markets support balanced production and consumption and equal
and sustainable livelihoods. Deep involvement of the target group achieved through inclusive business (supported by Scrum) is assumed to be more likely to contribute to sustainable livelihoods than Western market-oriented economic solutions. Also, Landrum's (2020) view challenges not only previous approaches to poverty alleviation but also the SDGs themselves, as they are based on economic concepts (Weber, 2017). She recommends viewing ways of life at the BoP not as problematic but as a traditional approach to poverty reduction.

Inclusive business has been shown to have at least one effect on improving food and nutrition security (SDG 2 of Agenda 2030), which is it increases farmers’ incomes. However, it cannot be said that this ensures food and nutrition security for the broader population because, among other issues, other sources of income besides agriculture remain scarce (Van Westen et al., 2019). Kaminski et al. (2020) investigated inclusive business models in aquaculture and emphasized that inclusiveness should be defined based on the nature of underlying relationships, as there are economic and social upgrading opportunities that arise from horizontal and vertical coordination. However, a gap still exists regarding aspects of environmental upgrading, which leaves open the question of whether inclusive business models can cover all aspects of sustainability. Another example to question environmental impacts is the shea butter processing technology in Ghana. The technology significantly improved women's lives socially and economically by improving employment opportunities and incomes, increasing savings for medicine and education, and increasing productivity (Mohammed et al., 2013). However, environmental aspects should also be considered in detail in this example, as it is possible that the efficient processing technology requires more resources. In general, rebound effects, such as the effects social improvements could have on the environment, should be considered (Sorrell, 2007) when overall sustainability is assessed.
6.3 Aspects of leadership theories in Scrum

As outlined in the theoretical background section, agile approaches have a long history (Abbas et al., 2008; Larman & Basili, 2003). They have received considerable attention in research and practice in recent years, as they address several barriers in traditional software development. However, agile methods are not suitable for all projects, and some key factors need to be considered to successfully adapt them (Boehm & Turner, 2005; Chow & Cao, 2008; Nerur et al., 2005). Although the results of the research of Boehm and Turner; Chow and Cao; and Nerur et al. refer to software-related projects, it is assumed that barriers also occur in non-software projects. Therefore, the IBSA should be seen as a guideline that needs to be designed according to the project and context requirements.

The design of leadership in the IBSA is thus considered supportive for the Scrum team, as the team members will come from various backgrounds. Scrum teams are self-organized but not leaderless, and they constantly reorganize themselves to overcome challenges (Cockburn & Highsmith, 2001). In terms of leadership theories, a Scrum team practices a form of shared leadership, as the team members influence each other to achieve a goal, for example, the sprint goal or a broader organizational goal (Pearce & Conger, 2003). The Scrum Master is often labelled as a servant leader (Holtzhausen & de Klerk, 2018; Schwaber & Sutherland, 2017). The idea of servant leadership is strongly rooted in the leader’s personality and motivation, which comprises their motive, mode, and mindset (Eva et al., 2019; Greenleaf, 1977). A servant leader is a servant first, which results in empowering people (Greenleaf, 2002). Van Dierendonck (2011) pointed out that servant leadership differs from transformational leadership in that the aspect of idealized influence (Bass, 1999) is missing and its focus is on the well-being of the individual rather than the pursuit of organizational goals. In summary, Scrum to some extent includes aspects of leadership methods that could be supportive for a productive work environment even without the Scrum framework around them. However, it is perhaps the
combination of leadership methods that contributes to the spread of the framework. For example, Pearce and Sims Jr. (2002) have shown that combining shared leadership with transformational and empowering leadership is particularly valuable in teams with complex tasks.
7 Methodological limitations

This dissertation is based on qualitative methods and a conceptual work because the state of the research on the topics considered in this dissertation are still evolving (Eisenhardt & Graebner, 2007). Moreover, the African context or the low-income context is broad and includes several different influences. Therefore, a quantitative approach was not feasible. It would be valuable to add quantitative data, for example, to collect success criteria across a more representative number of frugal case studies that incorporate inclusive business structures. However, the contextual conditions are possibly too diverse to create a meaningful quantitative research project that would support case study research (Yin, 2009).

The generalizability of the findings from the case studies is limited to the cases and the setting (Yin, 2009; Zucker, 2009), and the findings can be seen as a basis for large-scale studies (Bouncken et al., 2021). From the in-depth study of the cases, a theoretical generalization was made, while an inferential generalization to other contexts is conceivable but was not made. The possibility of generalizing the findings to other contexts depends on the degree of similarity of other contexts (Lewis & Ritchie, 2003).

Access to data was limited because the research context was in rather rural areas on another continent than where we are located. Interviews were mainly possible using virtual methods. It would have been valuable to extend the projects and achieve better triangulation by including, for instance, on-site observations (Lewis & Ritchie, 2003).

Long-term evaluations of the cases and evaluations from additional perspectives would have also been valuable. For example, to consider the perspective of the target group consumer who becomes an employee would be interesting to deeply examine the impacts of the case for other stakeholders, as was demanded by Rosca et al. (2018). This extended examination would have been valuable for addressing possible negative outcomes, as called for by Knorringa et al. (2016) regarding frugal innovations (see Section 6.1). The sustainability assessment was also
limited to aspects that could be found in publicly available data or were mentioned in interviews but did not consider in-depth measurements to address, for example, ecological impacts. In addition, qualitative research should be conducted to investigate the practical applicability of the IBSA conceptual model presented in the final paper.
8 Research implications and future research ideas

This investigation contributes to filling gaps in business research in low-income contexts mainly by proposing options for practical implementation. Therefore, this research should be of interest to economic and especially managerial researchers. Several implications and future research ideas are outlined in the individual papers. The main ideas can be summarized and expanded as follows.

The first paper on frugal innovation and sustainability introduced a framework that worked well in assessing the sustainability of the frugal cases considered. The main intention of the framework was to simplify the complexity of the SDGs (e.g., Bali Swain & Yang-Wallentin, 2020; Fonseca et al., 2020; Nilsson et al., 2016) in sustainability evaluations without losing too much detail. This framework is valuable for research and practice. For example, the framework can be used to obtain a first impression on the sustainability of an innovation, process, or service. It can also be used as a guide for more detailed assessments where, for example, the main sustainability contribution (i.e. which of the three sustainability dimensions) is ascertained for further evaluation in a next step using more tailored methods. Because the framework achieves a more holistic perspective on sustainability initiatives, it also supports Elkington's (2018) call to understand sustainability as systematic change for future capitalism. Recent literature also emphasizes that sustainability commitments can influence the strategic behavior of companies and their innovations (Klein et al., 2021). In general, research on holistic approaches for evaluating sustainability should be extended, as the complexity of these approaches still hampers research.

Regarding the manifold definitions of innovation in low-income contexts, the second paper added a further characteristic to frugal innovation, modular design, which could be further explored in future research to better concretize features of frugal innovation. The modular
design feature could even address some of the challenges outlined by Reinhardt et al. (2018) on low-end innovation, such as distant needs customer acquisition or access creation. Both the paper considering frugal innovation and inclusive business and the paper considering inclusive business and Scrum addressed the challenges raised by the UNDP (2008) regarding inclusive business and provided recommendations on how to overcome them. In particular, the application example in third paper integrates the barriers the UNDP summarized. Moreover, Knizkov and Arlinghaus (2020) recommended addressing all steps of the value chain to achieve a frugal process. Doing so could also improve environmental aspects such as waste reduction.

The second paper on frugal innovation and inclusive business also stressed the importance of deep integration in the value chain but with a focus on social contributions. Combining our results with the findings of Knizkov and Arlinghaus could lead to an interesting research approach for achieving a more holistic perspective of sustainability contributions. In general, more empirical data would be valuable for further research on inclusive business, perhaps even quantitative data intending to derive success factors. Future research could also look more closely at the contribution of inclusive business to social sustainability and examine, for example, what other effects may result from improved incomes. Moreover, López-Pérez et al. (2018) found that the positive impact of corporate social responsibility actions on business performance is higher for family-owned firms. They assume a relation with the Stewardship Theory (Davis et al., 1997). It would be interesting to evaluate whether similar results can be found in the field of inclusive business, as the results in this field also suggest that social ties are important (Masiello & Izzo, 2019).

The second paper and especially the third paper support previous research that considers consumers at the BoP as not only "poor" consumers for cheap solutions but also as partners in the sense of self-interested entrepreneurs. In particular, the papers highlighted how this target group can be integrated into the value chain and the benefits of doing so. One important
advantage of integrating the target group is the contribution to knowledge transfer, as a lack of education is a characteristic of poverty definitions (World Bank Group, 2018) and consider thereby the SDGs (UN, 2015a; 2015b). A second important aspect is partnerships. Focusing on the entire value chain (as recommended in the second paper to achieve deep integration into the target group) and collaborating with different stakeholders (as highlighted in the third paper) could further support a more holistic evaluation of sustainability (Arnold, 2015). Inclusive business approaches and partnerships could also conceivably enhance sustainability impacts according to circular economic principles (Van Niekerk, 2020). Future research should, of course, look more closely at the design of partnerships, as recommended in the papers. This investigation could also further develop aspects of partnerships outlined for inclusive business by Zhu and Sun (2020), for example, by investigating how partnerships evolve in the IBSA. However, particularly in regard to Section 6.2, which illustrated a critical view of BoP initiatives, future research could focus on cases where the initiatives are driven from the bottom-up and are perhaps only supported by an incoming organization. On the one hand, all the findings of this work are applicable to grassroots initiatives and, on the other hand, it is assumed that the success of grassroots initiatives is more sustainable, as these initiatives are better embedded in their context (Hossain et al., 2021; Kaminski et al., 2020; Landrum, 2020).

Finally, more research on the use of Scrum in inclusive business contexts could also extend research on leadership in agile environments. Especially in distributed teams, the question arises as to which aspects of leadership are useful in addressing, for example, cultural and temporal complexity (Lous et al., 2018), which are challenges that were assumed with the IBSA. Furthermore, the application of the IBSA could complement the research of Soundararajan et al. (2021), who recommend implementing an agile sustainability governance mechanism that incorporates aspects of sustainability more deeply.
9 Managerial implications

One outcome of this dissertation is that the findings intend to address considerations of practical implementation. This outcome started with the first paper, which introduced a framework for evaluating sustainability in an adaptable way and was followed by the paper that considered inclusive business approaches for frugal innovations. This paper concluded that modular designs for frugal innovations can support a deep integration into the target group. Finally, the last paper focuses on the operational level by suggesting implementation opportunities that could be supportive in various contexts, as they are based on experiences in dynamic environments.

When organizations intend to enter low-income markets, contextual conditions should be carefully considered and innovations should be adapted, and frugal solutions may be appropriate. Moreover, handing over as many steps of the value chain as possible to the local population may be fruitful for implementing inclusive business approaches. Therefore, organizations could consider both proposed frameworks, the IBLMFI and IBSA, to benefit from their advantages, which are partnerships, knowledge transfer, and empowerment. Scrum is suggested as a guideline for building a flexible, simple structure for collaboration and knowledge transfer. Scrum might be understood as an option that mainly takes benefits of leadership styles (Pearce & Sims Jr, 2002) to design operational and collaborative processes in the implementation of inclusive business practices. In addition, a sustainable orientation must also be promoted by leadership (Jones et al., 2017; Kurucz et al., 2017), and this could be supported by a Scrum-oriented manager. Moreover, supporting the development of frugal innovations with modular designs, using Scrum could be valuable since the original idea of Scrum is based on the development of increments that fulfill a basic functionality (which, in the software context, leads to a release). However, organizations should make their decisions based on holistic perspectives and also weigh the amount of information they are willing or
able to share and what kind of knowledge they would need in the target context to support their innovations (Schanz et al., 2011).

Combining frugal innovation with inclusive business to establish a business structure and using Scrum as a guideline for executional implementation could support organizations in targeting low-income contexts, whereas the areas of application are broad and can encompass, for example, low-income contexts, sustainability initiatives, and also inclusive business approaches in developed markets.
10 Conclusion

The aim of this dissertation was to link several phenomena and illustrate their interrelations that could increase value creation and could be success factors when addressing low-income contexts. Thereby, benefits for social sustainability, partnership building, knowledge transfer, and empowerment of the target group can be achieved. Inclusive business structures seem to provide the necessary support through a collaborative approach. Especially by working with agile methods such as Scrum, the target group in the low-income context could be included as a partner at eye level rather than viewed as a producer or, even worse, merely as a consumer. The goal is to build a collaboration that takes the context into account rather than only aim to achieve competitive advantages or find a marketing gateway (Knizkov & Arlinghaus, 2019). Another goal is to find an adequate business model that can realize long-term success in terms of sustainability. This goal is in line with the definition of inclusive business of Schoneveld (2020), who recommended integrating the target group to achieve solutions to neglected problems that address sustainability. Nevertheless, as the critical considerations show, issues concerning approaches to poverty reduction and their link to sustainability are still disputed. The results of the cases considered in this dissertation outline that a contribution to sustainability can be achieved, at least with respect to improving living conditions. In most of the cases, other sustainable benefits were also observed. However, to achieve sustainability, the SDGs may not be the only guiding metrics, as they are not without tradeoffs and also appear to be linked to conventional economic pathways (Fonseca et al., 2020; Spann, 2017; Weber, 2017). In any approach, the BoP consumers themselves are suggested to play a key role because they are the ones who best know their markets, needs, networks, and circumstances. They are in a position to build markets based on their experience (such as described in Landrum, 2020), and their experience and approaches could be supported to the extent that it is actually necessary, for example, through innovative and sustainable materials. Such innovations or
materials can be frugal or should at least be strongly driven by local conditions and requirements. For example, they should be resilient with respect to extreme weather conditions, which was an important factor in some of the examined cases. Then the responsibility for building business structures could be given to the target group as much as possible, intending to achieve a close collaboration. This can be supported by approaches such as inclusive business and Scrum, which serve as guiding principles.
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