Module 02 : Scanning the business environment

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IWMI
International
Water Management
Institute

Week 01:
Analyse waste supply

Resource Recovery and Reuse
(RRR) Entrepreneurship

Week 1 module 2: Analyse waste supply

“Welcome to module 2, week 1: Analyse your waste supply.

This week we are going to look at waste supply, so the raw material you will need to produce a RRR product.

Let me go back to the overview of waste-to-resources options that you were already introduced to in module 1. While this is the RRR product that you will be eventually selling, this is your input or raw material, so human excreta, organic residues, animal manure and used water from households or industry. This is your most important resource, so you want to make sure that it is available in desired quantity and quality.

If you think about it, waste is simply unutilized raw material that is discarded by someone because it has no value to them. So, it is a very individual thing to see something as waste. As an RRR entrepreneur you know that technically all waste is made up of different materials and chemical compounds which can potentially be utilized in a different way, like nutrients, water, and valuable materials. While societies in general have understood that paper, glass, metal and plastic are valuable materials that should be recovered and reused, people are hardly sensitized to the value of nutrients and water; with some very few exceptions. Singapore is a country with very little access to fresh water, which is why they recycle the bulk of the wastewater for non-potable industrial use and cooling. This is equivalent to about 40% of Singapore’s daily (overall) water demand.

So what people consider as waste, depends very much on the person and their needs, the location the material is at, the potential for future use, the timing of use, and many more factors. This is not something you have to analyse now, but you definitely have to keep this in mind when you get to analysing your customers in module 3. The challenge will be – finding the value in it and making a business out of it.

What you should look at now is the waste supply in your local area. You might say, no problem! We have plenty of waste, our streets look like this and our rivers look like this.

Well, I can see the potential, but the big question is if this waste can be translated into a financially viable business, so if you can process this waste at a cost and sell the recovered resource at a price that allows you to break-even after a few years – or even make a profit. Sounds too complex? Let me give you an example: A2Z Infrastructure Limited, a RRR business from India, has formed a Public-Private-Partnership (PPP) with the municipality to produce nutrient-rich organic fertilizers from municipal solid waste. A2Z charges the municipality – that has the mandate to collect waste from households – 7.4 US dollars per ton of collected waste. This is sufficient to exactly cover the costs

of waste collection and transportation and any surplus income from the sale of fertilizers allows the company to make profits.

At the end of the day, managing your waste supply well, will have an impact on your bottom line, either resulting in a profit – as in the case of A2Z from India – or in a loss, if the cost of sourcing your waste supply is too high or you simply don't sell enough products because you are missing the raw material.

So, before venturing into your business, you need to answer these very essential questions.

- **What is the most reliable and cheapest waste stream for producing your RRR product?** The 'primary' waste source in your area is actually not always the one to seek, as it does not have to be the most reliable, safest, high quality or cheapest to access. So, which waste stream in your local area will provide the right amount, at the right quality, at the right cost and at the right time? The most common waste streams are: Municipal Solid Waste, Market Waste, Wastewater, Faecal Sludge, Agro-Industrial Waste and Animal Waste.
  - Municipal Solid Waste; this is your regular household waste which usually consists of a mix of organic waste, as well as plastic, metals, paper.
  - Market Waste is primarily organic waste, such as unsold food, discarded at or near food markets.
  - Wastewater is a combination of water and waste from the kitchen, bathroom and toilet discharged by households and institutions, as well as industries often mixed with storm water; it is typically transported through a sewerage system.
  - Faecal Sludge is the human excreta that is contained in pits and vaults: if a household is not connected to the sewerage system, this is most the predominant toilet system worldwide.
  - Agro-Industrial Waste are agricultural or industrial residues. Agriculture residues can be further divided into field residues and process residues. Field residues are residues that are left in the field after the process of crop harvesting. These field residues consist of leaves, stalks, and stems, whereas the process residues are present after the crop is processed at the farm, so roots and bagasse. Industrial residues occur at food processing factories such as potato skins, fruit seeds, coconut oil cake etc.
  - Finally Animal Waste is the excreta of animals generated in animal farms.

  When naming the waste stream, be as specific as possible though: just naming wastewater as your waste source is too general. Is it wastewater from households, from institutions like schools or from industry? You may also already have in mind which exact area or institution you will get this wastewater from.

- **What are the characteristics of the waste?** The quality of waste streams can differ depending on where you get it from and when. For example, fecal sludge from households has a different quality than that of public toilets. Ideally you will want to find a waste source that offers good quality waste, so with a high percent of organic materials or already separated waste, limited

contamination (think heavy metals, pathogens,...). These pie charts show the composition of municipal solid waste in high and in low income countries. While organic material makes up only one third of household waste in high income countries, it is over half in low income countries. As you might guess, this is due to different shopping and eating habits. Even if you cannot generalize from this chart to every country, it might give you some idea on the organic share in the waste of your area. Other quality criteria that you should look at depend highly on your business model and the ideal parameters that your technology or process requires. For example, while high moisture content is beneficial for producing biogas, it is not for compost production. For producing nutrient-rich fertilizer for tea plantations, the input waste ideally contains high levels of those macro- and micronutrients that the tea plant requires. It might not be easy for you to determine the exact parameters from the start, so you should produce some prototypes and by further improving your product, you will be able to define your quality criteria better.

- **Where is this waste currently located?** If your waste source is animal manure you will most likely find it in the rural areas where most farmland is. If you want to produce biogas for urban households from this manure, you have to factor in higher transportation costs. Also if you have to collect your waste from individual households, this collection will have a significant impact on your transportation costs. For example, NAWACOM, a Kenyan cooperative that produces compost from municipal solid waste, has been able to reduce its transportation costs because it has outsourced waste collection and separation to the communities that are members of the cooperative. The communities in return get access to machinery and equipment for processing this waste at a lower cost. In general, you will want to get your waste from few distinct sources like markets, institutions, agroindustry, sawmills, slaughterhouses, etc. that will minimize your transportation costs.

- **How much waste is being generated and how regular is this supply?** You need to know the quantity of waste being produced per year and how this amount is distributed over the months. Certain waste streams differ between seasons, so agro-waste like field residues might only be available during harvest season, which is not year-round in all regions. Further consider, if this waste stream is likely to stay constant or even grow over the next decades (at least the lifetime of your processing plant).

    - If you want to get an understanding of how much municipal solid waste is collected and from where (by the public authority or via private companies), ask the waste management departments of your area. They should also know how much they cannot collect with their current capacity.

    - For assessing the quantity of wastewater being generated in your target region, you need to know: the percentage of sewerage coverage in the region – so the number of households or institutions with sewerage connection; and: the location and size of the sewer networks and wastewater treatment facilities. You should be able to get this data

from the municipality. By the way, wastewater is the only source of additional water that is increasing with population growth and therefore easy to predict!

- Finding data on fecal sludge, so types of toilet systems used both in households and institutions, emptying frequency and transport services are not easy to find. You can look into census data on household characteristics (census data can be obtained from national statistics offices), interviews with sanitation experts, septic tank operators and records collected at fecal sludge treatment plants or known dumping places.

- **Who owns the waste and how much does it cost?** This might seem strange to you, particularly because you see that wastewater is currently being discharged into rivers and no one seems to care about the resulting pollution. But in some cases there are laws and regulations regarding municipal wastewater for example. In this case, it is often the municipality that regulates and owns the wastewater. In the worst case, it is illegal to use this wastewater for any other purpose or by a private business like you or the waste stream might already be contractually bound to a competitor. If you need to source industrial wastewater, it is very likely that the factory who produces the wastewater owns the waste stream. This does not mean that you cannot use it, but you might have to buy it off them. And depending on the scarcity of the contained resource and the presence of other RRR businesses in your country that need the same waste stream, the selling price of your raw material will vary. For example, Husk Power Systems Inc. (HPS) is an Indian business that sells electricity services to rural households. The electricity is generated through a gasifier system fed with rice husks – these are the outermost layer of the paddy grain that is separated from the rice grains during the milling process. The rice husk is procured from local rice farmers at a cost of approximately 0.02 US dollars – so 2 cents per kg. HPS faced significant challenge in procuring rice husk for the gasifier for a suitable price. At one point suppliers – rice mill operators and farmers – started demanding higher price. HPS countered this by establishing its own rice mills, where it offered milling services at no cost in return for the rice husk. This forced the suppliers to enter long-term contracts at a fixed price.

- **Is the waste stream accepted by your community?** Most importantly your customer has to be ready to buy a product that is made from waste. In some cultures the acceptance of organic fertilizer or even briquettes is very low if it comes from human excreta, so fecal sludge or wastewater. In this case, it will take considerable awareness raising and promotional efforts to be able to sell these products. Besides your customers, you will also want to make sure that the communities neighbouring your processing plant do not reject your idea of transforming large quantities of fecal sludge into compost in front of their doorsteps. In the case of Terra Firma, a municipal solid waste processing company in India, occasional community protest rose up against the company's waste transportation through the community neighbourhood. This was solved by running local community support programmes.

The questions and examples I have given you should enable you to assess your own waste supply now. You may download and use the worksheet below to record your findings. You will most likely

not find all your answers by searching the internet. So this is the moment where you should leave your office and go outside to find answers. Talk to the municipality, to sector experts, your professor, to farmers or any other person producing the waste that you want to get hold of. You might even occasionally have to look into a waste bin, visit a treatment plant or a dumping site. If this is not for you, I advise you not to start a RRR business ;)

After you have filled in the worksheet, 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

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