



REPORT ON REPLICATION ROADMAPS FOR (AT LEAST 4) SITES

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Abstract	The deliverable D4.4 ‘Report on replication roadmaps for (at least 4) sites’ consists of the highlights and main outcomes from the three regional workshops conducted individually with demonstration, validation, and replication partners involved. This deliverable also documents the methodology used in the three regional workshops. The methodology has evolved gradually in the three workshops to cater to the target audience. The deliverable is an easy-to-navigate document that highlights the methodologies, learnings, and outcomes from the workshops. The sequential implementation of the activities around the workshops is presented as replication roadmaps and developed into a three-phase replication approach. This can be used as an inspiration and guidance in future replication and exploitation.



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Abbreviations

BM	Business Model
BMC	Business Model Canvas
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortization
HORECA	Hotel, Restaurant, and Catering
ICT	Information and Communication Technology
IoT	Internet of Things
LL	Living Lab
METOS	Market, Economic, Technology, Organisation and Sustainability
NGO	Non-governmental organisation
OEM	Original Equipment Manufacturer
PAYG	Pay-As-You-Go
SESA	Smart Energy Solutions for Africa
SIN	Smart Innovation Norway
SME	Small and Medium Enterprise
VPC	Value Proposition Canvas

Executive Summary

The deliverable D4.4, titled "Report on Replication Roadmaps for (at least 4) sites" focuses on developing the replication roadmaps based on the three regional workshops. The report encapsulates the main outcomes from three regional workshops conducted with demonstration, validation, and replication partners.

The report begins with an introduction that provides background information about the deliverable, its relation to other tasks within the SESA project, and its overall structure. It emphasizes the importance of the methodologies and approaches developed and used during the workshops for future replication.

The second chapter details the highlights and main outcomes of the three regional workshops held in Kenya, Ghana, and Rwanda. Each workshop's purpose, methodology, activities, and key takeaways are thoroughly discussed. The workshops focused on topics such as business modelling, market segmentation, revenue models, and other crucial aspects to ensure the long-term sustainability and impact of the solutions developed by the SESA living labs and SMEs.

The third chapter presents the replication potential of the SESA sites, using the METOS template. This template covers crucial parameters such as market potential, economic viability, technological advancements, organizational growth, and sustainability. The chapter includes inputs from various living labs and SMEs, outlining their future goals and plans for growth. Some SMEs foresee growth in terms of expanding in new countries. Some LLs and SMEs foresee the growing impact of their solutions and services in rural areas to serve customer needs and provide energy access.

The fourth chapter presents the overview of the SESA solutions, integral activities from the project and a table for key outcomes, learnings and observed challenges. Following this, the three-phase approach for replication roadmaps is developed: Assess, Implement, and Impact. Each phase includes specific activities that can be used as guide and inspiration by other replicators, stakeholders and enterprises working with similar products and solutions. This approach holistically provides the replication roadmaps for smart energy solutions in different regions in Africa.

The report concludes by summarising the key points and providing final thoughts on how the deliverable can serve as a guide for future replication and exploitation. It can be recommended that the replicators should also understand the market segmentation for their businesses and products, and engage with the customers and end-users to understand the needs and challenges. In addition, it is also recommended that the new replicators understand the significance of each activity, methodology and tool used in the workshop interactions with the LLs and SMEs. This is to ensure that the learnings from the project can be shared beyond the project boundaries to achieve the long-term goals of the SESA project and drive sustainable development in Africa.

1. Introduction

1.1 About the report

The SESA project's main objective is to contribute to climate change mitigation and improve access to sustainable energy under affordable and reliable conditions in the selected nine African countries. The SESA project aims to achieve higher levels of replicability for different actions and energy solutions tested, validated and replicated during the project. This helps to maximise the project's impact on rural and urban societies and communities in Africa. Furthermore, the SESA project also provides opportunities to create replicable business opportunities for local entrepreneurs and innovators. Thus, to support this effort in the project, deliverable D4.4 is developed as a report on replication roadmaps which can be used as inspiration and guidance in future replication and exploitation of the project outcomes and learnings and positively impact society.

In particular, D4.4 consists of the highlights and main outcomes from the three regional workshops organised by Smart Innovation Norway (SIN) individually with the SESA demonstration, validation and replication partners involved in the project. D4.4 documents the methodology used in the three regional workshops. The methodology evolved gradually in the three workshops to cater for the participants attending the workshops. The three regional workshops were crucial for aligning with the other implementation activities ongoing in the project. Thus, D4.4 provides a holistic overview of how methodologies, approaches, learnings and outcomes can be developed as roadmaps for future replication of the SESA project activities.

1.2 Relation to other tasks

This deliverable D4.4 is an outcome of the three regional workshops delivered under SESA Task 4.2 'Co-develop demonstration actions: Living Labs'. D4.4 also relates to the activities in Task 3.4 'Start-up Incubator'. Task 3.4 provided financial and non-financial support to the selected and sub-contracted SMEs. These SMEs had work scoped out to support the validation and replication activities in the SESA project. D4.4 also connects the three regional workshops to the other sessions conducted during the three regional events, such as peer-to-peer exchange sessions, policy dialogues, capacity-building sessions, investment summit, etc. To prepare this deliverable and avoid repetition from other submitted SESA deliverables, such as details about the energy solutions, country-specific challenges, detailed progress of the LLs and SMEs, etc. are assumed to be known and not mentioned.

1.3 Report Structure

The dissemination level of this deliverable is 'Public'. Hence, business-sensitive information has not been added to this deliverable. The deliverable consists of the following chapters:

- **Chapter 1 'Introduction'**: provides a brief background about this deliverable and its relation to other tasks and activities in the SESA project.
- **Chapter 2 'Regional workshops - Highlights and Main Outcomes'**, presents the overall purpose of the three regional workshops, the methodologies used, and the main takeaways from the workshops.

- **Chapter 3 'Replication potential based on three regional workshops'**: presents details about the future goals and plans of the SESA demonstration, validation and replication living labs and SMEs using the METOS template.
- **Chapter 4 'Three-phase approach for replication roadmaps'**: This chapter summarises the different energy solutions implemented in the project, integral SESA activities for replication roadmaps, summary table for key outcomes, challenges observed and learnings from the regional workshops and the project in general. The chapter further presents a three-phase approach that contributes to the replication roadmaps.
- **Chapter 5 'Conclusion'**: provides final thoughts about how this deliverable can be used as an easy-to-navigate document and serve as an inspiration and guidance in the future.

2. Regional Workshops – Highlights & Main Outcomes

After a brief introduction about this deliverable in chapter 1, the chapter 2 presents the details of the three regional workshops organised in Kenya, Ghana and Rwanda as part of the first three SESA regional events. These regional events facilitated discussions among the project partners including the living labs (LLs) and SMEs. They engaged with several stakeholders, such as external groups, municipalities, technical experts, policy experts, local leadership, peers, etc. who were present in these SESA events. Overall, these events, workshops and discussions contributed significantly to the SESA objective of boosting the accessibility of innovative, affordable and efficient renewable energy solutions in Africa.

The three regional workshops were structured to use the co-creation approach and help the SESA living labs, validation SMEs and replication SMEs learn from each other and explore ideas that can help the participants in adapting their business models wherever necessary. The overarching intention to organise these workshops physically was also to get the participants together from different African countries and facilitate discussions around challenges, opportunities and peer-to-peer knowledge exchange. This helped to co-create learnings that could be adopted by the participants in the future.

The agendas for the three regional workshops are shared in the appendix of this deliverable- A.1. Kenya regional workshop agenda, A.2. Ghana regional workshop agenda and A.3. Rwanda regional workshop agenda. The description, purpose, methodology used, activities and main takeaways for each workshop are described in the following subsections in this chapter. Further, it should be noted that the methodologies used in each of the three workshops evolved over the project period to cater best for the needs of the participants.

2.1. Kenya regional workshop

2.1.1. Description and purpose

This workshop was organised in October 2022 in Kenya in the initial phase of the SESA project. The workshop was aimed towards participants from the SESA living labs (LLs) from Kenya, Ghana, Malawi, Morocco and South Africa. This workshop helped the LLs better understand the process of identifying customers, users and target groups for their products and services offered in the SESA demonstration and validation LL activities. The workshop session covered some high-level strategies to develop the revenue model for the proposed solutions for each of the SESA living labs (LLs).

2.1.2. Methodology used in the workshop

The methodology used in the workshop was a co-creation approach with a combination of the powerpoint presentations and discussion sessions with the SESA LLs. The regional workshop with the LLs discussed topics including Business model definition, Business Model Canvas (BMC), Market Segmentation, Revenue Models, etc. The methodology used in the workshop aimed to facilitate an understanding of the need to think about the economic viability of the proposed innovative solutions/products/services by the SESA living labs. This would help SESA LLs to achieve long-term sustainability and impact on their local communities, regions and geographic areas which are considered in the project. Further, the methodology also aimed to assist the LLs in getting acquainted with useful processes and tools such as market segmentation, business model canvas (BMC), etc. for developing business models and plans.

2.1.3. Activities in the workshop

The presentations and discussions during the Kenya workshop focussed on the topics of BMC, market segmentation and revenue model mapping which are described below in detail.

1. Business Model Canvas (BMC)

During the Kenya regional workshop, the presentation began with a discussion about business models (BMs) suitable for the SESA LLs in Africa, and how the BMs are used for identifying the value proposition and further creating, capturing and delivering value through their products and services. Considering the limited availability of time during the workshop, the presentation discussed the two important blocks of the BMC which were, Customer Segments and Revenue Streams. The focus of this discussion was also to clearly understand and prepare the LLs for how they can identify the most important customers for their products and solutions. Further, it was also crucial for the LLs to ponder upon the strategies on how they can make money, what is their revenue model and pricing tactics.

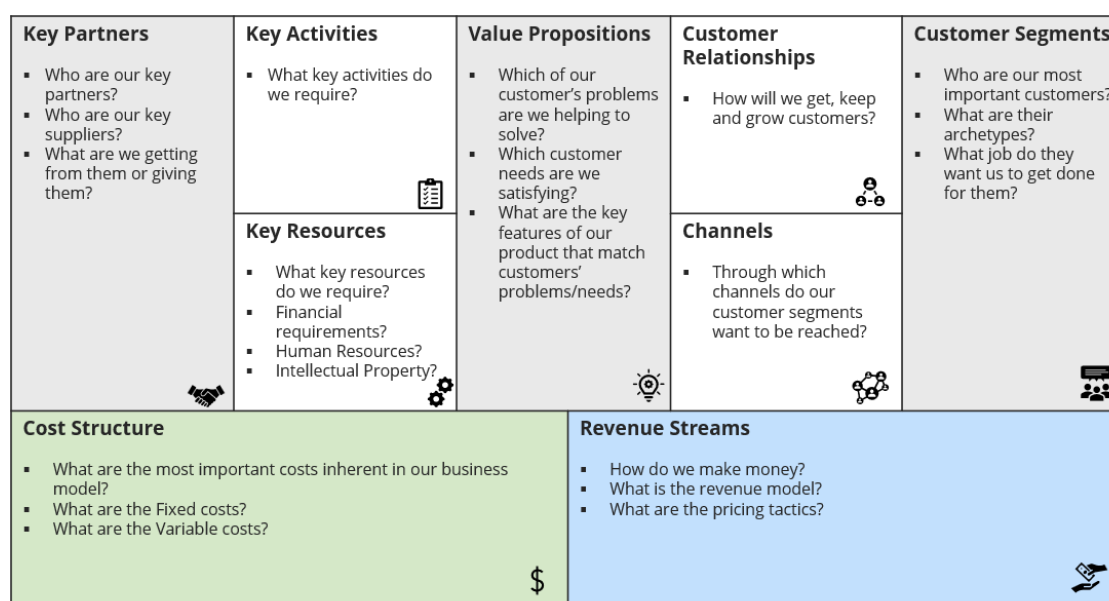


Figure 1: Business Model Canvas (BMC) template

2. Market Segmentation

During the presentation in the regional workshop with the LLs, the topic of market segmentation and its needs were also discussed. Some of the learning goals during this session included 'What is segmenting?', 'Why use the segmentation approach?' and 'How to segment the proposed markets?'. Since the Kenya regional workshop was conducted in the early stages of the SESA project, this discussion was important due to a general perception that a significant amount of effort is spent on developing the technology and/or setting up the living labs. Alternatively, sufficient time must also be spent in understanding the customers and their needs.

Further, the presentation also addressed the topic of 'How to find the right market segments?' and presented four requirements for good segmentation. These include, (i) Identifiable (Who is your target customer group?), (ii) Adequate size (Is the target group large enough?), (iii) Stability (Will the target group pass over time?), (iv) Availability (can the target group be reached?). This enabled the participants to think more deeply about some more key questions such as, 'Who are your

customers?', 'Which pain do the customers have?', 'What is more important for your customers?', 'How do you communicate with the customers?', 'what triggers will sell the solution?', etc. The SESA LLs participating were given two tasks in the workshop sessions. The first task was to brainstorm their ideas to identify user or customer groups for their solutions using the segmentation approach. The second task was to select the most attractive market that they would like to analyse more thoroughly.

3. Revenue model mapping

The next topic covered during the Kenya regional workshop was Revenue Models. In the SESA project, the LLs needed to develop a strategy for the amount customers have agreed to pay to buy or lease the product, service, or solution. A four-step revenue modelling process was also presented to the LLs which included:

- reflecting on the revenue model,
- identifying financial structure,
- developing a strategy for financial sustainability and,
- outlining the next steps

To assist the SESA LLs, some of the fundamental revenue models were proposed for their products/solutions being developed in the project. These included Cooperative model, Payment-for-Service model, Cost-subsidization model, Franchise model, etc. The LLs were then advised to reflect on the revenue model strategy suitable for their products/solutions. Further, if the SESA LLs were partnering with other businesses/SMEs, they were advised to choose the product or solutions and revenue models that fit the vision and business approach of the collaborating partners.

2.1.4. Main takeaways from the workshop

The main takeaways from the Kenya regional workshop are summarized in this section. For the SESA LLs, the workshop developed an understanding of the business model canvas, and its various components, including the value proposition, cost structure, revenue streams, market segmentation for the developed products/solutions/services, and identifying target market segments and strategies for revenue generation from the customers. Since this workshop was conducted relatively at the early stage of the SESA project, some of the business and revenue modelling concepts introduced were later adopted and implemented by the LLs. For example, the Morocco and South Africa LL use the payment-for-service revenue model for their electric mobility use cases.

2.2. Ghana regional workshop

2.2.1. Description and purpose of the event

This section provides an overview of the activities conducted during the regional workshop in Ghana, encompassing Accra and Kumasi, in October 2023. The workshop was organised by targeted towards the participants from the sub-contracted SMEs and partners in the SESA validation countries. The objective of the workshop was to equip these enterprises with the necessary tools and insights to transition from early adopters to a broader market segment, which they can utilise for sustainable growth and scalability. This workshop was organised after the 6-week Incubator programme for the validation SMEs given by Smart Innovation Norway from March to April 2023. The details about the 6-week Incubator programme are presented in the SESA deliverable D3.3.

2.2.2. Methodology used in the workshop

The Ghana regional workshop was titled 'Crossing the Chasm' (see Figure 2) and centred around the "Bowling Alley" strategy. The workshop organisers used the co-creation approach to engage the participating validation SMEs in intensive sessions. These sessions were designed to refine their market penetration strategies which eventually helped to improve and adapt their business model to increase the number of customers. The methodology used in the workshop was a combination of powerpoint presentations, examples, exercises and discussion sessions with the underlying theme of 'Crossing the Chasm'. Figure 2 describes several enterprises struggle to cross the chasm from early adopters to early majority customers due to failure to create a complete product and articulate its pragmatic benefits to a larger group of customers. Some examples of this were discussed during the workshop.

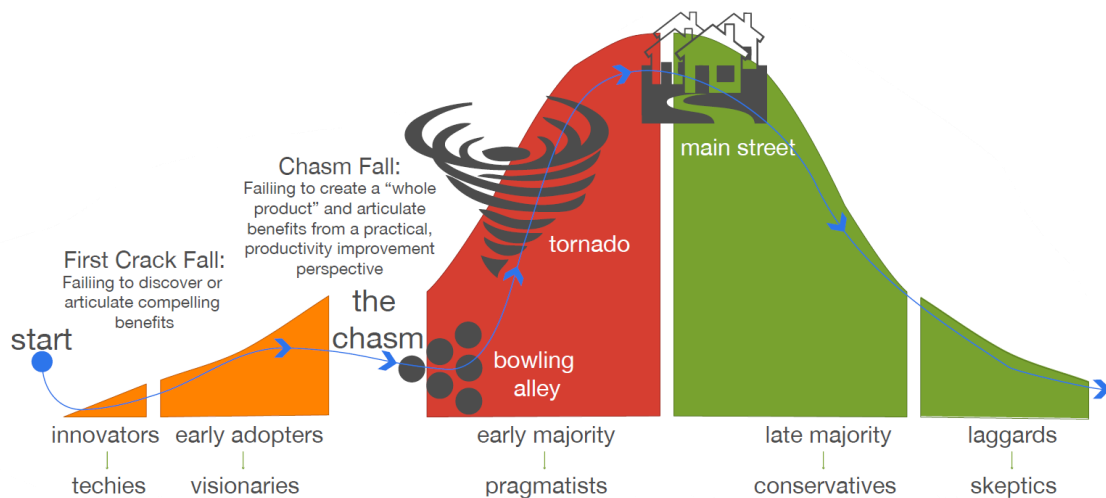


Figure 2: Infographic about 'Crossing the Chasm' theme for the regional workshop (Moore, 1999)

2.2.3. Activities and discussion in the workshop

The activities and discussions conducted during the Ghana regional workshop with the validation SMEs included the use of the following templates.

1. The sessions presented an overview of the types of customers in Figure 2, and how it affects the technology adoption life cycle. Figure 3 and Figure 4 show the template used in this activity to understand the components of each of the sections in the template. Although the validation SMEs are in business, the templates helped them in rethinking the approach they were using to reach out to their customers. This discussion highlighted the different types of customers namely, 'Innovators', 'Early Adopters', 'Early Majority', 'Late Majority' and 'Laggards' and their characteristics. Figure 3 and Figure 4 broadly showcase the behaviour patterns of these different types of customers and respective reactions to the pricing, product development, success factors, etc. when adopting a new technology or product.

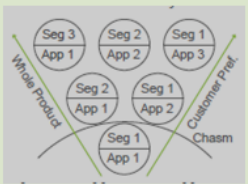
	Innovators	Early Adopters	Early Majority		Late Majority	Laggards
Description	Skeptical Technology Specialist: Price Sensitive Influential gatekeepers to life cycle Want truth - not sales pitches Forgiving of bugs and poor documentation Need access to most tech person in company	Supportive Product Specialist: Not Price Sensitive Believes in competitive advantage through disruptive innovation Brings money to table and demands changes Match technology to strategic opportunities Sees the new product as 80% of the solution and says "Let's build other 20% together"	Skeptical Market Generalists: Pragmatists are risk-averse buyers seeking a <u>whole product solution</u> to their existing productivity problems. "I'll buy this thing when it's done, not before."  		Supportive Company Generalist: 	Look to dismiss your product at every opportunity Try to de-rail any new technology/innovation
Position/ Messaging	Focus on how it works rather than possible benefits Showcase: • Architecture • Schematics • Demos • Trials • Tech press coverage • Guru endorsements	Focus on breakthrough opportunity to leapfrog competition ROI opportunity Showcase: • Benchmarks • Product reviews • Design wins • Initial sales volumes • Trade press coverage • Visionary endorsements	Focus on economic buyer and end-user Emphasize ROI as the compelling reason to buy Showcase: • Market share • Third party support • Standards certification • Application proliferation • Vertical press coverage • Industry analyst endorsements	Focus on infrastructure buyer and ignore economic buyer Ignore ROI Focus on timely infrastructure deployment Commoditize product for general purpose use Distribute via low-cost, high volume channels to ensure maximum market exposure Attack competition to gain mass market share Position products horizontally as global infrastructure	Main Street Sell to end-user Focus on end-users product experience; seek to gratify individual needs Differentiate commoditized products via +1 campaigns directed at specific niches Continue same channels but focus on merchandising that communicates +1 messages Gain margins above low-cost clone with +1 benefits Compete against own low-cost offering to boost margin share Position in niche markets based on end-user preferences	

Figure 3: Technology adoption life cycle template (Part-1) (Adopted from (Moore, 1999))

	Innovators	Early Adopters	Early Majority		Late Majority	Laggards
Price	Give out for free or at cost in exchange for trials, press coverage, endorsements, etc.	Use value-based pricing to maximize profit margins and build into the margin a disproportionately high reward for the distribution channel	Transition from value-based pricing to competition based pricing	Use competition based pricing to maximize market share	Use cost based pricing to prevent entrants	
Product			 Build out the “whole product” with feedback from visionaries and bowling alley segment leaders		+1 or value added extensions that deliver additional benefit	
Success Factors	Product Leadership - Compelling benefits - Ongoing improvement		Product Leadership - Whole Product - Niche Customization Customer Intimacy - Strong Relationships - Niche Customization	Product Leadership - Whole Product - Niche Customization Operational Excellence - Ability to scale fast - «Just ship it»	Product Leadership - Plus 1 Extensions - Aftermarket support Operational Excellence - Ability to scale fast - «Just ship it» Customer Intimacy - Strong Relationships - Extensive Support	

Figure 4: Technology adoption life cycle template (Part-2) (Adopted from (Moore, 1999))

2. Product development phases:

It is necessary for startups and SMEs that they keep on developing their products to stay competitive in the market. In addition, it is also important to understand how and when the improved versions of the products need to be developed and launched. Figure 5 gives an example of how the product versions are developed with added features and upgrades. This is also included and explained in the Figure 3 and Figure 4 about how the product development phases cater to and are acceptable to the different categories of customers. For example, the version 2.0 (Whole Product) from Figure 5 is developed for the Early Majority customer segment in Figure 4.

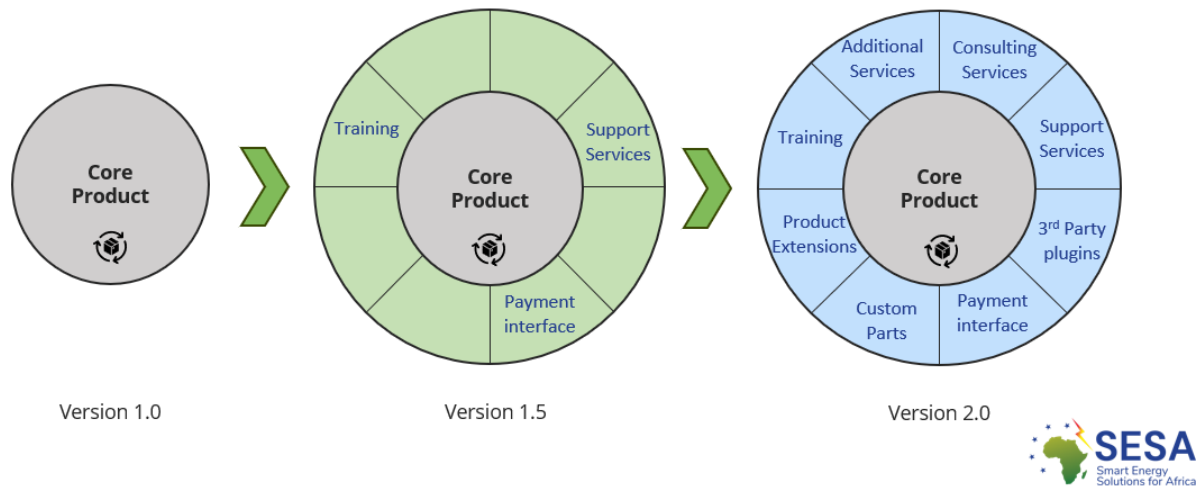


Figure 5: Example for versions of product development (Adopted from (Moore, 1999))

3. Segmentation:

This includes the defining which of segments are primary and secondary segments for the product or service and a description of their needs, pains, and challenges. To explain segmenting to the workshop participants, the SIN mentor used an example of a product, the GoPro camera. The intention of using this example was the general familiarity of the product among the participants and who can then relate this example to their respective renewable energy products or services in their businesses. The filled example template used for the segmentation exercise for GoPro camera in the workshop is shown in Figure 6 below. The example showcased the SMEs that by adding features and applications, the product or services can be sold to newer customer segments.

	Extreme Sports Enthusiasts (Segment 1)	Backpackers (Segment 2)	Family Users (Segment 3)	Nature Lovers (Segment 4)
Definition	Needs, Pains & Challenges 	Needs, Pains & Challenges 	Needs, Pains & Challenges 	Needs, Pains & Challenges 
Application / Feature	Simple to use, durable and waterproof camera	+ GPS tracking	+ Some sharing functions	+ Solar charging options for better battery lifetime
Arguments / USP	Capture your most daring adventures and memorable journeys with GoPro... Travels by...	Whether you're exploring remote places or creating everyday memories, GoPro is your perfect companion to capture the moments that matter most. Travels by...		
Offers	High performing camera with impressive quality Travels by...	+ Special discounts Travels by...	+ user-friendly resources, such as user manuals, online training, etc. Travels by...	+ environment protection initiatives Travels by...

Figure 6: Template and example used for segmenting exercise

Furthermore, Figure 7 showcases the relationship between how product development and different segments (bowling alley) can be considered to reach out to different segments. It also suggests that as the product develops into a whole or complete product with additional services or features, it can be sold to different segments with customers who have these required preferences for the product or service.

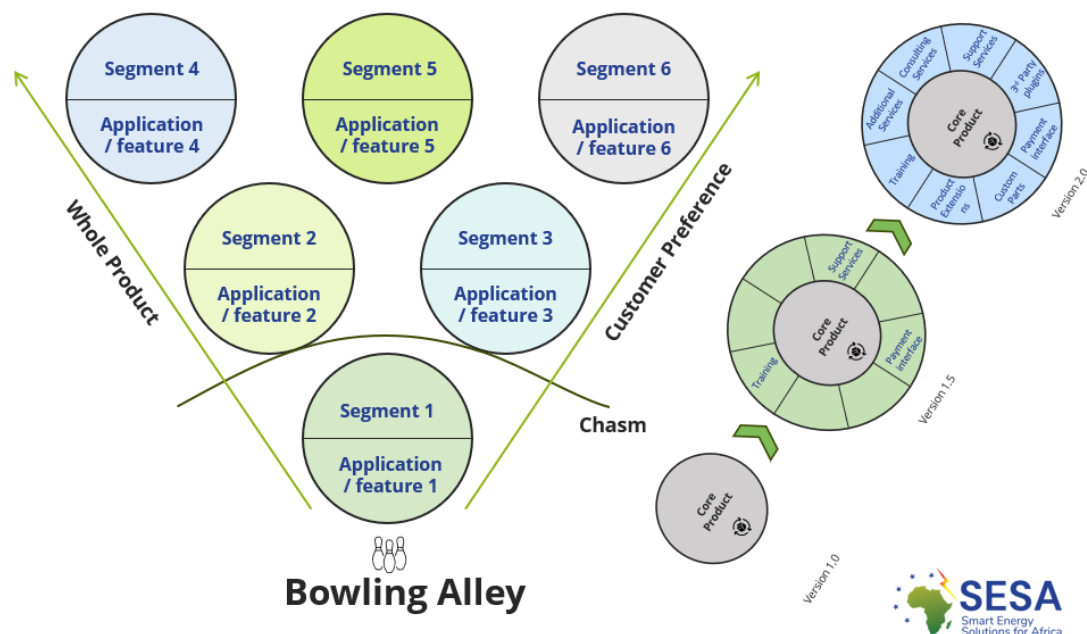


Figure 7: Infographic of Bowling Alley (Adopted from (Moore, 1999))

2.2.4. Main takeaways from the workshop

The main takeaways for the SMEs from this regional workshop can be summarized as the discussions about how the startups can cross the chasm and develop their products or services for customer segments from early adopters to the early majority. This can be done with effective

customer/market segmentation and prioritization of the segments, developing and evolving the products based on the customer needs, pains and challenges. These are some of the effective strategies that can be adopted by startups and SMEs for business growth. In the context of the SESA project, one of the SMEs, Smart Energy Enterprise took the learnings from this workshop and developed additional services along with its core product in solar irrigation to sell to its customers. Other validation SMEs also focussed on developing their products further and creating value-added services around their core products to achieve a competitive edge in the markets they operate in.

2.3. Rwanda regional workshop

2.3.1. Description and purpose of the event

This regional workshop on business modelling was organised in April 2024 as part of the third regional event of the SESA project, organised in Kigali, Rwanda. The business modelling and co-creation regional workshop was aimed to serve as a face-to-face meeting with the SESA sub-contracted replication SMEs, SESA EU mentors and consortium members of the SESA project. Representatives from the two national Business incubators ([250 Startups Rwanda](#)) & ([Grid Innovation and Incubation Hub \(GIH\), University of Rwanda](#)) were present in the workshop to share their experiences and knowledge with the participants of the workshop. This workshop was scheduled after completing the 6-week Accelerator Program 2024 offered by Smart Innovation Norway (SIN) in March-April 2024. Several important topics from the 6-week program beneficial for the business activities of the SMEs were selected and discussed in detail during the workshop.

2.3.2. Methodology used in the workshop

The workshop used the methodology of co-creation and a hands-on approach for exercises and discussion using different types of tools. The tools included the identification of target user groups, value proposition canvas (VPC), business model canvas (BMC), METOS template for future goals, and full life cycle use case tool. The workshop also included Pitch Sessions from the SMEs for which external mentorship experts were invited to provide feedback and improvements for the SMEs.

2.3.3. Activities and discussion in the workshop

The activities and discussions conducted during the Rwanda regional workshop with the validation SMEs included the use of the following templates.

1. Startup/ScaleUp life cycle:

Startup Stage:

In the startup stage, a business focuses on validating its product or service idea, aiming to achieve product-market fit. This phase involves high risk as the company develops an initial offering, builds a small team, and secures early-stage funding. The primary goal is to prove that there is a viable market for the product.

Scaleup Stage:

The scaleup stage begins once the business has achieved product-market fit and is ready for rapid growth. During this phase, the company expands its operations, scales its team, and seeks larger funding to support its growth. The focus shifts to increasing revenue and market presence and establishing more structured processes to handle the complexities of scaling. Figure 8 shows the stages of the startup and scaleup lifecycle for the businesses.



Figure 8: Stages of the startup/scaleup growth lifecycle

During the workshop, the discussion about scaling the products or services to new geographies was pursued by many replication SMEs as they are looking to expand their businesses in new African countries.

2. Value Proposition Canvas (VPC)

The VPC framework was used to understand the product market fit and for refining an existing product or service and also when developing new products or services. In the SESA project, the VPC was shared with the SMEs who have existing products and services. The SMEs used the VPC as shown in Figure 9 to understand and discuss the current challenges they face in terms of customers and how they can provide better value for their customers.

Customer Profile

The Customer Profile section of the VPC focuses on understanding the target customer by identifying their key tasks, challenges, and desires. It consists of three components: Customer Jobs, which are the tasks and objectives the customer wants to accomplish; Pains, which are the difficulties and obstacles that hinder them from achieving these tasks; and Gains, which are the positive outcomes and benefits that customers seek. This detailed understanding helps businesses tailor their offerings to meet specific customer needs effectively.

Value Mapping

The Value Map is the section where businesses outline how their products or services address the customer's needs. It includes three parts: Products and Services, which are the solutions offered; Pain Relievers, which explain how these solutions alleviate the customer's pains; and Gain Creators, which describe how the solutions help the customer achieve their desired gains. By clearly mapping out these elements, businesses can ensure that their offerings are directly aligned with what their customers value most.

Using the VPC offers several key benefits for businesses and the replication SMEs. It encourages a customer-centric approach, ensuring that products or services are closely aligned with customer needs and preferences. In the workshop, the use of the VPC by the SMEs was a revisit into their business value proposition to understand and get clarity and focus. This will enable the SMEs to communicate their value proposition effectively and identify opportunities for innovation and improvement, ultimately driving business growth and customer satisfaction.

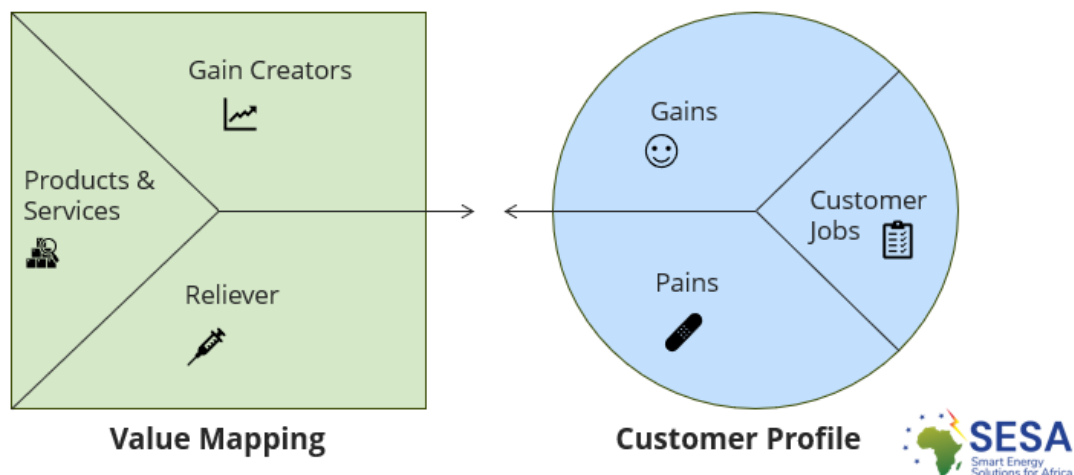


Figure 9: Value Proposition Canvas (VPC) template (Adopted from (Strategyzer, 2024))

3. Full life cycle use case tool

The template for the full life cycle use case is shown in Figure 10 below. This template was given to the SMEs to showcase and discuss the stages that are involved in acquiring a paying customer. The stages can be described as, building a successful business requires understanding the customer journey, starting with how customers become aware of their needs or problems and seek solutions. Companies can tailor their offerings by identifying customer priorities. Next, understanding where customers search for solutions informs an effective go-to-market strategy. As customers evaluate options, insights into this process help refine the value proposition and competitive positioning. Grasping the purchase process aids in shaping the business model and pricing. Post-purchase, ease of installation and usage feedback drive continuous improvement. Determining the value, providing support, encouraging repeat purchases, and leveraging word-of-mouth are critical for sustaining growth and enhancing customer loyalty.

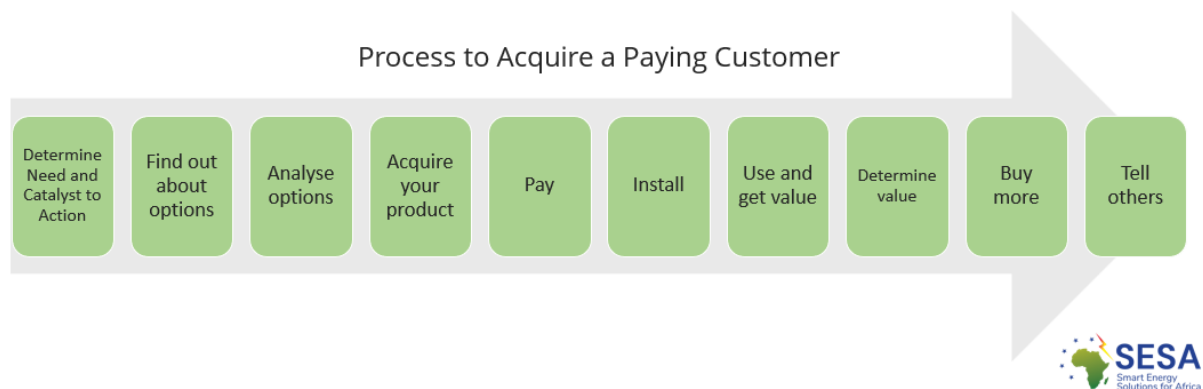


Figure 10: Template/stages for the process to acquire a paying customer (Adopted from (Leadership Institute for Entrepreneurs, 2024))

4. METOS template

The METOS template was developed to collect information from the living labs and SMEs about their future plans and growth potential. The METOS template shown in Figure 11 covers the crucial parameters including market, economy (financials), technology, organisation and sustainability that are important to consider to understand the overall growth of any enterprise and also help to develop an understanding of how enterprises are thinking as the way forward for their

businesses. It can be in technology development, organizational growth, economic or financial growth, etc.

Vision
▪ <i>What is the overall vision of your company, product/solution, and business model?</i>
Market (M)
▪ <i>What is the market potential and/or marketing strategy for your company/LL?</i>
Economy (E)
▪ <i>How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?</i>
Technology/Product (T)
▪ <i>What is your plan to use/develop new technology/product further?</i>
Organisation (O)
▪ <i>How do you plan to improve and grow your organization/people in the future?</i>
Sustainability (S)
▪ <i>How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?</i>

Figure 11: METOS template with guiding questions

2.3.4. Main takeaways from the workshop

The third regional workshop on business modelling focusing on the replication SMEs of the SESA project involved discussions about how these companies view their growth in the coming years. The discussions of the participants with SESA mentors and external experts were crucial for the SMEs to understand the ever-changing market dynamics and how they can adapt their business models and navigate their way forward in the coming years. It was also interesting to understand the current challenges the SMEs face in each of their respective markets. and how SESA can support them with the curated regional mentorship program for each of the SMEs.

3. Replication potential based on three regional workshops

Based on the successful interactions with the SESA Living Labs (LLs), Validation and Replication SMEs and partners during the three regional workshops, it was essential to understand the plans of the partners who foresee growth in their businesses during and after the SESA project's completion. Thus, this chapter summarises and presents the learnings to develop the roadmaps for the potential exploitation and replication of SESA activities in the future. To develop the SESA roadmaps, the METOS template was found to be a suitable template for gathering inputs from the SESA LL partners and SMEs. This template helped to understand the vision and future goals of the sites and SMEs and describes the parameters including, Market, Economy, Technology/Product, Organization, and Sustainability (People, Planet, Profit). The following sub-sections present the inputs based on the METOS template from the selected LL partners and SMEs who showcase a replication potential based on the interactions in the workshops. Since the project is yet in its penultimate year of completion, some of the sites or use cases are under progress and not mentioned here. These may also showcase replication potential in future years.

3.2 Demonstration sites

WeTu (Kenya)

The Kenya demonstration site is led by WeTu in the SESA project. This site aims to test and demonstrate different solutions and services deployed in the selected peri-urban (Katito) and rural (Kisegi) areas. In the SESA project, WeTu aims to demonstrate solutions and services including e-bikes, solar-powered cold storage, solar-powered irrigation, solar-powered water ATMs, and products such as solar lanterns, etc. Based on WeTu's implementation activities, they have experienced that to make a viable business for any solution or service, some crucial actions need to be taken. These include engagement with the local community through co-creation, capacity building, knowledge transfer, impact measurement, and strategic partnerships. Having this experience, WeTu envisions growing as an organisation in the coming years and creating a positive impact on society by providing affordable, reliable, and sustainable alternatives powered by clean energy. In addition, WeTu believes that the SESA funding has been instrumental in achieving this success, enabling it to reach and serve its target markets effectively and capture a significant percentage of market share in both locations.

The METOS responses shared by the Kenya demonstration partner (WeTu) are mentioned below:

- **Vision**

What is the overall vision of your company, product/solution, and business model?

As a social enterprise, **WeTu** envisions creating a sustainable and scalable model by empowering fishermen, boda-boda riders, farmers and other B2B customer groups by increasing their incomes and providing an environmentally friendly and reliable alternative technology in the market based on solar energy provision. Beyond the B2B business model, WeTu provides clean safe water access to private homes and individuals through water ATM dispensing systems to support rural communities with basic needs products and services. The vision is to enhance agricultural productivity including fisheries through solar energy solutions, beginning with fishing lanterns,

cooling solutions for the value chain, solar-powered water ATMs and expanding to electric-powered agricultural tools and electric mobility (two-wheelers and three-wheelers).

▪ **Market (M)**

What is the market potential and marketing strategy for your company/LL?

Katito demonstration site: The market potential is significant, given the high demand for affordable transportation and clean water in Katito based on e-bike demand and sales and deliveries of clean safe water. The marketing strategy will focus on community engagement through user co-creation, partnerships with local organizations, and demonstrating the social, economic and environmental benefits of the solutions.

Kisegi demonstration site: The market potential is vast, considering the large number of fishing communities and farmers who lack access to reliable electricity. The marketing strategy will leverage existing relationships with fishermen and their respective beach management units (BMUs), horticulture farmers, agricultural extension services, and local leaders to raise awareness and drive the adoption of the technologies and innovations.

▪ **Economy (E)**

How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?

To further support the growth of both demonstration sites there is a need for further investment to scale the use cases piloted due to the demand for the same to tie into the financial and sustainability growth strategies to not only rely on revenue generated.

Katito demonstration site: The growth strategy will rely on a combination of revenue generation from water ATM sales and electric bike leases. Financial sustainability will be achieved through efficient operations, cost-effective maintenance, and a pricing model that balances affordability with profitability.

Kisegi demonstration site: The growth strategy will be financed through a mix of revenue from solar lantern rentals, water sales, and leasing of agricultural pumps and equipment. Financial viability will be ensured through the improvement of lanterns and infrastructure, scalable production of water, and exploration of innovative financing models including but not limited to leasing of agricultural pumps but also exploration of models such as the pay-as-you-go model for farmers.

▪ **Technology/Product (T)**

What is your plan to use/develop new technology/product further?

Katito demonstration site: The plan is to expand the electric vehicle fleet and to also explore further electric tuk-tuks (three-wheeled vehicles) for cargo transport such as delivery of water and other services. Additionally, the water purification system will be refined to improve efficiency and reduce maintenance costs.

Kisegi demonstration site: The plan is to develop and deploy more new and improved lanterns to meet the growing demand for the same and launch solar-powered agriculture tools and models such as irrigation pumps and improved crop watering equipment. The solar charging hub will be upgraded to accommodate the increased energy demand.

▪ **Organisation (O)**

How do you plan to improve and grow your organisation/people in the future?

WeTu is committed to the growth of the organization and staff through capacity building and enhancing staff expertise in sustainable energy through different avenues. It actively promotes technical training on circular economy approaches, solar systems, and relevant certifications from national authorities like the Energy and Petroleum Regulatory Authority (EPRA) on the certification of solar technicians. Additionally, WeTu has recently launched our WeLearn project that fosters capacity building and training on STEM skills in renewable energy among both WeTu staff and local youth. We also encourage staff participation in the SESA capacity building program under the NUA campus to further deepen their understanding of sustainable energy technologies.

▪ **Sustainability (S)**

How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?

WeTu plans to sustain and replicate its business model through continuous innovation through research and development of innovative products and services. Their focus will continue being on a sharing and circular economy approach which ensures that both users and local stakeholders benefit from our shared success, leading to improved incomes and living conditions. The revenue will be reinvested to expand the services and product offering, enhance and expand infrastructure, and strengthen community partnerships through collaborative co-creation and feedback loops. They will measure societal impact through a number of KPIs such as increased access to clean safe water, clean green transport with reduced transportation costs, reduced CO2 emissions, reduced post-harvest losses, improved fish catches and crop yields, better air quality, and ultimately, enhanced livelihoods.

3.2 Validation sites

In the SESA project, the validation sites in countries include Malawi, Morocco, Ghana and South Africa. The partners involved in the project from these countries are considered as the SESA living labs (LLs). Each of the LLs identified the domains and suitable solutions/services that can be implemented to improve energy access in these countries. In addition, some SMEs were selected and sub-contracted through the SESA Start-up incubator to complement the activities of the LLs. Thus, in this section, METOS responses collected from the selected living labs and SMEs are presented. This helps in understanding how these partners envision their organizational and business growth in the coming years.

i. **Smart Energy Enterprise - SEE (Malawi)**

SEE mentioned that SESA funding has played a crucial role in advancing their business objectives by facilitating the introduction of new products and validating the business model. This support has enabled SEE to make significant strides toward reaching its target market, enhancing the commercial viability of offerings. By leveraging this funding, it has been able to refine the product range and demonstrate the effectiveness of the business model, position for continued growth and success in the market. SEE's strategic focus on digital solutions and product innovation will drive significant growth in our revenues and profits, amplifying our impact on the agricultural sector. This approach will empower more farmers to adopt sustainable practices, ultimately contributing to food security and economic development in the region. The METOS response shared by SEE is presented below:

- **Vision**

What is the overall vision of your company, product/solution, and business model?

To be the leading provider of solar-powered irrigation systems to smallholder farmers in Malawi.

- **Market (M)**

What is the market potential and/or marketing strategy for your company/LL?

The total addressable market for the business encompasses 510,000 hectares of farming land in Malawi, with a potential revenue of US\$ 166 million. Within this broader market, SEE has specifically targeted 10,500 hectares, aimed at serving 5,000 smallholder farmers in the Karonga district, which translates to a potential revenue of US\$ 4.9 million. It has significant market potential and to reach this target, SEE is engaging with financial institutions and establishing agents to increase the sales and distribution of solar-powered irrigation systems to smallholder farmers.

- **Economy (E)**

How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?

The financials of SEE are exponentially increasing and improving due to increasing demand which is triggered by climate change and seasonal variations.

- **Technology/Product (T)**

What is your plan to use/develop new technology/product further?

SEE has plans to expand the production of the new technology (Kanyumba Solar Irrigation System) and develop various types of irrigation systems to meet the customer's growing needs and demand. Over the next 5 to 10 years, Kanyumba solar irrigation systems will be replicated through effective digitization utilizing IoT principles. This digital transformation will eliminate geographical and other barriers, enabling seamless management and sales of the product across diverse regions and time zones.

- **Organisation (O)**

How do you plan to improve and grow your organisation/people in the future?

We will capitalize on digitizing our business model to make it more sustainable and also more innovative solar-powered irrigation technologies will be developed.

- **Sustainability (S)**

How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?

The business model will be replicated and sustained through digitization, aligning with the global village concept. This strategy will enable SEE to expand its revenues, profits, and impact both in Malawi and across African countries. By continuously refining the products and embracing cutting-edge technologies, SEE aims to maintain its relevance and competitive edge in the market, not only in Malawi but across other African countries as well.

ii. **Nastech Power Solutions (Ghana)**

- **Vision**

What is the overall vision of your company, product/solution, and business model?

Nastech envisions becoming one of the biggest industry players in battery development and manufacturing in Africa, focusing on battery technology development, recycling and repurposing of batteries.

▪ **Market (M)**

What is the market potential and/or marketing strategy for your company/LL?

Nastech Power Solutions targets three main customer segments: rural, residential, and businesses. The company focuses on areas with minimal energy accessibility and aims to provide affordable and reliable solar energy solutions. The market potential is significant, especially in Ghana, where about 40% of rural settlements lack access to the national grid, affecting approximately 4 million people and having a growing demand for electrification.

▪ **Economy (E)**

How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?

The economic impact of Nastech's operations is significant, especially in Ghana, where there is a high demand for affordable and reliable energy solutions. By repurposing waste batteries and providing solar energy solutions, Nastech is addressing a critical need in the market and contributing to the overall economic growth of the region.

▪ **Technology/Product (T)**

What is your plan to use/develop new technology/product further?

Nastech Power Solutions has a comprehensive plan to use and develop new technology and products further. They focus on creating sustainable, reliable, and affordable solar energy systems by repurposing second-life batteries from e-waste sources.

▪ **Organisation (O)**

How do you plan to improve and grow your organisation/people in the future?

Nastech plans to improve and grow its organization by continuing to provide skills training in solar energy technologies to young Ghanaian youths, expanding production capacities with new machinery, and targeting new customer segments with pay-as-you-go and subscription models.

▪ **Sustainability (S)**

How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?

For people, Nastech will continue providing skills training in solar energy technologies. Nastech aims to expand its production capacities by acquiring new machinery to boost production and develop high-capacity battery banks. The company plans to target new customer segments, including large industries and bigger facilities. For societal impact, Nastech is committed to sustainability by repurposing waste lithium-ion batteries and scaling affordable energy solutions.

3.3 Replication sites

In the SESA project, the replication sites/countries include Namibia, Nigeria, Rwanda and Tanzania. For implementing the replication activities of the project, several SMEs were selected and sub-contracted through the SESA Start-up incubator. This was to support and analyse the replication

potential of energy solutions and services across various countries. Some of the technologies and solutions for energy access in the replication countries have more mature markets and business growth potential. Therefore, this has helped in sharing knowledge, expertise and experiences among the partners and SMEs involved in the demonstration, validation and replication actions of the project. In this section, the METOS responses from the replication SMEs are presented to understand how these SMEs envision growing their respective businesses in the coming years.

i. Simusolar Ltd. (Tanzania)

Link on SESA website: <https://sesa-euafrica.eu/startups/simusolar-limited/>

▪ Vision

What is the overall vision of your company, product/solution, and business model?

Our vision is that rural prosperity can be realized in off-grid and weak-grid environments, where capital is often scarce but the opportunity for productivity gains remains great.

▪ Market (M)

What is the market potential and/or marketing strategy for your company/LL?

The company uses a micro-market strategy by crop and region. In addition the company uses social media, more demos to attract new customers, incentives to referrals, demos, etc. as part of their marketing strategies.

▪ Economy (E)

How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?

The company is focusing on economic growth in the coming years based on its revenues.

▪ Technology/Product (T)

What is your plan to use/develop new technology/product further?

The company is also focusing on improving its existing product in terms of technology advancements and support for its farming and other customer categories in the coming years.

▪ Organisation (O)

How do you plan to improve and grow your organisation/people in the future?

The company looks to expand its business and customer base in different geographies in Tanzania, Uganda and Kenya. Further, looking to develop the team through training, and develop future female leaders in energy.

▪ Sustainability (S)

How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?

The company rewards performances in different departments and thus motivates its employees. It is working towards changing customer choices from the use of fuel pumps to solar pumps, further making improvements in its PAYG system, minimising portfolio risks and increasing revenues through different streams, such as government tenders, etc.

ii. SLS Energy (Rwanda)

▪ Vision

What is the overall vision of your company, product/solution, and business model?

Battery-as-a-service using repurposed batteries for a green and circular economy.

- **Market (M)**

What is the market potential and/or marketing strategy for your company/LL?

The company has targeted a diverse array of markets, ranging from telecom towers to mini-grids, commercial buildings, industries, and households. The company is focusing on the African telecom market and commercial and industrial market (C&I), recognizing its vast potential for sustainable energy solutions. Further, SLS is also assessing mini-grid markets expanding their reach to these markets can significantly contribute to bridging the energy gap and fostering sustainable growth.

- **Economy (E)**

How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?

In terms of the economy and financials to support the growth strategy in the coming years, SLS is looking to become EBITDA profitable and increase its annual turnover.

- **Technology/Product (T)**

What is your plan to use/develop new technology/product further?

For the development of the technology/product in the coming future, SLS is aiming to improve its battery management system, expand SaaS to other applications, and improve hardware and module designs.

- **Organisation (O)**

How do you plan to improve and grow your organisation/people in the future?

SLS is planning to grow the organisation in terms of increasing the number of full-time employees and technicians in the coming years.

- **Sustainability (S)**

How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?

SLS is aiming to effectively replicate its product over the next five years and ensure the sustainability of the business. It has devised a comprehensive roadmap incorporating several key strategies, including the increase in deployment of its technology, achieving significant tonnes of annual CO₂ equivalent savings, and generating monthly recurring revenues. Through strategic collaboration with partners and diligent implementation of our roadmap, SLS plans to position to replicate the product successfully and drive sustainable growth in the years ahead.

iii. **Powerstove (Nigeria)**

- **Vision**

What is the overall vision of your company, product/solution, and business model?

The vision of Powerstove is to provide clean and efficient cooking solutions to households, promoting sustainability and improving livelihoods. Powerstove provides high-quality, explosions-proof, plug-n-use biogas systems to rural farming and urban households. Biomass feedstock are

manure, human, kitchen and green waste converted to biogas that power the twin gas cookstove and a generator for electricity. In addition, organic fertilizers are also produced for farming use.

- **Market (M)**

What is the market potential and/or marketing strategy for your company/LL?

Market potential: Biogas is almost nonexistent as cooking fuel in Nigeria now. However, Nigeria's national goals see a huge role for it in the future. Thus, it seems to be a suitable moment for Powerstove to enter the market and develop biogas systems for domestic use. As the market is currently evolving and is a predominately informal market, it's difficult to get accurate statistics on the market size for each customer segment.

- **Economy (E)**

How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?

Powerstove adjusted its pricing strategy from PAYG to setting competitive prices in partnership with microfinance banks that reflect the product's features and benefits. By this, Powerstove aims to capture market share and establish a strong presence in the new region. The company expects this pricing strategy to result in increased revenue and sustained profit margins over time.

- **Technology/Product (T)**

What is your plan to use/develop new technology/product further?

The initial product technology was observed to fail to achieve initial traction in the new region where the company is replicating its technology. Therefore, based on the feedback of the early adopters, Powerstove improved on the product design and after successfully launching, we observed that a smaller size biogas system remains the most preferred size that gained market confidence and desired sales revenue. Larger biogas systems are no longer feasible for Nigerian households and are therefore only tested in the commercial HORECA market segments. Additionally, the company also redesigned the biodigester to become a single unit saving more space and production costs.

- **Organisation (O)**

How do you plan to improve and grow your organisation/people in the future?

Powerstove plans to expand to new regions and countries, diversify its product line, and strengthen partnerships to improve local impact such as employment opportunities.

- **Sustainability (S)**

How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?

A key challenge for biogas systems remains their affordability. Partnerships with financial institutions would help to facilitate access to financing for households and smallholders.

iv. Havenhill Synergy (Nigeria)

- **Vision**

What is the overall vision of your company, product/solution, and business model?

Havenhill Synergy Limited is a clean-tech utility company that uses renewable (solar) energy to generate clean, cost-effective and sustainable electricity in urban and rural areas. Havenhill Synergy's Farm Fuse initiative addresses the multiple, interrelated challenges faced by Nigeria's

smallholder farmers, who produce 90% of the country's agricultural output but live predominantly below the poverty line. The initiative provides comprehensive support to smallholders through four key activities: 1. the deployment of solar-powered irrigation systems, 2. the provision of high-quality seeds, fertilizers, and other inputs on credit, 3. the securing of supply contracts with large-scale processors and off-takers, 4. training and capacity-building programs for farmers.

▪ **Market (M)**

What is the market potential and/or marketing strategy for your company/LL?

Market potential: Nigeria has an agricultural area of 69 million hectares (ha), of which almost half is cultivated. However, only 10% of Nigeria's agricultural land is irrigated, leaving most farmers dependent on rainfall and limited to cultivating their fields during the rainy season. Evidence shows that irrigation has increased crop yields in Nigeria by up to 30% compared to rain-fed farming. Unlocking this potential will require financial support and business models that overcome the burden of high capital costs, as well as training in the effective use of solar irrigation systems.

Marketing strategy: Havenhill's distribution channels engage smallholder farmers in mini-grid communities. During the SESA project, the company leveraged existing networks and relationships within these communities. Many of the targeted farmers were already customers of Havenhill's energy services, so the company built on these existing connections. Havenhill also ran awareness campaigns and outreach programs to educate farmers about the benefits and availability of the solar irrigation service. A direct outreach approach was used to target farmers across the two communities, with engagement meetings supported by the community leaders.

▪ **Economy (E)**

How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?

Havenhill's solar irrigation service is provided to smallholder farmers on an Infrastructure-as-a-service basis. There is no upfront cost to install the irrigation infrastructure on their land. Instead, a % fee of the farmer's crop is charged per cropping cycle for the ongoing use of the facility. This fee is set out in an agreement with the agreement with farmers and will contribute to the maintenance and sustainability of the solar irrigation system. Havenhill's revenue will be derived mainly from the fee charged to the farmer's crop for the solar irrigation system. The higher the yield resulting from the installation of the irrigation systems, the higher the income for Havenhill, allowing the company to reinvest in further support services for the farmers.

▪ **Organisation (O)**

How do you plan to improve and grow your organisation/people in the future?

To support ongoing operations and expansion, Havenhill will seek additional partnerships and funding opportunities, engaging with local financial institutions, NGOs, and government programs. Continuous data collection and analysis will allow the company to refine the revenue model and operational strategies, ensuring affordability and sustainability.

▪ **Sustainability (S)**

How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?

The irrigation-as-a-service model is designed to ensure long-term financial sustainability through strategic revenue generation and ongoing support mechanisms. As described earlier, the fees collected from farmers are reinvested into maintaining and sustaining the solar irrigation system. This ensures the infrastructure remains operational and efficient, providing continuous benefits to the farmers. To support the company's growth, Havenhill plans to raise additional funding to scale operations to new host communities, expanding its customer base and revenue streams.

v. Ohengo Electrics (Namibia)

▪ Vision

What is the overall vision of your company, product/solution, and business model?

The company is committed to providing premium energy-efficient solar home systems to communities across Namibia. It believes in supplying high-quality energy solutions to all segments of society.

▪ Market (M)

What is the market potential and/or marketing strategy for your company/LL?

To have reached the municipalities and regional energy producers to have them supply our product to their communities.

▪ Economy (E)

How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?

To expand in neighbouring African countries, we have the potential to capture a market of 25 million Euros in Namibia alone.

▪ Technology/Product (T)

What is your plan to use/develop new technology/product further?

Ohengo plans to develop its technology and have its AI-operated software so that customers can operate their systems remotely.

▪ Organisation (O)

How do you plan to improve and grow your organisation/people in the future?

The company has people from diverse cultures working for our country in other parts and regions of Africa – particularly in neighbouring countries.

vi. ECOGREEN Solutions (Rwanda)

▪ Vision

What is the overall vision of your company, product/solution, and business model?

Discovering, developing, and delivering innovative and meaningful environmentally friendly cooking solutions that help enrich the lives and welfare of families, and communities and putting the climate first by providing educational programs, resources and tools designed to help empower communities about the environment.

▪ Market (M)

What is the market potential and/or marketing strategy for your company/LL?

ECOGREEN has identified significant market potential in Rwanda and neighbouring countries. The company aims to increase its market share from 5% to 18% over the next five years. The target customer segments include humanitarian settings, urban, suburban, low-income earners, and rural areas. Overall, ECOGREEN's marketing strategy focuses on increasing product affordability,

expanding market reach, and raising awareness about the benefits of clean cooking solutions to achieve its growth targets and environmental goals.

- **Economy (E)**

How do you see the Economy / Financials that will support the growth strategy and targets for your company/LL?

In the coming years, ECOGREEN is looking forward to increasing its product sales, revenues and profits based on its growth targets. The company is also engaging more investors and commercial banks to support its vision. Overall, ECOGREEN's financial plan is designed to support its ambitious growth strategy and targets, ensuring sustainability and profitability in the long term.

- **Technology/Product (T)**

What is your plan to use/develop new technology/product further?

The company plans to develop its product further to enhance stove efficiency, use of local materials, IoT integration and carbon credit trading in the coming years.

- **Organisation (O)**

How do you plan to improve and grow your organisation/people in the future?

ECOGREEN's plan to improve and grow its organization and people is centred around capacity building, job creation, community engagement, supply chain optimization, continuous innovation, and financial support to achieve its growth targets and environmental goals.

- **Sustainability (S)**

How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?

ECOGREEN is committed to capacity building and knowledge sharing. They train their staff and provide internships to young graduates, focusing on improved cookstoves and pellet production. ECOGREEN has outlined a five-year financial plan to support its growth strategy. Mission is to provide sustainable, affordable, and environmentally friendly cooking solutions. Overall, ECOGREEN's plan to sustain and replicate its business model is centred around capacity building, financial growth, and environmental sustainability to achieve its growth targets and societal impact.

vii. DRITOVEN Engineering (Namibia)

- **Vision**

What is the overall vision of your company, product/solution, and business model?

To be a major player in the electrical and renewable energy service industries with unique attributes characterized by quality products, and services and increase our product stock up by 90%.

- **Market (M)**

What is the market potential and/or marketing strategy for your company/LL?

The company views major channel partnerships with big brand OEMs as having good market potential and has a target to deploy 100 community-based lease-to-own irrigation.

- **Technology/Product (T)**

What is your plan to use/develop new technology/product further?

The company plans to manufacture renewable systems, locally in joint venture with international OEMs in the coming years and also incorporate water mapping, borehole drilling and installation as part of the technology development plan. The company is also looking to employ modern farming practices like hydroponics and aquaponics in its business portfolio.

- **Organisation (O)**

How do you plan to improve and grow your organisation/people in the future?

The company is working for youth empowerment and generating employment opportunities.

- **Sustainability (S)**

How do you plan to sustain and replicate the BM for your company/LL in terms of people, profit and impact on society?

The sustainability plans include developing solar irrigation training for farmers to be able to maintain the system and increase the system's self-life and production. It is also looking to increase profit by developing business models from solar irrigation farming products into manufacturing and adding value to the modern commercial market.

4. Three-phase approach for replication roadmaps

In the previous chapters, the description of the three regional workshops in the chapter 2 and the inputs shared by the LLs and SMEs about their future plans and replication potential in the chapter 3. In this chapter, a three-phase approach is developed as part of the replication roadmaps in this deliverable. Holistically, the replication roadmaps consist of the various energy solutions implemented in the SESA project in different countries, by LLs and SMEs (shown in Figure 12), the integral activities as shown in Figure 13, the key outcomes, challenges observed and learnings based on the regional workshops as presented in Table 1 and finally the three-phase replication approach. All these together provide an understanding of how the different energy solutions, incubator programme methodologies, tools, workshops, etc., can help and support new organisations that would like to replicate some of these components in their respective enterprises.

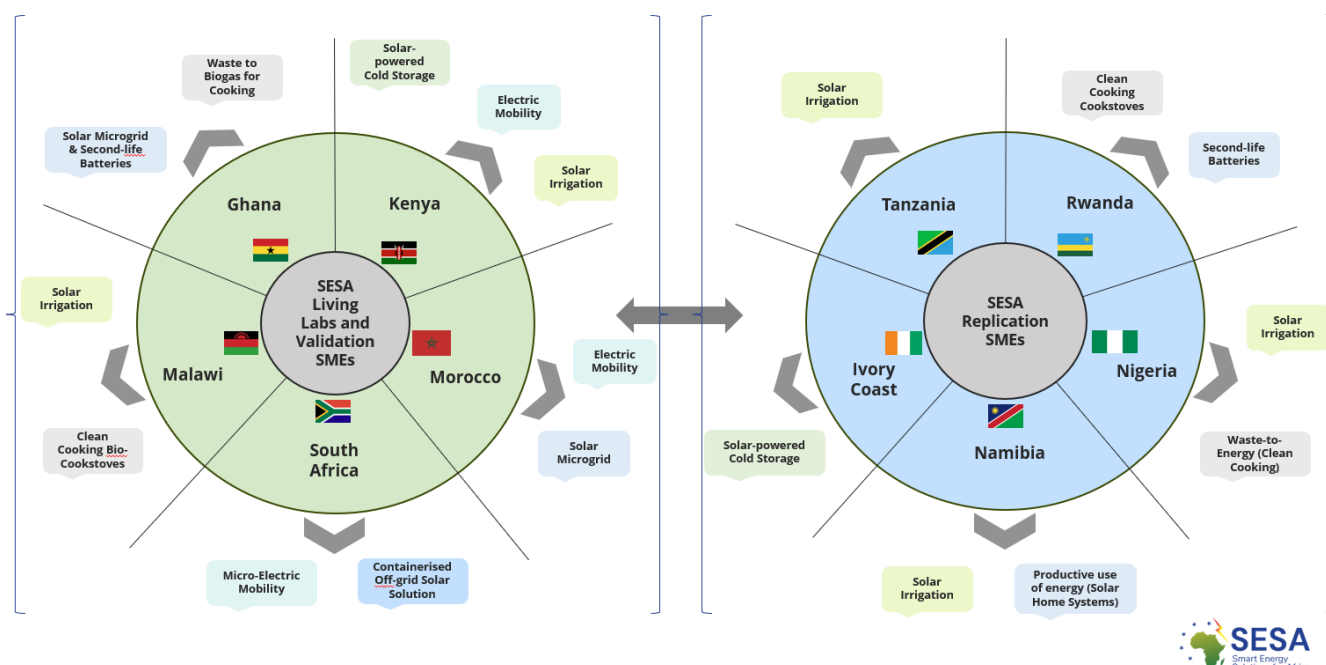


Figure 12: SESA living labs, SMEs and implemented energy solutions in SESA

Further, the details about the three regional workshops on business modelling organised were complimentary to the other activities in the SESA project. Running these workshops as part of the first three SESA regional events, provided the living lab partners and the SMEs with a deeper understanding of user needs evaluation for the products, business modelling aspects, market segmentation, incubation, mentorship, knowledge sharing (peer-to-peer exchange), policy dialogues (local and national plans), etc. This is depicted in Figure 13, which showcases the crucial tasks and activities done in the SESA project duration (from project start to end). Figure 13 also shows the timeline in which the three regional workshops were organised for the participants (living labs and the SMEs).

In this deliverable, the main focus is on developing the replication roadmaps which will serve as guidance and inspiration in the future for different stakeholders. Figure 13 helps in understanding and mapping the crucial aspects of the SESA project that help in the development of the roadmaps. It shows the relation of the SESA regional workshops for business modelling with the other tasks

and activities performed by the SESA consortium partners, such as the energy solutions catalogue, baseline estimations, evaluation frameworks, user needs assessment, etc. These activities were done from the beginning of the project based on which the living labs and SMEs implemented their products and solutions in their respective markets.

Further, the three regional business modelling workshops targeting the living labs and the SMEs covered several aspects such as revenue mapping, business model canvas, market segmentation, financial support, incubator/accelerator program, regional mentorships, value proposition canvas, pitching, etc. These activities formed the core aspect during the mid-phase of the project to support the SMEs and LLs. Before the end of the project, the main tasks and activities that will be done include, finalising the business models and plans, analysing the user acceptance of the solutions, plans for exploitation and dissemination of the results and studying the alignment of the project outcomes with the local and national plans for future uptake of the solutions, products and services deployed and tested in the SESA project.

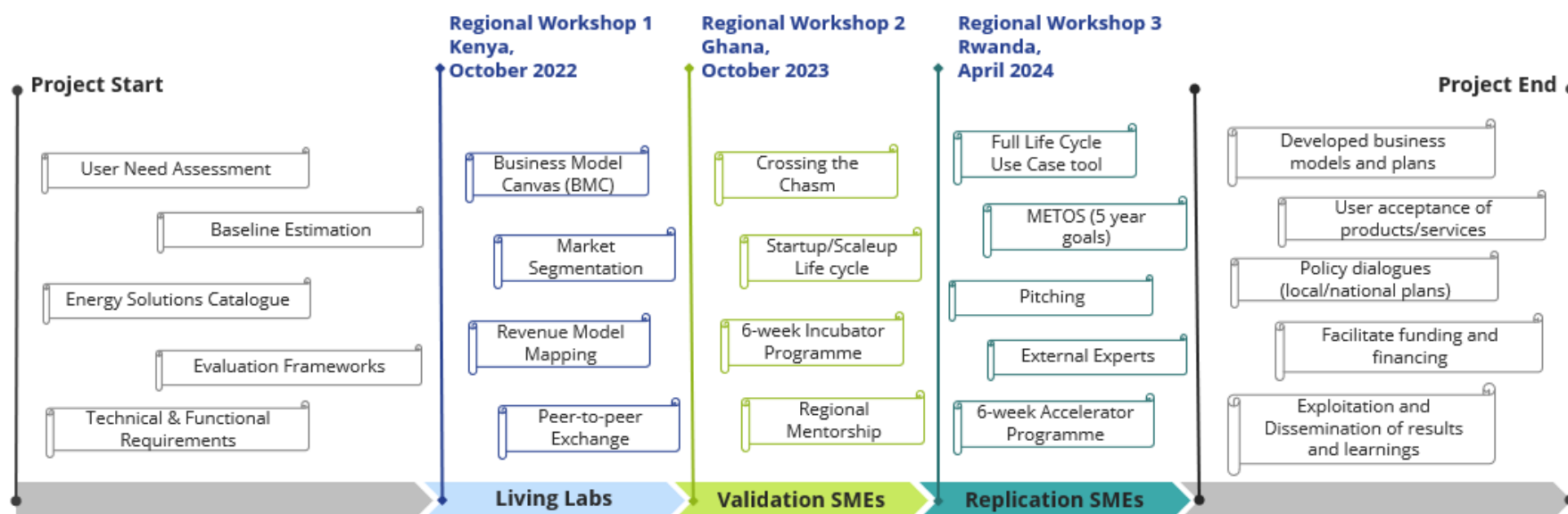


Figure 13: Integral SESA activities in replication roadmaps

The Table 1 presents the key outcomes, challenges observed and learnings for the SESA solutions discussed in the context of the three regional workshops. It provides an overview for the new replicators or organisations who wish to learn from the experiences of their peers in nine different African countries in the SESA project. It also gives insights into different aspects such as technical, economic, etc., and helps in understanding the intricacies that the different African countries face during project implementation.

Table 1: Summary of SESA solutions, key outcomes, challenges and learnings

SESA partner	Solutions implemented	Key Outcomes	Challenges Observed	Learnings
Demonstration (Kenya)	- Solar-powered cold room; - Solar-powered water ATMs - Electric-mobility, - Solar-powered irrigation	Installations done and operations are ongoing at different sites in Kenya for these solutions. At the moment, the maturity of each use case may vary depending on the progress of the business in the future.	- Difficulty in capturing the initial market in rural areas. - As observed by the partners, it is sometimes challenging to change customer behaviour to adopt new technology or solutions.	- Importance of customer awareness programmes when deploying innovative solutions in new places. - Training and workshops are necessary to increase the adoption of novel products or services by the users.
Validation LLs and SMEs (Ghana, Malawi, Morocco, South Africa)	- Waste to biogas for cooking; - Biocooker for electricity and internet access - Solar microgrids - Electric vehicles/e-mopeds - Micro-electric utility vehicles - Solar irrigation solutions - Containerised off-grid solar solution - Biofuel for cooking	- Developed and tested a product prototype (Biocooker) during the SESA project period in Malawi LL. - The rural microgrid has been installed and is in operation for the selected rural community in Morocco. The community can access electricity for their domestic purposes and agricultural water pumping needs. - The electric vehicles on the university campus provide ease of transport access to the students, and other user	- High production and transport cost of the bio-cooker product as compared to other alternatives in the market. - The location of the microgrid in rural areas makes it challenging for higher utilization of the solution due to the low number of users. - Initial low number of users for the vehicles in the Alicedale region.	- It can be recommended that it is crucial to analyse the user needs on-ground and the customers' willingness to pay for the new product or service implemented. - Product costs should be comparable to the available products in the market with innovative features that make the product stand out. - The selection of the community should be done considering the

SESA partner	Solutions implemented	Key Outcomes	Challenges Observed	Learnings
		groups, especially women in different cities of Morocco LL. ▪ South Africa LL provides transportation support to the rural Alicedale region for passengers and goods. ▪ SME with Ghana LL provides clean electricity access to rural areas for domestic usage and internet access. ▪ SME with Malawi LL provides irrigation access to several small-holder farmers to support farming activities. ▪ SME with South Africa LL provides electricity access through its containerised solution for productive use of energy such as internet cafes, solar trainings, etc., in the Alicedale community ▪ SME with Ghana LL tested its biofuel cooking product with schools as customers.	▪ The local communities may require training and education about microgrids, so requires more effort to sell products. ▪ There may be some customers who default on payments for the products or services. ▪ Currency devaluation results in the expensive import of products. ▪ The high cost of the bio-ethanol fuel compared to other alternatives makes it difficult to sell to the right customer group.	potential to scale, i.e., communities with a higher number of residents or households may provide a clear opportunity to scale the solutions. However, if the purpose is to serve the economically weaker sections of the society, the business strategies will need to be adopted. ▪ In case, the project or business is publicly funded, it is crucial to analyse the market potential of the product or solution after the funding ends. The sustainability of the business needs to be considered in this scenario.
Replication SMEs (Tanzania, Rwanda, Nigeria, Namibia)	▪ Solar pumps for irrigation ▪ Clean cooking ▪ Solar irrigation ▪ Waste-to-energy ▪ Off-grid energy systems ▪ Solar irrigation	▪ SME in Tanzania has a growing business of solar pumps to provide access to irrigation solutions to the communities and are gaining satisfied customers.	▪ From the discussions with these SMEs, it can be seen that they face challenges when they try to expand their business into a new country due	▪ Public funding opportunities, other financial and non-financial support such as sub-contracts for the SMEs can help in increasing the production capacity to

SESA partner	Solutions implemented	Key Outcomes	Challenges Observed	Learnings
	- Innovative energy storage (second-life batteries) - Containerised solar cooling	- SMEs in Rwanda are growing in terms of sales of their clean cookstoves and exploring the potential of the second-life batteries market in the country respectively. - SMEs in Nigeria are selling products for clean cooking bio-digesters and irrigation using solar water pumps respectively. - SMEs in Namibia have growing business in the solar irrigation sector for small-holder farmers and off-grid energy systems that provide access to energy in the rural areas of Namibia.	to different local market conditions. - Some of the SMEs face delays due to the import of the product components which sometimes makes it difficult to catch up with the demand for their product. - Identification of the initial customers for their innovative solutions which the SMEs want to sell needs detailed market segmentation, revenue model analysis, etc. - Some of the SMEs are working with communities in rural areas which are far away from each other in terms of proximity, which makes it challenging to quickly reach out to customers.	make up for the market demand and avoiding missed opportunities. - SMEs are seeing business growth for their enterprises with the help of financial and non-financial support. - Participation in international and nationally funded projects helps SMEs gain traction in the market, improve credibility and visibility on an international level.

Furthermore, based on the SESA's five-pillar conceptual approach (SESA Project, 2024), which is, *Inform, Inspire, Initiate, Implement* and *Impact*, a three-phase replication approach (Figure 14) is developed as an outcome of this deliverable. The three phases include '**Assess**' (Inspire, Initiate, Inform), '**Implement**' and '**Impact**' as shown in Figure 14. Each of the three replication phases has specific activities that can be used as inspiration by other stakeholders, replicators and SMEs who are working with similar products, solutions, methodologies, tools, etc. as in the SESA project.

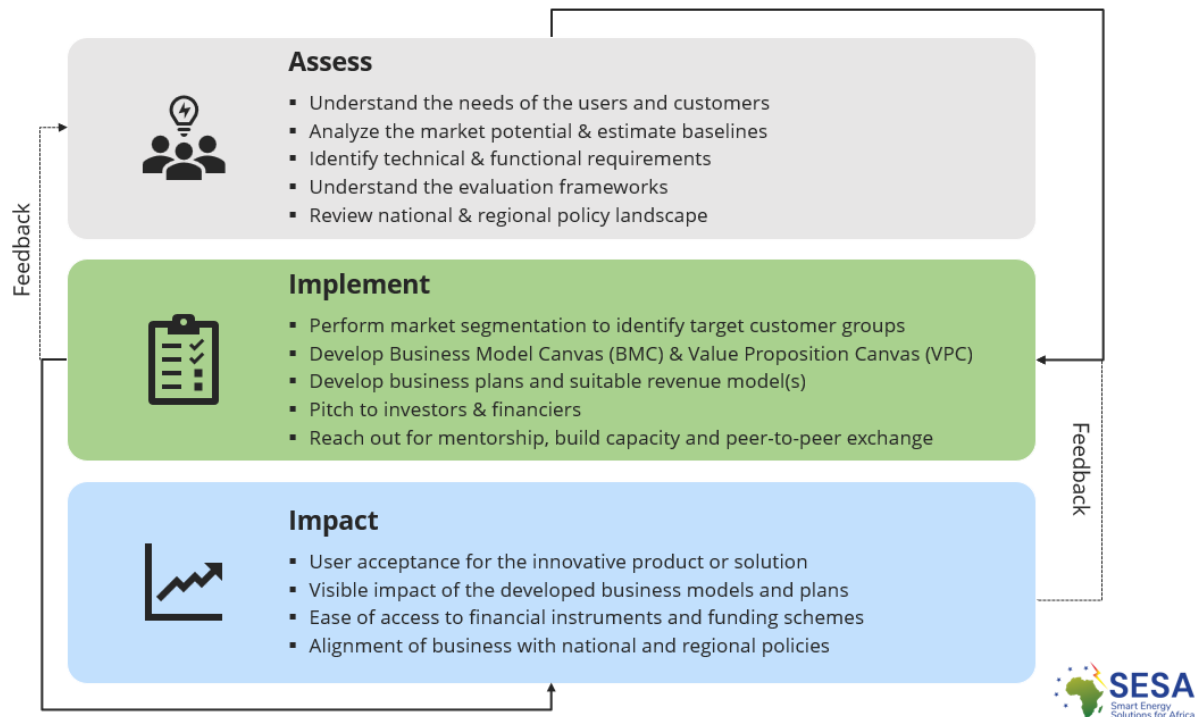


Figure 14: Schematic for the three-phase replication approach

The first phase as shown in Figure 14 'Assess' is a combination of the first three phases of the SESA concept, namely Inform, Inspire and Initiate. It will assist the replicator in understanding the user and customer needs in detail, along with analysing the market potential for the product or solution being developed and how it can provide some unique element to solve the customers' needs. Further, the baseline parameters should also be analysed such as the availability of similar products or solutions in the market, their pricing, target customer base, etc. Then, it is also necessary to understand and identify the evaluation frameworks and standardization methodologies available to make the new product or solution align with the global standards. Further, it is necessary to review the national and regional policies that currently and in future will favour the growth of the business and the product or solution.

The second replication phase is to 'Implement' what has been analysed during the first phase. This involves developing and using the market segmentation approach to identify the right target groups and customer segments who will be interested in paying for the product or solution developed. This should be supported by concretely identifying the value proposition and business model that can be implemented. It is crucial to identify the revenue streams using the most suitable revenue model that will help the enterprise earn from selling its product or solution. Further, many businesses require capital/finances to carry out their business activities and operations. Thus, it is crucial to prepare for pitching the idea and business to the investors who can be onboarded to contribute to the success of the business. In some cases, it is also important to take support of mentorship and find a suitable mentor who resonates with the team, and the business and can help in the growth of the organisation.

The third replication phase is 'Impact', which helps in highlighting the achievements of the business and how successfully it has positively affected society. This can be understood and measured using parameters such as user/customer acceptance of the product or solution, ease of access to funding, financial schemes which depend on the future growth potential of the business and alignment of the business with national and regional policies. So, the replicators can analyse these three phases in detail for their respective living labs and businesses to develop clarity about their future growth. However, it should be noted that the list is not limited to the mentioned activities, and may be expanded on each point based on the requirements of the replicators.

5. Conclusion

The SESA project has made significant strides in developing and implementing smart energy solutions across various African regions. Through the collaborative efforts of demonstration, validation, and replication LL partners and SMEs, the project successfully conducted three regional workshops, each contributing valuable insights and methodologies to the overall replication roadmaps. These workshops have highlighted the potential of smart energy solutions in Africa and assisted in developing roadmaps for future replication and exploitation. Some key takeaways include the LLs and SMEs that have shown a high potential to scale and replicate in new geographies and customer segments by improving their product offerings. Some of the LLs and SMEs are impacting the lives of customers by providing them access to fulfil their basic energy needs in rural areas.

Further, the challenges observed from the LLs and SMEs such as less competitive pricing of the products, low uptake of novel products in rural areas due to overestimation of the market potential, difficulty in sourcing funding, etc. are crucial for the new replicators to understand for their businesses. The lessons learnt from the workshop discussions in the SESA project will affect future initiatives that can achieve greater impact and sustainability. The project's focus on activities such as business modelling, capacity building, peer-to-peer exchange, etc. has equipped partners with the necessary tools and knowledge to drive the adoption of smart energy solutions. The three-phase replication approach presented in this deliverable can guide to initiation of replication of similar energy solutions in the market. It can also be recommended that the SMEs and replicators should actively engage with their customers and end-users to understand their needs, challenges, and pains, and segment their market accordingly for their product offerings.

In conclusion, the SESA project has laid a strong foundation for the replication of smart energy solutions in Africa. The replication roadmaps and three-phase approach presented in this report offer a clear path forward for future projects, ensuring that the benefits of smart energy solutions can be realized across the continent. The continued collaboration and commitment of different stakeholders will be crucial in achieving the long-term goals of the SESA project and driving sustainable development in Africa.

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Annexes

A.1. Kenya regional workshop agenda

General Assembly Day 1 Tuesday, 25 October 2022

Venue: Sarova Panafric Hotel, Along, Valley Rd, Nairobi, Kenya

Time (EAT)

Session title

8:30-9:00	Welcome and registration
9:00-9:10	Introduction from the Coordinator, Magdalena Sikorowska, ICLEI Local Governments for Sustainability (ICLEI ES)
9:10-10:30	State of play of different Work Packages 1-6 WP1 Esther Van Bergen, Stichting Cenex Nederland (Cenex NL) WP2 Claudia Schroder, ICLEI Local Governments for Sustainability (ICLEI AS) WP3 Sanket Puranik, Smart Innovation Norway (SIN) WP4 Elvis Bahati Orlando, Blekinge Institute of Technology (BTH) WP5 Edmund Teko, Urban Electric Mobility Initiative (UEMI) WP6 Natalia Cardona, F6S Network (F6S)
10:30-11:00	Coffee break
11:00-12:30	Challenges and experiences from the demonstration and validation countries Moderated by Magdalena Sikorowska, ICLEI ES and Elvis Bahati Orlando, Blekinge Institute of Technology (BTH) Kenya Charles Ogalo, WEIHub Victoria Limited (WeTU) Ghana Albert Awopone, Akenten Appiah-Menka University (AAMUSTED) Malawi Zione Kamtamba, Going Green Morocco Abdellatif Ghennioui, Green Energy Park South Africa Edem Foli, Nelson Mandela University (NMU) Q&A session
12:30-13:30	Lunch
13:30-15:00	Thematic working session SESA project M&E, KPIs identification per country and timeline Moderated by Esther van Bergen and Jorden van der Hoogt, Cenex 30 minutes: General overview of objectives for everyone 60 minutes: split into working groups
15:00-15:30	Coffee break
15:30-16:00	Thematic working session Session on E-Mobility Charles Ogalo, WeTu, Abdellatif Ghennioui, Green Energy Park, and Edem Foli, Nelson Mandela University (NMU)
16:00-16:30	Thematic working session Session on renewable energy solutions and applications Asier Sanz (Technalia), Sisty Basil, ELICO Foundation, and Geoffrey Gasore, University of Rwanda (UR)
16:30-18:00	Thematic sessions (running in parallel) Session on market analysis and revenue models Sanket Puranik (SIN) Kenya Partners Working Session on the SESA project implementation Judith Adem Owigar (UN-Habitat), and Charles Ogalo (WeTu)
18:00	Closing
20:00	Gathering Dinner in Nairobi - Baobox

A.2. Ghana regional workshop agenda

Programme overview

From 9-13 October 2023, SESA will be hosting its second Regional Event in Ghana. The visit will take place in two parts. The first three days will take place in Accra, where participants will take part in a business model workshop, peer-to-peer exchange activities, a financing workshop, site visit, and a policy dialogue. Following these sessions, the Regional event will continue in Kumasi, involving a visit to the rural living lab and a capacity building session.

Venue: 9-11 Oct Accra City Hotel, Accra, Ghana

10 Oct Safisana, Ashaiman (Accra) (Site Visit Waste-to-Energy)

10 Oct St. John's School (Site Visit urban living lab)

12 Oct Kumasi Site Visit

13 Oct AAMUSTED Campus, Kumasi, Ghana

Monday 9 October: Business Model Workshop		
9:00-17:00 Business Model Workshop Day 1: "Crossing the Chasm"		
Tuesday 10 October: Workshops and Site Visit		
8:30-13:00 Peer-to-peer exchange Waste to Energy Site Visit Safisana, Ashaiman (Accra)	9:30-12:00 Business Model Workshop Day 2: "Crossing the Chasm"	9:00-15:00 Climate Finance & Project Development Taking the first step
15:30 Site Visit - St. John's School		
Wednesday 11 October: Ghana Policy Dialogue		
9:30-12:00 Ghana Policy Dialogue		
Fly to Kumasi		
Thursday 12 October: Living Lab Launch		
9:00-15:00 Living Lab Launch and Site Visit Biofuel Cooker and Microgrid system		
Friday 13 October: Capacity Building		
9:30-15:00 Capacity Building		



A.3. Rwanda regional workshop agenda

Programme overview

The Rwanda Regional Event is hosted by the University of Rwanda (UR, Kigali), which is a Consortium member of the SESA project. The event is also supported by SESA Consortium members: ICLEI Africa, ICLEI Europe, Technical University Berlin, Smart Innovation Norway, F6S, Siemens Foundation, Urban Electric Mobility Initiative.

Venue: 22 April - Park Inn Radisson Hotel, Kigali (Rwanda)
 23 April - Park Inn Radisson Hotel & Ecogreen Facility, Kigali (Rwanda)
 24 April - Park Inn Radisson Hotel, Kigali (Rwanda) & Online
 25 April - Park Inn Radisson Hotel, Kigali (Rwanda) & Online
 26 April - University of Rwanda, Kigali (Rwanda)

Monday 22 April: Business Modelling Workshop	
9:00-16:00 (CAT)	Business Modelling and Co-creation Workshop: Day 1
Tuesday 23 April: Business Modelling Workshops and Site Visit	
9:00-12:00 (CAT)	Business Modelling and Co-creation Workshop: Day 2
14:00-17:00 (CAT)	Site Visit- EcoGreen Facility
Wednesday 24 April: SESA Procurement & Venture Summit	
9:30-15:30 (CAT)	Invest & Procure Summit: Fueling Startup Growth through Procurement and Investment
Thursday 25 April: Rwanda Policy dialogue & Peer-to-peer exchange	
9:00-12:30 (CAT)	Rwanda Policy Dialogue: Solar Irrigation and Second-life batteries
14:30-16:25 (CAT)	Peer-to-peer exchange: Cities and businesses: how to achieve climate objectives together
Friday 26 April: Capacity Building	
9:30-15:00 (CAT)	Building capacity on solar PV mini-grid systems, second life EV batteries & carbon credits



