

Module 04 : Planning operations

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Week 01:
Plan your
production process



Resource Recovery and Reuse
(RRR) Entrepreneurship

Week 1 module 4: Plan your production process

“Welcome to week 1 of module 4: plan your production process.

This week we are going to look at **operations**, which include the day-to-day activities that your business will perform to create a value proposition for your costumers.

As you have already learnt in module 3, the operational aspects of your business are presented on the left-hand side of your business model canvas, which includes key activities, key resources, key partners, cost structure and social and environmental costs.

We are now going to have a close look at the operations of your business.

Let me ask you something, when thinking about the operations of your RRR business, what is the first thing that comes to your mind?...

Probably, it is the production of your RRR product, which is the process of turning waste into a product. Am I right?

And this is true, production is in fact the core of a RRR business, since it has major impacts on the value proposition and the costs involved. Furthermore, production will employ most of your employees and your assets, so machines and equipment.

However, operations do not only include production, but also support activities, which need to be carried out by your business in order to facilitate the core activity.

You want to make sure that these activities are well aligned to support the efficient and effective delivery of your value propositions. These are:

- Procurement, which is concerned with sourcing your raw material, so the waste!
- Marketing & sales: creating demand for your offer and selling it.
- Finance: finding funding for your machinery, equipment and operating costs.
- Human resources, recruiting workforce and managing your employees.
- Partnership management: managing contracts with your key partners
- Inventory management, taking care of your inventories.

- Legal: safeguarding your business in legal issues.

An established business usually has several departments, and each department is assigned a specialized function. However, if you are just starting, it is probable you and any co-founders will have to perform all of them!

Let us have a closer look at your production process now, so that you plan it accordingly. You already learnt in previous modules that the production of your RRR product involves the conversion of an input, like faecal sludge, into an output, like biogas, through a transformation process.

Now, be aware however that it is not only your waste input that will be needed to produce your RRR product. Input here refers to what is called the Ms of production:

- Material: the waste flow you have identified in module 2.
- Manpower: the workforce you need to produce your products.
- Machine: the devices and equipment your workforce will employ.

Let's look at the example of Eco-Fuel Africa (EFA), a private company from Uganda that converts farm waste into briquettes for cooking.

The business runs a micro-franchising system in which it brings together important value chain actors, such as rural farmers, micro-franchisees and women retailers to produce and distribute its briquettes to final customers. EFA, as the focal point of the value chain, is involved in the technology transfer and leasing, as well as training and distribution of products.

The inputs of EFA's production are:

- Material: the agricultural waste
- Manpower: the rural farmers, micro-franchisees, women retailers and the EFA staff.
- Machine: a kiln for the carbonization of the waste, press machines for the preparation of briquettes, and vehicles for transporting the materials.

Once the elements of production are in place, the transformation process occurs.

Transformation is the process by which the inputs are converted into outputs. It is a value addition process which modifies or adds value to the inputs and converts it into a form that is more useful and sold to the customer.

This value addition can be done in any of the following ways:

- **Transportation:** this refers to the physical movement of raw material or goods from one place to another.
- **Treatment:** this includes all the activities such as change in the physical state of input, including change of composition, temperature, etc.
- **Storage:** this refers to preserving the goods in a protected environment so that they can be made available at a later date.

As an RRR business, you should take into account that your production does not only entail the treatment of the waste, but also the transport of the waste to your facility, the storage of the waste, as well as the storage of the intermediate and finalized products and the delivery to the distributors or customers.

In the case of Eco-Fuel Africa (EFA), different actors are in charge of different steps of the transformation process. The rural farmers collect the agricultural waste and convert it into charcoal powder using kilns; the micro-franchisees convert the charcoal powder into charcoal briquettes; the EFA staff packages and distributes the charcoal briquettes to the women retailers, who sell the briquettes to the final consumer. As a focal point of the value chain, the EFA staff is in charge of technology development and transfer, leasing, training and network management.

The transformation process of Eco-Fuel Africa (EFA) includes:

- The **treatment processes** of: Carbonization, pressing into briquettes and packaging.
- But also, the **transportation** of all the intermediate products between the different process steps, such as the charcoal powder and the briquettes to packaging, as well as the transportation of the packages of briquettes to the retailers.
- Also, don't forget the **storage** of the raw material, intermediate and final products at the different points of the value chain. The storage capacity needed will definitely impact the space requirements of your production plant, so it is paramount to consider it.

So to sum up, if you have the required inputs and the proper transformation processes in place, you can produce the outputs, your RRR product.

All while reaching the level of quality that you have set with positioning your product. Reaching a production volume that allows you to achieve your forecasted income, and ensure efficiency in the process so that you can cover your costs and make profits.

Sounds too lofty? Let's go ahead and make it concrete: it is time to plan your production process now! Use **the worksheet below to record your findings**.

For this, you will:

- Describe the general process steps, indicating their sequence.
- Select specific technologies
- Specify the capacities of each process step
- Specify the needed units, tools and equipment.
- Determine the workforce needed
- Define how the different units will be laid out in your plant, which will give you the land and location requirements

Here are the steps you need to follow to plan your production process. You start with the analysis of the data you developed in previous modules:

For instance, the **quality specifications** of your product. You should already know whether you will produce non-carbonized or carbonized briquettes. In the case of wastewater reuse businesses, you should already know what values should have the parameters of your irrigation water.

You also need to know the forecasted demand for your products, so the **sales volume** you calculated in module 2.

Your sales volume indicates how much you need to produce over a certain period of time, so the **delivery schedule**.

The next step is to design your process.

A common way of designing a process is by drawing a simple **process flow diagram**. This visualizes the individual process steps and their logical sequence. I suggest that you take a big piece of paper again – like a flipchart paper – some post-its and markers to draw your process flow diagram.

Here is the process flow diagram of Eco-Fuel Africa. Note that Eco-Fuel's process flow diagram also includes – next to the treatment of waste into resource – the storage and transportation.

Once you have identified your process steps, it is time to look into specific treatment systems and technologies.

In the following lecture, I will be introducing you to the elements of treatment systems, and the different types of treatment available, which are a combination of biological, physical and chemical processes.

In week 3, you will choose the cluster of technologies that you need to learn more about, depending on your business model:

- Nutrient and organic matter recovery
- Energy recovery from organic waste
- Wastewater for agriculture, forestry and aquaculture.

At the end of week 3, you will have identified the technologies that you will implement and will describe the specifications of the technology.

In week 4, I will then give you some advice on how to plan the layout of your plant and the requirements of land and location, as well as how to calculate the workforce and O&M requirements.

But before that, it is time to draw your process flow diagram! So, get started and I will see you in week 2!

List of Reference:

Graph sources:

- Unless otherwise noted, all graphics and case studies from OTOO, M. (Editor), DRECHSEL, P. (Editor) (2018): *Resource Recovery from Waste. Business Models for Energy, Nutrient and Water Reuse in Low- and Middle-Income Countries*. International Water Management Institute (IWMI). Routledge

Image sources:

- Unless otherwise noted, all images from IWMI flickr library www.flickr.com/photos/iwmi/

*Information and data were compiled to our best knowledge, but mistakes remain possible. In such a case we apologize and kindly ask for feedback to correct them.