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Practical examples of application of SD4SEA approach/Tools

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Chapter 8
Practical Examples of Application of SD4SEA Approach/Tools

8.1 Introduction

This chapter illustrates two practical applications of the SD4SEA design approach and tools, describing how they have been used by companies, practitioners and academics in different countries as part of the LeNSes project.

The tools have been applied in practice with different types of users. On the one hand, companies and practitioners (NGO, consultants, and designers) used the tools for a range of purposes ranging from understanding the market in a given geographic area to exploring new sustainable business opportunities to design concepts of S.PSS applied to DRE. On the other hand, academics and teachers used the SD4SEA approach and tools to teach the various aspects of designing and developing S.PSS applied to DRE.

The following sections describe two cases of application of the SD4SEA design approach and tools.

- ***Case 1:*** *Solar energy company (Botswana)*
  Tools used: S.PSS & DRE Innovation Map, the S.PSS & DRE Design Framework and Cards, Energy System Map;
  Objectives: to explore new business models and other technology options in order to reach a wider range of customers in Botswana.
- ***Case 2:*** *SMEs for energy (Uganda)*
  Tools used: Innovation Diagram for S.PSS&DRE, Sustainability Design Orienting Scenario for S.PSS&DRE, Sustainable Energy for All Idea Tables (and cards), Energy System Map, Stakeholders Sustainability and Motivation Table;
  Objectives: to innovate and increase sustainability of the current business of the SMEs, adopting the Sustainable Product-Service System applied to Distributed Renewable Energy model.

8.2   Solar Energy Company, Botswana

Context and Objectives

An example of how a company used some of the S.PSS and DRE design tools is related to a workshop organised to support SMEs in developing sustainable Product-Service Systems for energy access in African contexts.

A company from Botswana was involved in a three-day workshop to redesign their business model. The company sells mini kits and solar products with consultancy and training services. They aimed at expanding their portfolio of offerings to other customers and possibly including new products in their range. After a short introduction on S.PSS and DRE models, their benefits and the proposed design approach, participants used some of the SD4SEA tools to refine and re-orient their business model.

Description of Activities

1. **Exploring the applications of S.PSS and DRE in low-income and developing contexts.**

Participants were first introduced to S.PSS applied to DRE, their benefits and the design tools. Then, they used the Innovation Map and the Archetypal Models cards to map five examples of case studies on the map, positioning them according to the S.PSS type, the energy system used and the target user. This activity aimed at getting familiar with the Innovation Map and at understanding different types of S. PSS and DRE offers.

2. **Strategic analysis with the Innovation Map**

The company started this task by positioning their current offerings on the Innovation Map according to the type of energy system, the target customer and the S.PSS type. The company positioned themselves on the quadrant related to 'pay-to-purchase mini kits with advice and consultancy services'. Looking at other options provided by the Map, they immediately thought about moving towards leasing models and pay-per-unit of satisfaction of both mini kits and bigger individual solar systems. These discussions were triggered by the fact that most competitors in the market are operating in the 'pay-to-purchase' area. In fact, during the discussion on competitors, participants positioned all of them in the bottom part of the Map and on the Non-PSS offers area. Because of these reasons they decided to explore types of offers that were not provided in the context of Botswana (see Fig. 7.35).

3. **Concept generation with the Innovation Map**

In a second phase, participants used the tool to brainstorm about new concepts. They used the Concept Cards to define three new business models and then position them on the corresponding area of the map. As illustrated in Fig. 2.5, concepts were composed by a combination of different offers. Concept 1 combines a product-oriented offer (pay-to-purchase with additional services) with a use-oriented one

(leasing model) involving solar water pumps offered through an entrepreneur-managed model. Concept 2 involves the provision of energy services through solar mini kits on a pay-per-unit of satisfaction. Concept 3 combines a use- and a result-oriented S.PSS and involves leasing charging stations (solar kiosks) to mobile money producers, employing local entrepreneurs to provide charging services to end-users.

While Concept 1 employs the solar mini kits technology, which corresponds to the current type of products offered by the company, the other concepts involve larger systems and charging stations. In fact, after having mapped a competitor providing solar kiosks in the non-PSS area, the company brainstormed about possible partnerships to set up with this company, with the aim of reaching a wider number of customers.

Another interesting aspect emerging from this first idea generation was the decision to target different types of users. The company, in fact, identified areas for opportunities in the farming sector and in off-grid communities, brainstorming about different technology options to satisfy their energy needs (solar water pumps and charging stations) (Fig. 8.1).

4. **Concept detailing with the Design Framework and Cards**

The second day of the workshop focused on detailing the concepts generated by using the Design Framework and Cards (see Sect. 7.2.7). They were given the
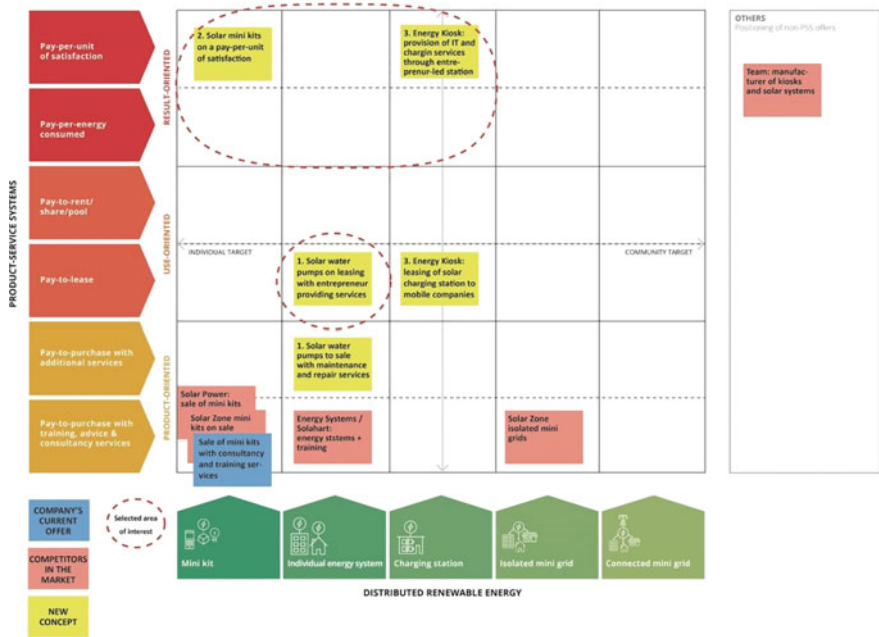

Fig. 8.1 Innovation map completed by the SME in Botswana. *Source* designed by the Authors

Framework with Cards and a Design Canvas to be filled out with post-its. By browsing the Cards and getting inspiration from case studies and guidelines, participants completed their own Design Canvas (Fig. 7.32).

After having completed the first idea generation with the Innovation Map, the company had to decide which concepts to select for the detailing phase. The company initially decided to focus on result-oriented S.PSS (pay-per-unit of satisfaction) for their mini kit concept, positioned in the corresponding area of the Map (Fig. 2.5). However, after having discussed implications for implementing this model and necessary resources needed (such as capital financing), they decided to return to their initial business offer (offering mini kits on a pay-to-purchase with additional services) and kept the result-oriented model as a concept idea to be implemented in future. This suggests that the Innovation Map helped the company in identifying and detailing new strategic opportunities to be pursued in future, even though these cannot be implemented straight away.

The brainstorming session was then focused on developing all three concepts selling mini kits with consultancy services; providing solar water pumps on leasing and on sale to farmers; providing charging stations on leasing to entrepreneurs who would then provide charging services to end-users (pay-per-unit of satisfaction). To avoid confusion, ideas were written down on different types of post-it (Fig. 2.6).

This activity helped the company in detailing the network of stakeholder involved (partnership with local manufacturer and local entrepreneurs) and in understanding the different services they would need to integrate in their offers. In particular, they included installation, maintenance, as well as training on product management targeted to local entrepreneurs. The company also discussed about providing end-of-life services and collection of extinguished batteries, a service that currently no other actor offers in Botswana (Fig. 8.2).

5. **Visualisation and communication with the Energy System Map**

The last phase of the workshop focused on using the Energy System Map (see Sect. 7.2.7) to detail some aspects on the new solutions and to visualise the entire model. Participants were provided with a printed example of the tool, a set of icons and a template to use for designing their own system map. By cutting the icons and pasting them on the template, participants identified the main elements of their business model. In the second stage, they drew flows of information, services, goods and money between stakeholders (Fig. 2.7). The company affirmed that this process helped them in clarifying some aspects of their concepts, especially in terms of payment flows. In fact, using the tool at the end of the idea generation session helped them in identifying issues in their concepts and overall achieving a higher level of detail (Fig. 8.3).
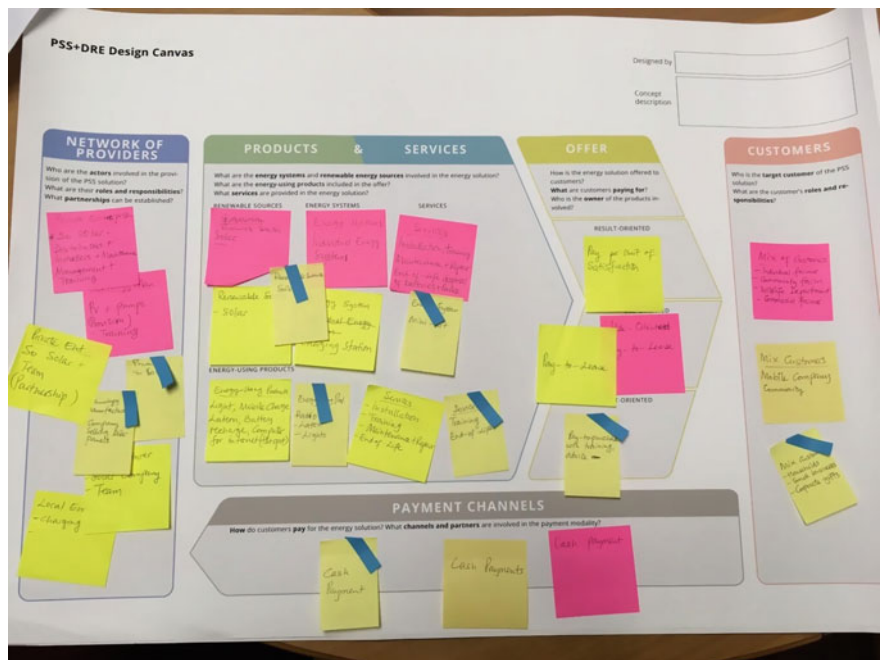
Fig. 8.2 The design canvas produced by the company. *Source* designed by the Authors

Outcomes

The company currently sells solar mini kits with consultancy services. After having applied some of the SD4SEA tools, the company explored the opportunity of shifting their current offerings on different types of S.PSS offers, exploring different technology options and target customers. In terms of offering, they generated concepts in the use and result-oriented areas, moving away from the product-oriented area where they currently operate. Moreover, the company combined two models, leasing option and pay-per-unit of satisfaction, in their solar charging station concept (energy kiosk).

This example illustrates how companies can design solutions moving away from their current product-oriented models towards ownerless-based offers. According to feedback received by the company, the tools helped them in identifying opportunities for their chosen market and a promising niche to explore ('*it was helpful to see where this niche markets are amongst competitors. It gives a good visualisation of where the current market is heading… you are able to take advantage of opportunities not being explored*'). In fact, the company was able to see that all competitors in Botswana are located in the product-oriented area, and thus that interesting opportunities to create a competitive advantage lie in providing use- and result-oriented S.PSSs.
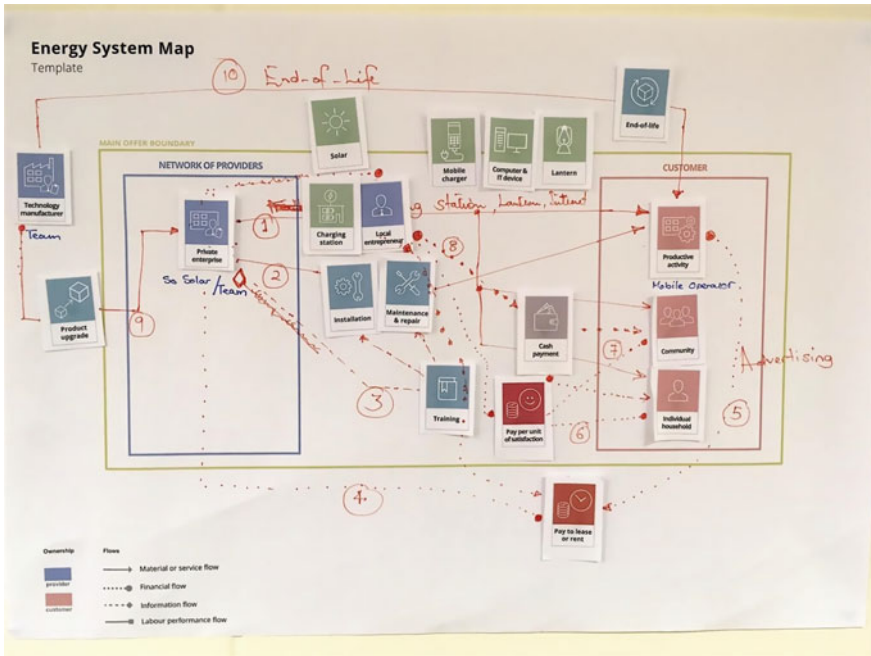
Fig. 8.3 The energy system map produced by the company. *Source* designed by the Authors

8.3 SMEs for Energy, Uganda

A further prototyping of the SD4SEA tools was conducted by the Makerere University (Uganda—2016) as a collaboration between the Centre for Research in Energy and Energy Conservation (CREEC) of the University and Politecnico di Milano. The course involved nine Small and Medium Enterprises (SMEs) for energy from Uganda.

Objectives
Participants were asked to innovate and increase sustainability of their existing businesses, by designing Sustainable Product-Service System applied to Distributed Renewable Energy concepts. Attention was addressed to designing new concepts, and to properly communicate them to external audiences using dedicated tools.

Description of Activities
The SMEs representatives were asked to work in groups of 3–4 practitioners, dealing with different Distributed Renewable Energy (DRE) such as biogas, sun, hydropower and cook-stove technologies. The course was based on theoretical lectures, case studies and a design consultancy.

1. **Strategic Analysis of the SMEs state of the art**

The first activity was conducted with the use of the Innovation Diagram for S.PSS and DRE tool, aiming to understand the current business of each SME. From the analysis, it was evident that most of the SMEs are proposing product-oriented solutions, where the product is sold with (eventually) additional services included, such as maintenance (Fig. 8.4).

2. **Exploring opportunities**

After the analysis, the Sustainability Design Orienting Scenario for S.PSS and DRE tool was used to show promising visions (four videos), to give inspirations to participants. Then, the Sustainable Energy for All Idea Tables were used. In fact, each group designed several ideas to move their product-oriented business, to explore new solutions (Figs. 8.5 and 8.6).

3. **Design concepts of S.PSS applied to DRE**

The most promising system ideas among those generated, they were copied and clustered by each group within the Innovation Diagram for S.PSS and DRE. This allowed each group to generate a concept and to characterise it in terms of network of providers, customer/s, type of S.PSS (Product-oriented, Use-oriented, Result-oriented), products and services offered, configuration of the system and type/s of renewable resources. To clarify the interactions of (potential) actors of the system, the Energy System Map tool was used by all groups, and as well the
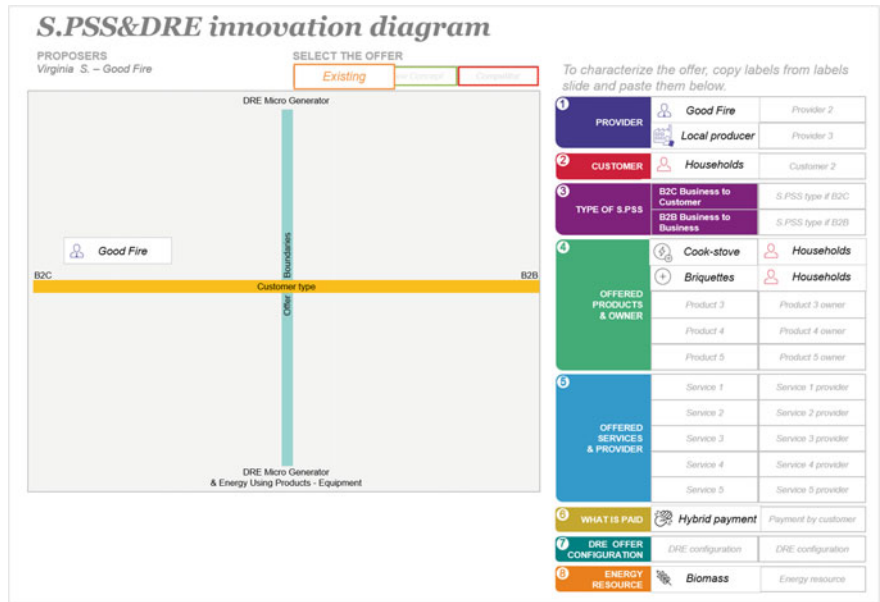
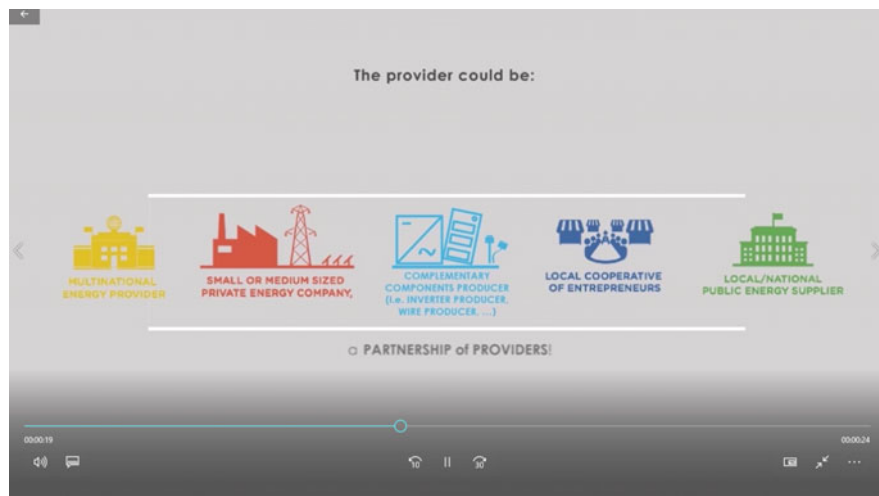**Fig. 8.4** Current business of a SME involved in the course. *Source* designed by the Authors

Fig. 8.5 Screenshot from sustainability design orienting scenario for S.PSS and DRE. *Source* designed by the Authors

Fig. 8.6 Ideas generated using the SE4All idea generation tables and cards. *Source* designed by the Authors
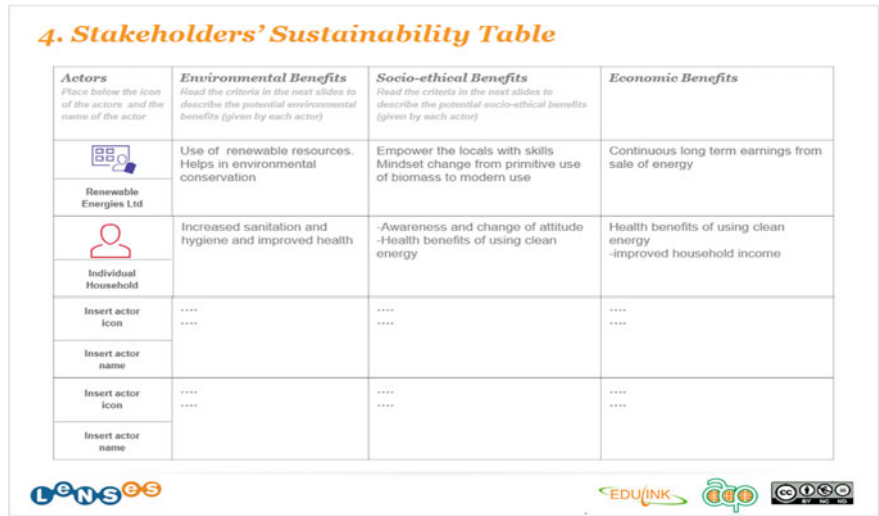
Fig. 8.7 Stakeholders' motivation and sustainability table generated by participants. *Source* designed by the Authors

Stakeholders' Motivation and Sustainability Table tool, which brought more details on motivations/contributions/benefits from and for each of the (potential) stakeholders (Fig. 8.7).

Outcomes
Three concepts of S.PSS applied to DRE were developed, thus opening innovative opportunities for their current businesses. One of the concepts was *'A business to customer (B2C) solution, based on a community bio-digester, owned by the Renewable Energies Ltd (REL), who is responsible for its installation, training, repair and maintenance. REL offers to its customers biogas stored in bags to facilitate cooking activities and charged batteries for lanterns. Customers pay-per-use to use the energy services (biogas refill/battery charging). REL owns biogas bags and the batteries, customers own the stoves and the lights. To gain extra-money and Customers can provide bio-waste to support the function of the bio-digester, that will be paid from REL'.*

8.4 Summary and Considerations

The SD4SEA tools, approach and support have been used (and tested) not only in the above-described situations. In all 10 organisations (SMEs, NGOs, Research Centres) and 10 students and 10 teachers have been involved in courses and lifelong learning modules. In fact, the tools have been applied by companies, practitioners

and students in four African countries and in Europe. The experiences conducted validated the tools and their adaptability to different purposes of application.

All feedbacks have been very positive, thus encouraging the diffusion and their use in both low, middle and high-income contexts.