MICHIGAN ROSS

Designing an Implementation Framework for Green Innovation Adoption in the Global South, Using the Country of Benin as a Case Study

by

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Abstract

With the increased environmental, social, and economic impacts of climate change, it is imperative that green innovations are utilized for sustainable growth, particularly in the Global South. When providing a green innovation, a context-specific implementation needs to be utilized. This research works to create an implementation framework for green innovation suited for the Global South, using the country of Benin as a case study. Using a grounded theory approach, qualitative data was collected through interviews and was then analyzed to find key concepts related to the success of green innovation interventions. These findings were used to develop an implementation framework for Benin and other countries with similar contexts. This study adds to the growing research on how sustainable interventions can be introduced to the Global South.

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1. Introduction

With record-breaking wildfire seasons, coral reefs facing extinction, and a melting Arctic, climate change is simply not allowing itself to be ignored any longer. As the impacts of climate change intensify, sustainable solutions are becoming more important than ever. Last year, with the Belém Action Mechanism (BAM) developed at COP30, it is evident that the Global South can be a force for positive transformation towards climate goals. The UN Climate Change Conference of the Parties (COP) 30 set a new precedent for climate action, specifically focusing on human rights and providing the Global South with tools for clean economic growth (UNU EHS, 2025). BAM is a platform from COP's Just Transition Work Programme (JTWP), centered around a just transition where the Global South is a driving actor within the system. While countries in the Global South will face the effects of climate change more intensely than their counterparts in the Global North, it is vital that opportunities for economic development are still present under the current climate circumstances. Green innovation serves as a tool to further economic growth while still providing a net positive environmental and social impact. While green innovations can foster significant sustainable development, their implementation process heavily alters the success of any potential technologies. Because of this, it is critical to develop and utilize an implementation framework tailored to the specific context of a location to maximize any potential benefits. Benin, a West African country, is one example of a country that is both facing the detrimental impacts of climate change but also has the potential for being a force for positive development. By designing an implementation framework for green innovation in the country, Benin can be empowered to pursue economic growth while mitigating climate risks.

1.1 Statement of the Problem

As the effects of climate change continue to devastate the environment and society, it is imperative that sustainable economic development is pursued. This issue is particularly relevant in the Global South, who are least equipped to deal with the effects of climate change, but who will be most impacted. Benin, a country in Sub-Saharan West Africa, faces these immediate climate risks. The goal of this research is to provide insights into potential green innovations to meet the needs of Benin and how to implement a potential technology. The objective of this implementation framework is to provide positive environmental, social, and economic impacts. In terms of social impact, this implementation will positively benefit the Beninese population, specifically addressing individuals who may be overlooked in traditional ventures. This technology implementation will also result in economic growth while avoiding any potential negative climate impacts. By addressing all three avenues of impact, this research will provide a holistic perspective on potential ventures the country can pursue.

Green technology provides a solution to reduce negative environmental impacts while fostering economic and social development. Because green innovations vary so drastically, it is important to analyze what aspects of technologies are best tailored to each individual market. While identifying the relevant technological components is vital, determining the means of implementation is equally important. Implementation frameworks can determine the success rates of the initiative, further the benefits they provide, and influence the profitability for the firm designing and implementing these interventions. Because of this, the following research questions have been outlined to determine potential interventions:

- RQ2: What implementation framework or process for green innovations would result in the greatest usage and sustainable development in Benin and countries with similar contexts?
    - RQ2.1: Considering the cultural, social, and geographic context of Benin, what components or features of green technologies would be best suited to meet their needs?

By utilizing these two research questions, a grounded theory approach can be taken to apply an intervention that results in economic, environmental, and social welfare in the country of Benin.

1.2 Justification of the Problem

With the global destruction that climate change will cause, intense mitigation strategies need to be pursued immediately.. While climate change has adverse environmental effects, it also leads to social and economic degradation. In terms of health impacts, the World Health Organization (WHO) has identified that approximately 250,000 additional deaths will be caused each year from climate change between 2030 and 2050 (World Health Organization (WHO), 2023). By developing climate risk mitigation strategies proactively, these unnecessary and tragic deaths can be avoided. While negative health impacts are one result of climate change, climate change also adversely impacts the economy. As found by the World Economic Forum, “the global cost of climate change damage is estimated to be between $1.7 trillion and $3.1 trillion per year by 2050,” (Bennett, 2023). These costs include the destruction of infrastructure, property agriculture, and human health. From an economic perspective, accepting the results of climate change is significantly more expensive than developing the appropriate mitigation strategies. Due to the imminent threats that climate change is causing, it is imperative to utilize green technology to alleviate the impacts of climate change while pursuing economic growth.

When looking at Benin specifically, it is clear that climate change will have a particularly negative impact on their country. Because Benin is a coastal nation, sea level rise and coastal erosion has especially problematic impacts on their country and population. Not only that, but in Benin, over half the population- over three million individuals, live on the coast (United Nations Development Programme, n.d.a). This means that the majority of inhabitants of Benin are extremely vulnerable to the effects of climate change. Also, according to ND-GAIN rankings, which evaluates a country's vulnerability to climate change and their ability to adapt, Benin is currently projected to experience particular difficulties in this realm. Benin is ranked 171 out of 187 countries in terms of vulnerability to climate change, making them 91% more vulnerable to the impacts of climate change than other countries (University of Notre Dame Research, n.d.). When looking at the nine different areas evaluated to determine vulnerability (ecosystem services, food, health, human habitat, infrastructure, water, adaptive capacity, exposure, and sensitivity), Benin is ranked in the bottom 50% of each category. Their vulnerability to climate change is not relieved by their ability, or lack thereof, to adapt to these circumstances. Out of the 187 countries ranked, Benin is ranked 116 in terms of readiness and ability to adapt, 62% lower than the other countries ranked (University of Notre Dame Research, n.d.). Considering the three factors of economic readiness, governance readiness, and social readiness, Benin is ranked at the bottom 50% for both economic and social readiness. This emphasizes that while Benin is going to be greatly impacted by climate change, they are not currently able to manage these effects. While Benin is experiencing the consequences of climate change, they are not equally contributing to greenhouse gas house (GHG) emissions. According to the United Nations (UN), Benin only contributes 0.06% to the share of total global GHG emissions (United National Development Programme, n.d.b). Because of this, Benin must deal with the effects of climate

change while not working as a core contributor to the problem. This research conducted by the UN also highlights Benin's desire to balance economic development with reducing emissions in sectors directly related to economic growth. Creating the opportunity for Benin to reach their target metrics while allowing for economic growth results in a balance of potentially conflicting goals. With Benin's increased vulnerability to climate change, but their desire for economic development, this research will be able to outline potential solutions to address these needs.

When considering Benin's priorities and work towards sustainable growth, the Sustainable Development Goals (SDG) help provide quantifiable insights and suggestions for improvement. According to Benin's Sustainable Development Report from 2024, Benin is succeeding in a variety of sectors, more than halfway to completing all 17 SDGs (United Nationals Sustainable Development Solutions Network, 2024). While Benin is experiencing notable success, there are some SDGs that still require a more targeted focus. In particular, SDG 6 - Clean Water and Sanitization and SDG 7 - Clean and Affordable Energy are areas where Benin requires more concentrated efforts. While Benin is working to address all 17 SDGs, they have also clearly vocalized their interest and desire to achieve economic development through sustainable means. Benin has become the 51st state to become a member of the Global Green Growth Institute, an organization focused on sustainable economic growth in developing countries (Global Green Growth Institute, 2025). Through their commitments, Benin specifically states their desire to build climate resilience. As Benin has directly communicated their desire for sustainable economic growth and climate change mitigation, this research will provide a strong foundation for potential interventions.

1.3 Expected Contributions and Significance of Research

This research will develop an implementation framework to realistically ensure that potential green interventions can be utilized while also providing information on what aspects of green technologies are best suited for the needs of Benin and countries with similar contexts. When analyzing the Global South and their vulnerability to climate change, individuals and research often immediately focus on adaptation strategies. Though, as the largest market globally, the Global South can be viewed as an avenue for transforming and achieving sustainable development. This research considers mitigation strategies that can empower the country to reach sustainable economic growth. By developing a usable implementation framework, this research can realistically address pressing climate concerns without sacrificing economic development.

2. Literature Review

To develop a holistic understanding of relevant research conducted in the past, the topics of green innovation as well as innovation implementation, specifically in Base of the Pyramid (BoP) markets, needs to be studied.

2.1 Green Innovation - Definitions, Benefits, Challenges, and Applications

Developing an understanding of green innovation starts with learning what green innovation means. Throughout various research and publications, different definitions of green innovation have been created, though many similarities can be found between these definitions. Overarchingly, green innovation (GI) refers to a product, service, or process that has a positive environmental or social impact (Chavira et al., 2023). Understanding the definition of green innovation or green technology equips us with the language necessary to analyze these concepts. For this research, all innovations or technology resulting in a positive environmental or social

impact will be included under the GI label. Green innovation offers firms countless benefits, incentivizing firms to implement green technology when possible. GI offers not only environmental benefits such as pollution reduction, but also offers a competitive advantage against other firms, a stronger brand reputation, increased resource productivity, and greater revenues. Showcasing these benefits can help firms make the decision to prioritize GI development and utilization. A research study focused on defining green innovation and analyzing its impact also highlights potential barriers to designing GI. From a supplier perspective, the main barriers to GI include the lack of urgency to implement GI,, having a narrow focus on customer segments, not wanting to lose control through necessary collaboration, not having enough revenue to pursue green innovation, and having a fear of failure of the innovation (Chavira et al., 2023). These barriers give us insight into potential obstacles firms will face when attempting to develop and implement green innovation. One limitation this article highlighted in their own research was the lack of consideration of practical examples. Practical examples help put theoretical concepts into practice and create a real impact. With this in mind, this research study provides a practical application and implementation of green innovation in Benin, providing a specific opportunity to carry out these theoretical concepts.

While it is vital to understand what green innovation means, its benefits, and its challenges, it is also important to consider what ways that GI has been studied in the past. Overall, it is seen that green innovation is on the rise, making it more relevant than ever to research. One literature review on green innovation highlights that 44% of research articles looked at benefits of GI implementation, 23% looked at motivations and pressures to implement GI, 18% looked at barriers to implementation, 10% looked at the financial and economic impact of GI implementation, and 5% looked at public vs private sector GI (Takalo et al., 2021). This

gives a holistic understanding of what GI research has been done in the past. While significant research has been done regarding the benefits and motivations to execute green innovation, significantly less research has been conducted to understand specific applications of green innovation.

To better understand GI's potential impact, it is imperative to consider different scenarios in which green innovation has been applied. While there are a variety of green technologies that fall under the green innovation bucket, one large sector is renewable energy. One research article found that 54% of the population of Sub-Saharan Africa does not have access to electricity, highlighting the need for increased energy access (Mukoro et al., 2022). An article considering the relationship between financial inclusion and energy access in Sub-Saharan Africa also provides further insight into factors influencing clean energy usage. This article finds that higher financial inclusion results in greater energy access, specifically highlighting the relationship between mobile money and grid connectivity, the relationship between age and energy access, and energy access in urban vs. rural areas (Richardson et al., 2025). The importance of mobile money for women as well as their greater interest in the positive outcomes of solar energy usage compared to their male counterparts was also emphasized. Mobile money allows women to access financial services in a non-traditional manner as more traditional banking systems contain many barriers to access. This demographic understanding serves as a foundation to design green innovation implementation strategies that address all relevant stakeholders, ensuring that the strategies are socially sustainable. One limitation this study brings up is the lack of emphasis on women's roles and perspectives when designing implementation strategies. This serves as an important reminder to highlight these viewpoints when developing this implementation framework.

2.2 Innovation Commercialization and Implementation of - Business Models and Processes

Another important aspect of green innovation considers the different business models that can be employed to create impact. Research has identified two main types of business models commonly employed, utility-side models and user-side models (Mukoro et al., 2022). Understanding these two types of business models provides information as to the different ways that green technology can be employed. While a utility-side model centers the supplier's perspective and usually utilizes an approach with centralized technology, a user-side model revolves around the users' perspective and needs. The main concerns when implementing any sustainable energy systems include the lack of information on environmental impacts, not meeting user expectations, and using business models that are disconnected from the communities they are impacting. When designing an implementation framework, it is imperative to focus on co-creation, cultivate a deep understanding of impact, and develop an iterative process.

Within the umbrella term of user-side models, further distinctions can be made between different implementation processes. Understanding the variety of frameworks used for innovation implementation creates a foundation of relevant strategies to include when developing a framework for Benin. One article that considers this concept looks at the commercialization process of disruptive innovations. Through this research, it was found that the two approaches taken are either linear, which is a step-by-step straight line process, or non-linear, which is an iterative process that looks at product development and interacting with others throughout the process (Cubero et al., 2021). One very common framework used focuses on markets in a non-linear format. It outlines six activities for market creation, starting with generation and choice of application and ending with managing market evolution. Another

common framework looks at business-to-business firms, outlining six potential challenges which can be used to generate the implementation plan. Finally, we see a proposal for commercialization through the phases of 1. Discovery 2. Incubation and 3. Acceleration. By understanding the most common frameworks used for innovation commercialization, knowledge regarding framework structures, their benefits, and their challenges can be consolidated. That knowledge can be aggregated to find the most common factors relevant to multiple frameworks. This information is very useful in the process of developing an implementation framework for the specific context of Benin.

2.3 Frameworks and Factors of Implementation Specific to the Base of the Pyramid

While a variety of innovation commercialization frameworks have been developed, considering specific frameworks for addressing the needs of the Base of the Pyramid (BoP) provides more tailored information to this study. The BoP looks at the largest portion of the market, those with the lowest disposable income. Because of their differing circumstances from markets in the Global North, it is important to consider factors relevant to BoP conditions as opposed to directly transferring frameworks utilized in the Global North.

Firstly, with the BoP, it is important to understand that the needs of the market may not be able to be immediately met as the market needs to be first created (London & Hart, 2010). Though there are significant unmet needs at the BoP, customers often don't yet realize what those needs are. Before innovations are even suggested, the market first needs to be developed. Additionally, working with the BoP requires significant rethinking of past assumptions as individuals often come in with outside perspectives and unintentional biases. From their external perspective, individuals may have already developed certain assumptions about the BoP market, their needs, and how interventions should be employed. Before developing any venture targeting

this market, it is crucial to work to unlearn any biases. Without this step, individuals may have a clouded perspective that limits their ability to learn and interact with BoP community members. Another vital step to BoP interventions is ensuring the embeddedness of the innovation as well as social embeddedness. Embedding the innovation means that innovation should not serve as a one-time initiative that is employed but should instead be embedded into consumers' lives (London & Hart, 2010). As described by London and Hart, embedded innovation works to have consumers, "adapting behaviors and habits of thinking, reprioritizing routines and budgets, and adjusting relationships to other products and objects that make up their environment, (2010). This level of embeddedness works to deeply intertwine the product into the lives of consumers, developing a value proposition that is increasingly necessary. Additionally, it is also vital to become socially embedded during the implementation process as well. This involves immersing yourself in the community to better understand their needs. These steps can be achieved through building relationships with community members at the BoP. By communicating with individuals from this market and developing a relationship, individuals can better understand their lives as well as their needs (London & Hart, 2010). These relationships help with creating a new market, unlearning biases, and developing social embeddedness. Not only that, but building relationships with community members also works to develop trust. Because community members may already have significant relationships with local vendors and firms, developing trust is critical in influencing a consumers' willingness to try a new product. Even when implementing new innovation, entering partnerships with local teams is crucial to success (Casado Cañeque & Hart, 2015). Overarchingly, it can be seen that direct relationships with the consumer market is necessary when creating interventions for the BoP.

Another distinction research has outlined between traditional markets and BoP markets is the need for co-creation. Co-creation looks at how products and ventures are developed, removing the traditional boundary between the firm developing the product and the consumer purchasing the product and instead, utilizing a more reciprocal relationship between the parties (Prahalad & Ramaswamy, 2000). The goal of co-creation is to utilize the competencies of customers. One aspect of co-creation looks at encouraging dialogue as customers' perspectives can influence their understanding or use of a product. By having dialogue with customers, firms are better able to ensure that their products are meeting the needs of the market. Not only that, but co-creation also focuses on mobilizing customer communities. Because members of a community influence each others' perspectives, utilizing that community to garner support for a technology is imperative.

Another important aspect of reaching the BoP is utilizing patient capital. Patient capital is the idea that when making capital investments targeted towards the BoP, there may be a longer time horizon than in traditional investments before returns are seen (London & Hart, 2010). Patient capital also emphasizes that while financial returns are considered, social impact is also a significant metric of success. The concept of patient capital emphasizes the differences between financial investments in traditional markets as opposed to the BoP market.

To successfully reach the BoP, certain concerns must be thoroughly addressed. When considering what factors influence technology adoption, affordability, availability, awareness, and accessibility have all been outlined as crucial elements (Casado Cañeque & Hart, 2015). Additionally, it is important to ensure that products have been adapted to the needs and priorities of the BoP market while still providing quality-products (Casado Cañeque & Hart, 2019). These

factors provide information as to what elements of an innovation are most relevant to this specific market.

3. Theoretical Frameworks and Their Applications

3.1 Stakeholder Theory

One theory that serves as the foundation for this research is stakeholder theory, originally developed by R. Edward Freeman in 1984. Stakeholder theory considers that a firm's role is to create value for all of its stakeholders, not just investors or shareholders (Freeman, 2018). These stakeholders range from employees, consumers, community members, to shareholders . While the firm shouldn't negate the importance of profits, there is a greater emphasis on creating value for all stakeholders. In this context, the technology that is chosen and the implementation framework designed isn't based on what options provide the most profits. Instead, this research focuses on profitable interventions that meet the needs of the various stakeholders in Benin. Understanding this theory allows for a more nuanced perspective of potential solutions.

3.2 Embedded Innovation Theory and Co-Creation Theory

Embedded innovation theory also provides a deeper framework for this research. As previously described, this involves integrating the innovation into consumers' lives (London & Hart, 2010). When considering this research, a one-time venture proposed from an outside perspective pushed into the lives of the Beninese population should not be proposed. Instead, this innovation needs to be embedded into the ecosystem of their lives, addressing their needs from an inside perspective.

The final theory that greatly influences this research is the theory of co-creation. Co-creation allows consumers' own understanding of their needs, their communities, and their markets to be capitalized to develop more relevant products or solutions. In this scenario, it is

vital that technologies are not proposed before directly interacting with Beninese individuals. If this is done, the technology will have a lower likelihood of adoption. This concept of co-creation is also vital when developing an implementation framework as considering the perspectives of consumers is the first step in creating a usable intervention design. The value of co-creation and the embedded innovation theory work together to shape how technology is designed and implemented in a community.

4. Methods

4.1 Methodology - Grounded Theory Approach

This research utilizes a grounded theory approach for data collection and analysis. Grounded theory is a type of exploratory research that codes and analyzes observational data, developing categories of codes or themes (Corbin & Strauss, 2008). Grounded theory is an iterative process that focuses on identifying common themes through multiple iterations of data collection.

4.2 Research Design and Interviewee Identification

To get a better understanding of the factors that influence green technology adoption in the Global South, relevant industry experts were interviewed. Interviewees needed to have experience with green innovation, particularly in the Global South, and fell into one of the three categories listed below:

Categories of Interviewees	Example(s) of Relevant Fields
Civil Society Members	● NGOs ● Academia
Civil Servants	● Government ● International Development
Entrepreneurs	● Technology Development ● Startups

By interviewing individuals from a variety of backgrounds, a diverse array of perspectives can be collected. Interviewees were selected with purposive sampling. This involves selecting interviewees based on specific criteria, in this case, relating to their professional expertise. Then, a snowball sampling method was incorporated by having interviewees recommend other professionals to interviewee. The data collection also worked towards maximum variation sampling with the goal of acquiring a diversity of perspectives. A semi-structured interview approach was utilized, using guiding questions to provide an outline of the interview but leaving the questions open-ended to collect any information the interviewee may find relevant.

4.3 Interview Question Design and Interview Protocol

Using OpenAI to code findings from the literature review, the following categories were identified: 1) Drivers of green innovation, 2) Barriers to green innovation, 3) Barriers to green innovation adoption, 4) Organizational enablers, 5) Policy and institutional environment, 6) Adoption motivations, 7) Gendered dynamics of green innovation adoption, 8) Business model effectiveness and limitations, 9) Community and ecosystem embeddedness, 10) Market creation, 11) Co-creation, participation, and user-centric design, 11) Barriers rooted in affordability, access, and awareness, and 12) The role of ecosystems and partnerships (OpenAI, 2025).

The categories listed above were then used to develop a variety of interview questions and the following interview protocol. Interviewees were first categorized into one of the three aforementioned groupings. Before interview questions were discussed, all interviewees were told the "Interview Introduction Statement" (Appendix A) to provide further background on the topic of this research. While all interviewees were asked about the same topics and utilized similar questions, question language was tailored to the specific background and knowledge of the

individual and follow-up questions were asked as needed. Appendix B provides the set of principal questions utilized for “Civil Society” members. To begin with, interviewees were asked an open-ended question to create space for the interviewee to develop initial responses with follow-up questions and clarification being asked as necessary. While specific interview questions were utilized, it was also important to stay open to following the direction interviewees took their responses in and respond accordingly.

4.4 Data Collection

A purpose sampling method was initially utilized to reach out to potential interviewees from each category. Interviewees were either emailed or texted an interview request describing the nature of this research as well as the format and structure of the interviews. Interviews were conducted virtually over Zoom and took between 20 - 45 minutes, depending on the interviewee availability and the content discussed. To protect the security of all personal information, the Zoom meeting utilized a password protected meeting link, and the meetings were locked after interviewees joined, ensuring that unexpected participants could not enter. The Zoom meetings were recorded and stored on the Zoom Cloud. Altogether, 19 interviews were conducted. From those 19 interviews, 12 interviewees were Civil Society Members, 3 were Civil Servants, and 3 were Entrepreneurs.

4.5 Data Analysis

During these interviews, full transcripts of the conversations were collected. All transcripts were read through to check for accuracy and clarity. NVivo, a qualitative data analysis software, was then used to code each interview transcript. Using a grounded theory process, open, axial, and selective coding was conducted. First, open coding was used to analyze interviewee statements, going through each transcript line-by-line, and creating fairly detailed

codes or labels for each sentiment that was discussed. During this step, the codes are still fairly specific with less focus on professional or succinct language as the goal is to accurately depict the data and interviewee perspectives. For example, one code given to the statement, “everyone has glimmers of talent that show up in different ways, so then it's just about being mindful of what people are good at, and then calling that out in them, and asking them if they would like to take this little step” was “find and utilize peoples talent/niche”. During the first round of open coding, a total of 270 initial codes were created with 35-130 codes assigned per interview/transcript. After about half of the interviews were conducted and analyzed, many codes started repeating and were naturally being grouped together which led to the next step of axial coding. Axial coding was used to categorize the open codes and find and organize frequent sentiments. The goal of this step focused on identifying broad themes and relationships between the codes. For example, the theme of “Community Involvement” included codes such as “community input”, “community involved in decision-making”, “community buy-in”. From the axial coding process, selective coding was used to formulate clear relationships between these categories and develop the final implementation framework.

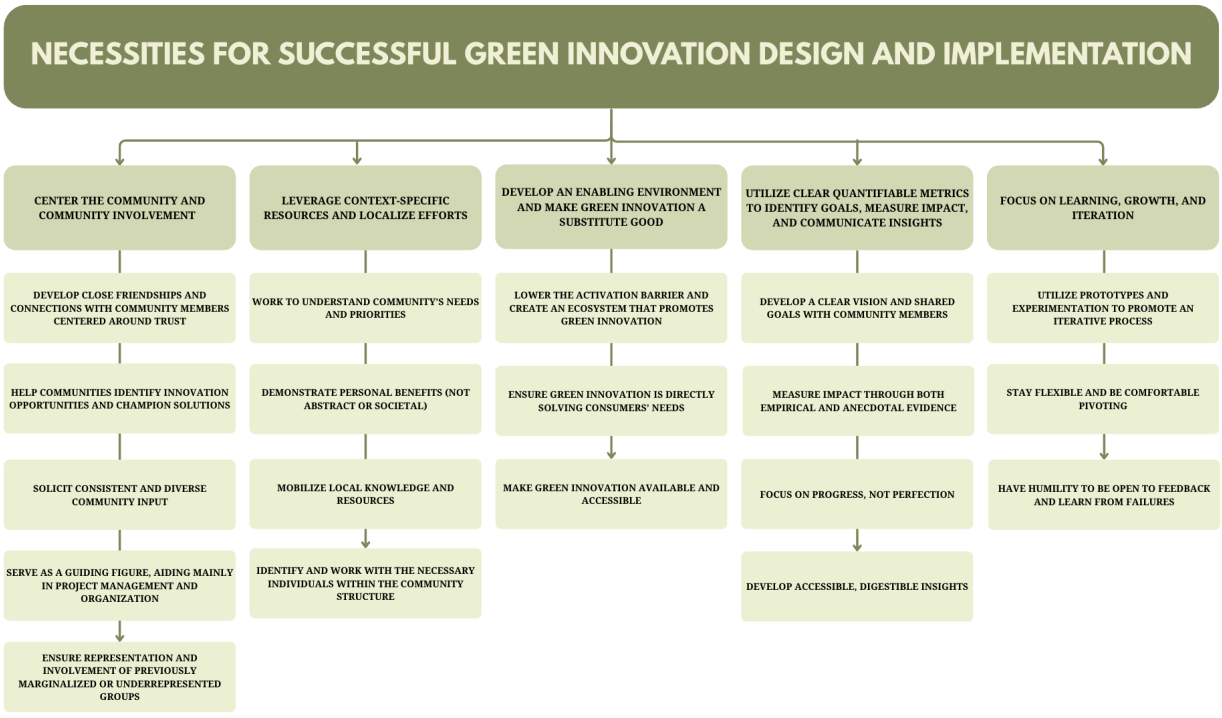
It is also important to note that aligned with a grounded theory approach, this process was not completely linear, or step-by-step, with clear completion and movement between one stage of coding and another. Instead, a more iterative process was utilized with movements, revisions, and comparisons between the codes and stages of coding. Through the coding process, the final framework discussed in the next section was created.

5. Results

5.1 Results and Implementation Framework

To demonstrate how a potential green innovation should be implemented, a framework was developed using the core themes identified from coding the interviews, with five major themes identified. The five themes identified along with their related principles are demonstrated in the implementation framework below. The five key themes are 1) Center the Community and Community Involvement, 2) Leverage Context-Specific Resources and Localize Efforts, 3) Develop an Enabling Environment and Make Green Innovation a Substitute Good, 4) Utilize Clear, Quantifiable Metrics to Identify Goals, Measure Impact, and Communicate Insights, and 5) Focus on Learning, Growth, and Iteration. To better understand how to utilize the framework, each principle will be discussed in further detail along with the relationship between the themes.

Implementation Framework



6. Discussion

6.1 Center the Community and Community Involvement

The first priority when developing and implementing green innovation in the Global South is centering the community and community involvement. The four principles required for this include 1) Developing close friendships and connections with community members centered around trust, 2) Helping communities identify innovation opportunities and champion solutions, 3) Soliciting consistent and diverse community input, 4) Serving as a guiding figure, aiding mainly in project management and organization, and 5) Ensuring representation and involvement of previously marginalized or underrepresented groups. The first step to any implementation involves developing close friendships and connections with community members with these relationships centered around trust. Interviewees explicitly stated how those relationships need to be developed over time and not one-off interactions. One potential concern identified was that community members may follow cultural expectations of formalities and politeness. Because of this concern, developing a closer relationship with community members can ensure that they feel comfortable voicing their opinions, even if it's not fully positive. Additionally, the external contributor needs to help communities identify innovation opportunities. Overarchingly, the demand needs to come from the local communities themselves. That means that as an external actor, individuals should be working to solve a specific problem. While they may have specific technologies to propose, it is important that the desire for the technology comes from within the community. One specific interviewee stated that, “you do not want things that customers do not want to persist,” clearly identifying the importance of customer demand. Though, this does pose a conflicting idea to the concept of creating a market for the product, another point that interviewees brought up. It is important to discern that while an implicit market may need to be

created for a product, it must be done in a way that helps the community realize potential solutions and connect their demand to opportunities. Another core component of this theme is soliciting consistent and diverse community input. This involves incorporating community input throughout the process and collecting input from those who may have been underrepresented in the past. Additionally, external contributors need to serve as a guiding figure, aiding in project management and organization. These activities include connecting local community members to resources and bringing stakeholders together. This emphasizes the point of centering the community. An external contributor's role should only be to guide and fill the logistical and organizational gap that may be present. Finally, it is vital to ensure that there is appropriate representation and involvement of previously marginalized or underrepresented communities. Specifically, interviewees identified potential groups that should be given particular attention such as women or those living in more rural areas. These green innovations will be able to fill in the gap and work to address long-standing social inequalities. Because of that, these marginalized community members should not only be represented but also actively involved.

6.2 Leverage Context-Specific Resources and Localize Efforts

Another key aspect of successful green innovation is localizing efforts and leveraging context-specific resources. This involves 1) Working to understand the community's needs and priorities, 2) Demonstrating personal benefits, 3) Mobilizing local knowledge and resources, and 4) Identifying and working with the necessary individuals within the community structure. Understanding the community, their needs, and their priorities provides the understanding to tailor the initiative or technology to the specific context. Interviewees stated that the best way to do this is to live within the community you are developing an initiative for, ideally for an extended period of time. The importance of emphasising personal benefits to community

members was also a salient point. Interviewees specifically stated the difficulty of communicating environmental benefits, especially as they are usually realized on a longer-term scale. Because of this, it is vital to identify short-term benefits that consumers will experience from utilizing green innovation, ensuring that they feel a need for the innovation.

One interviewee specifically stated that it "helps people prioritize things when they see the benefit for themselves". Additionally, local knowledge and resources should be mobilized to maximize the potential impact. This involves utilizing specific geographic resources as well as the knowledge of local community members who have more experience and perspective than an external source. Not only that, but interviewees emphasized the need to acknowledge the potential limitations of a solution. By recognizing the piece of the solution your organization provides, you can know when to bring in external support to bridge any missing pieces. Lastly, it is vital to specifically work with the "right" people within the community based on the community structure and perceptions of community members. By utilizing well-respected and well-liked community members as early adopters, their positioning within the community can lead to more widespread adoption. Specifically, interviewees emphasized potential stigmas and concerns with perception when utilizing these green solutions. Choosing the right representatives to be early adopters can help mitigate this concern. Not only that, but the high visibility of certain community members can lead to greater awareness of the innovation.

6.3 Develop an Enabling Environment and Make Green Innovation a Substitute Good

External contributors also need to work to develop an enabling environment for green innovation and make green innovations the best option for consumers. To do this, one must 1) Lower the activation barrier and create an ecosystem that promotes green innovation, 2) Ensure that the green innovation is directly solving consumers' needs, and 3) Make the green innovation

available and accessible. Firstly, the external contributor must lower the activation barrier and create an ecosystem that promotes green innovation. An interviewee described how a high activation barrier makes something feel like a “chore”, making them less likely to pursue the effort, such as learning about a new technology. Additionally, the green innovation needs to solve consumers’ needs, effectively making it the best option for consumers. This was a very salient point across interviewees. Overall, it was vital that green innovation works as a substitute for competing goods and is provided at a willingness-to-pay for consumers. This involves including sustainability as an added benefit to the technology, as opposed to that being the primary factor that is emphasized. When considering how consumers may evaluate electricity types, an interviewee explicitly stated that, “I don't think many of those people are thinking, this is better or worse… It's just the best option that there is”. While people may not adopt the green innovations for their sustainability benefits, the positive environmental and social impacts are still accrued. Finally, green innovation needs to be made available and accessible. This means that the innovation is available to all groups including those living in rural areas and those who have been marginalized historically.

6.4 Utilize Clear, Quantifiable Metrics to Identify Goals, Measure Impact, and Communicate Insights

Within this theme, the main principles include 1) Developing a clear vision and shared goals with community members, 2) Measuring impact through empirical and anecdotal evidence, 3) Focusing on progress and not perfection towards goals, and 4) Develop accessible, digestible insights. Developing a clear vision and goals with community members is an absolutely necessary step to ensure both parties are working towards the same desires. Interviewees described how setting goals helps create a realistic path to achieve them, making previously

unattainable efforts realistic. Not only that, but going through this process with community members helps confirm that both parties are on the same page and can move as one unit, working towards a shared vision. While an external actor may simply be focused on how many people adopt the technology, community members may be more focused on who is adopting the technology or where it is being adopted. When discussing a shared vision during this stage, interviewees also emphasized the importance of determining the desired scalability and generalizability of the solution. While scaling doesn't necessarily need to be the goal, this must be discussed and agreed upon. Interviewees also emphasized that clear goals can help hold people accountable and ensure that adequate progress is being made. While setting goals is the first step, that impact then needs to be measured, ideally utilizing both both empirical and anecdotal evidence. While empirical evidence helps provide quantifiable measures of success, anecdotal evidence helps personalize this success. When evaluating initiatives, there also needs to be a significant focus on progress, not perfection. Especially when entering new markets and industries, it is vital to focus on positive growth. An interviewee emphasized that when developing these new innovations, "it's not going to be perfect, but it'll be better than the alternative". Finally, any insights generated should be accessible and digestible by all stakeholders. Accessible and digestible insights creates room for knowledge sharing. Due to the emphasis on stakeholder involvement, all insights developed need to be accessible to the general public. The goal of knowledge transfer was a theme that remained salient throughout interviews. Utilizing measurement tools and developing accessible findings means that any intervention can be used as a future learning opportunity.

6.5 Focus on Learning, Growth, and Iteration

The last theme identified was focusing on learning, growth, and iteration which involves 1) Utilizing Prototypes and Experimentation to promote an iterative process, 2) Staying flexible and being comfortable pivoting, and 3) Having the humility to receive feedback and learn from failures. Firstly, the need for prototypes and experimentation was clear. These prototypes should be made cheap and fast, simply as a proof-of-concept. By experimenting with a variety of prototypes, insights can be gathered regarding any potential concerns or challenges with the solution. This iterative process ensures that the best version of the innovation will be presented to the community. Additionally, through the process, external contributors need to stay flexible and be comfortable pivoting. Particularly in the Global South, the fluctuation and randomness in policy means that quick changes may be necessary. One interviewee stated that they "had to learn how to take a breath, and let things play out". Additionally, there needs to be humility for feedback and to learn from failures. This ties back into the idea of decentering oneself. Coming from an outsider perspective, external contributors need to be comfortable accepting when they are wrong or don't have enough information.

6.6 The Framework as a System

When utilizing this framework, it is important to understand that it works as an interconnected system. The five themes work together to achieve successful green innovation implementation and adoption. Because of this, while the themes do have overlapping concepts, the specific principles and implementation of each principle differs. Though, the connection of the themes does mean that by working on principles towards one theme, work towards another principle may also be furthered. By understanding the interconnectedness of these efforts, a comprehensive approach can be taken towards successfully implementing a green technology.

6.7 Generalizability of Results

While these findings have external validity, there are also some applications specific only to Benin. Specifically, considering Benin's SDG goals, green innovation related to water purification or renewable energy sources such as solar, wind, hydroelectric, geothermal, or biomass energy would be most relevant. Additionally, interviewees emphasized the larger geographic and environmental constraints of locations in the Global South discussing concerns related to heat, terrain, and isolation of rural communities. To address these concerns, interviewees stated the importance of utilizing technology that was both durable and simply built. This reduces the need for consistent repairs or intervention and increases the likelihood that communities will continue using an intervention past when it was introduced.

The implementation framework can also be used in countries with similar environmental and/or social contexts. By considering the demographic makeup of a country, their culture, their politics, infrastructure, and geography, countries with similar contexts can be identified (Objective Lists, 2025). Because of their similar cultures and environments, other countries in Sub-Saharan Africa will be able to utilize these results. More specifically, members of the Economic Community of West African States (ECOWAS) would be most likely to have the similar contexts necessary to replicate or apply similar implementations. Within those countries, the Ivory Coast and Togo are most similar to Benin considering geography and culture. Because of this, a similar green innovation could be utilized with a similar method of implementation. While these results are generalizable to similar contexts, it is still vital to go through a detailed discovery process to ensure that solutions are tailored to the location as necessary.

7. Limitations & Further Research

Though this research provided some insight into how to implement green innovations in the Global South, there were significant limitations with the study. The first main limitation is the sample size. Due to time constraints on the research duration as well as difficulties acquiring relevant interviewees, the sample size could benefit from being larger. This means that while many findings can be identified, generalizability of the results are limited. By acquiring a larger sample of interviewees, the research could have provided more robust results that could be relevant to additional stakeholders. Another limitation of the study was the lack of diversity within interviewee types. While ideally an equal number of interviews would be conducted for each interviewee category, there was unfortunately a significant skew towards the "Civil Society" category. Because of this, the results are more likely to represent values and experiences from individuals who've worked in similar roles. Similarly to the last point, having a larger sample size and more purposefully collecting data based on the set categories would have led to a more accurate representation of sentiments.

Further research would benefit from a larger sample size that could adequately touch on each part of the research question. Additionally, the research could benefit from having more perspectives from community members in the Global South. The scope of this research meant that connecting with local community members would be infeasible. In the future, having a larger spectrum of perspectives could be beneficial.

8. Conclusion

While there are still future opportunities for further research, these findings provide context into how to effectively implement or develop a green innovation in the Global South. By learning from professionals working in that industry, insights could be collected into how green

technology can be implemented in the Global South. Though, as this research emphasized, one must first immerse themselves within a community and shouldn't impose ideas or beliefs prior. Keeping this in mind, it is vital to pursue further understanding of the specific context that the innovation is being implemented in. With the implementation framework, the five themes and their respective principles work together to further successful implementation of a green innovation. This framework can be utilized in Benin, and other countries with similar contexts such as Togo or the Ivory Coast. Combining the findings from this research with past results can help provide insight into how to foster sustainable development in the Global South.

Appendix

Appendix A - Interview Introduction Statement:

Statement: Thank you so much for taking the time to meet with me today. Before we get started with the interview, I wanted to provide some background information on this research and share some context of how these responses will be used. This research is being conducted for the Senior Thesis Seminar, fulfilling the senior capstone requirement at the University of Michigan's Ross School of Business. This research focuses on green technology adoption in the Global South, using the country of Benin as a case study. The research aims to understand what characteristics of green technology result in greater adoption and positive impact and seeks to develop an implementation framework that can be used to increase green innovation usage in the Global South. The interview questions will ask you to share your perspectives on creating change through green innovation, relevant business models, the role of policy, co-creation, and examples of initiatives. I want to confirm that you understand that interviews will be recorded and transcribed so that findings can be coded later, though no specific attribution to you will be made in presenting the results. Though this is not required, would you be open to having your current title, role description, and/or a short biography listed as an interviewee or would you prefer to remain anonymous?

Appendix B - Interview Questions (for "Civil Society" Interviewees):

Initial Question	*Follow-Up Question(s)*	*Purpose of Questions*
1. What role do you think green innovations have in creating change and fostering sustainable development?	1. What factors lead to more green innovation development? 2. What stops people from using green innovations? 3. How do these answers change depending on the context? (Global North vs. Global South)	● Find what factors increase or decrease green innovation design and development ● Gain an understanding of the barriers to green innovation adoption
2. What does your organization do to try to make green innovation initiatives more successful?	1. How is success defined? 2. Is a specific business model used? Why or why not? 3. What other factors are considered?	● Understand what factors or business models enable an organization's success

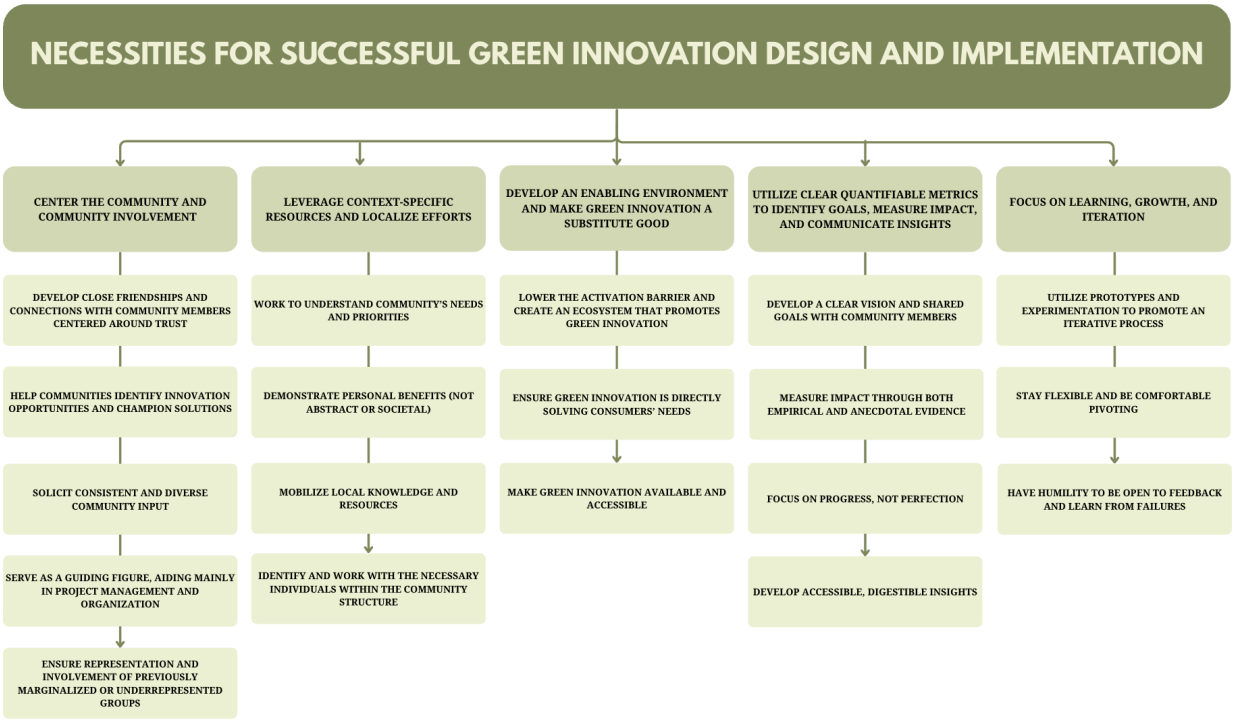
3. What role does policy play in developing green initiatives?	1. What are the most relevant policies or legislation to meeting the needs of your market?	● Understand political and institutional factors related to green innovation developing and targeting the Global South
4. What are the main reasons people/communities adopt green technology?	1. Do you think gender plays a role in adopting green innovation? 2. How do these answers change depending on the context? (Global North vs. Global South)	● Understand gender dynamics influencing green innovation adoption ● Understand the motivating factors behind green innovation adoption
5. What qualities or characteristics of green technologies lead to greater success and positive impact for the community?	1. How is success defined? 2. Is centralized (central authority/system with decisions and information flowing outward) or decentralized (control is spread or shared) technology more successful? Why? 3. Is open (publicly available with shared development) or closed (internal confidential innovation and knowledge) technology more successful? Why? 4. Is modular (system made of separate, interchangeable parts) or integrated (system works as one machine with tightly linked parts) technology more successful? Why?	● Understand what characteristics of technology lead to greater implementation success

6. In what ways should community members be involved in adopting innovation and creating change?	1. How do you successfully partner with community members/organizations? 2. How do you empower community members/organizations?	● Understand the role of community involvement and co-creation ● Find ways in which technology can be used as a mitigation strategy as opposed to an adaptation strategy
7. Can you describe one successful and one unsuccessful community imitative that you have worked on?	1. What factors influenced its success? 2. What factors do you use to determine the success of an intervention?	● Understand why certain technology interventions succeed to ensure that the proposed technology has the highest likelihood of success ● Understanding the metrics used to evaluate success helps determine how the intervention should be implemented to achieve that success
8. Is there anyone else you would feel comfortable connecting me with who may have perspectives relevant to this topic? This includes individuals working in green technology work in the Global South who may be academics, work at NGOs, in international development, startups, or technology developers.	1. If you feel comfortable sharing any personal information, is there a short biography that you can send that I can include in the data collection portion of this thesis? The biography can be between 50 – 100 words.	● Acquire more interviewees with a snowball sampling method

Appendix C - Interviewee Information

Identifying Code	Category	Role Title	Relevant Experience
PII290	Entrepreneur	Founder & CEO	Developed water purification technology that is newly being brought to market
PII427	Civil Society	Founder	Worked on malaria prevention in Gabon, Democratic Republic of Congo, and Pakistan. Experience as a pediatric nurse, public health nurse, and has made several trips to Gabon over the last 14 years, in addition to China, India, and Taiwan
PII338	Civil Society	Founder & CEO	Founded a non-profit to raise funds for conservation in Madagascar. Now, the org works with community members in the country to provide an education program, collaborate with a women's co-op, and support a local business in Madagascar
PII721	Civil Society	Program Manager - Energy and Mobility	Leads business development efforts in energy in the Global South. Supports commercialization of new energy technologies and manages energy consulting projects with experience managing programs at both international development organizations and at local organizations
PII596	Entrepreneur	Founder & Head of Product	Developed a technology for visually impared students in India to increase education access
PII634	Civil Society	Professor	Led work in the private sector in low and middle-income countries advising or directing projects related to education, energy, and healthcare
PII819	Civil Servant	Country Director	Works for the Peace Corp with volunteers, local community members, and host-country organizatinons to support the development Works with Peace Corps volunteers, local communities, and host-country organizations to support the development of the country
PII992	Civil Servant	Director of Programming & Training	Experience as a Peace Corp volunteer and work in international education
PII036	Civil Society	Project Developer	Spent a year living and working at a hospital in Gabon, Worked on partner driven development and charitable projects in Gabon and DRC for 7 years. Traveled to the Dominican Republic, Tunisia, Uganda, Gabon, and the DRC for humanitarian purposes. Committee chair for a humanitarian project committee for 7 years, involved with dozens of grants being awarded for projects around the world. Have spent the last 2 years volunteering to support the growth of a new hospital in the DRC founded and run by Congolese nationals
PII251	Civil Servant	x	x
PII184	Civil Society	Associate Director	Has held numerous positions over the last 15 years focusing on energy efficiency and decarbonization projects in India
PII323	Entrepreneur	Founder & CEO	Founded an organization and developed a technology to increase water access in countries such as India and Kenya
PII406	Civil Society	Operations Manager	Works at an organization to improve social well-being and address environment concerns in the Phillipines
PII568	Civil Society	Founder	Building and creating a movement towards sustainable mud houses in India
PII667	Civil Society	Researcher & Writer	Works in research on environmental policy with a Beninese background
PII872	Civil Society	Manager	Works at an organization to improve social well-being and address environment concerns in Costa Rica
PII925	Civil Society	Founder	Founded a school in India for low-income students with a focus on building life skills
PII117	Civil Society	Founder	Founded a school in India for low-income students with a focus on building life skills. Prior, served in a variety of positions as a mechanical engineer for renewable energy projects
PII068	Civil Society	Research Fellow & Professor	Has led many healthcare delivery and clean energy projects in the Global South

Appendix D - Implementation Framework



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