The potential for new recycling businesses from under-utilized waste streams in the Western Cape

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ABSTRACT

The Western Cape Industrial Symbiosis Programme (WISP) aims, among other things, to diverting waste from landfill by finding alternative waste management solutions for a previously unwanted material. This work has resulted in the identification of numerous waste materials that currently do not have any alternative management solution, apart from disposal. The unwanted materials considered in this study are fibreglass, foundry sand, coffee grounds and polyurethane.This paper makes a first pass at opportunity scanning and gap analysis for the selected materials. The study reviews some of the solutions for this material in other parts of the world. The intent is to identify opportunities for potential new business in the Western Cape. The outcomes of the study are speculative and would require further investigation to determine implementability.

The study does however outline four key opportunities and provides a brief outline from which to commence with a business plan to explore the feasibility of creating businesses from these opportunities. Such businesss could be key enablers of landfill diversion, but signficantly of secondary material value chains that could unlock some of the potential economic and job creation value inherent in materials currently going to landfill and supporting the shift to a circular economy.

1. INTRODUCTION

The Western Cape is home to a well-established manufacturing industry, with a variety of raw materials being used in production processes and producing numerous waste streams. Although recycling is a reality for many of the mainstream and homogeneous waste streams, such as metals or other recyclables, there are still large volumes of waste going to landfill.

The Western Cape Industrial Symbiosis Programme (WISP) aims to divert waste that is landfilled from the manufacturing sectors to other value adding solutions. The benefits of this goal apart from environmental and cost savings include extending the value chain, creating new business, catalysing opportunities for entrepreneurs and creating jobs. These are just some of the positive spin-offs of the WISP programme.

This paper presents a first pass gap analysis of certain waste streams currently going to landfill and what could result in their uptake into the recycling economy. It considers factors which are taken into account when entrepreneurs decide to open a business in the recycling industry and proposes a number of under-utilized resources (waste streams) based on the WISP database and City of Cape Town waste data that could be the stimulus for new enterprises in the waste economy.

2. UNDER-UTILIZED RESOURCES

As part of the WISP activities, data is gathered from manufacturing companies on the types and volumes of wastes being produced by their process. This information is stored on the WISP database. In doing so, WISP has been able to identify certain waste streams for which there are currently no further use. Some of the waste streams are as follows:

2.1 Fibreglass

Fibreglass is a hazardous waste (NEMWAA, 2014) generated as an off-cut primarily from the canopy, pool and boat building industries, situated in industrial areas of the province. Fibreglass is set in a variety of different resins and the off-cuts are sometimes cured or uncured. The off-cuts are generated in many different shapes and sizes, from almost powder form to pieces up to 2 m^2. Although there is variability in the resin, hardness and size of the off-cuts, fibreglass waste may hold numerous opportunities.

According to the WISP database there are roughly 14 fibreglass waste producing manufacturers with a total of 5837.5 tonnes of fiberglass going to landfill per year. All of these companies were having their fibreglass waste disposed of at landfill.

Data provided by the City of Cape Town revealed an average of only 355 tonnes per year being disposed to Vissershok Landfill and nothing to any of the other municipal landfills. The annual figures are presented in the graph below.

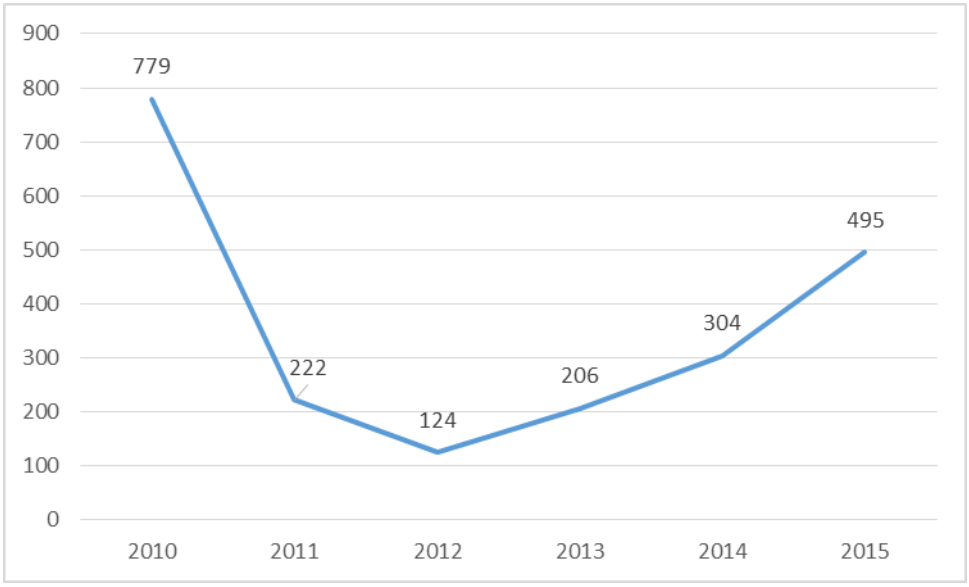

Figure 1: City of Cape Town tonnage of fibreglass disposal to Vissershok landfill

The discrepancy between figures from industry and from the city reveal that most of the waste is not disposed of separately and recorded as fibreglass. This could be because many of the manufacturers dispose of it in mixed general waste skips. (There is also a private hazardous waste (H:H equivalent) landfill at Vissershok. No data for any fibreglass disposal at this site was made available.

WISP's work and research has not revealed any solutions for fibreglass waste in the Western Cape. However, there is work being done to find a value adding solution for this material locally by interested entrepreneurs. International solutions include crushing and resetting, pyrolysis and cement making (Sponberg, n.d.)

The challenges with entering the market for fibreglass recycling include:

- Variability in size and chemistry of the material
- Volumes are not concentrated or skewed to any one manufacturer
- Manufacturers are spread out around Cape Town

The opportunities associated with fibreglass recycling include:

- Large volumes of the material available
- Cost savings from transport and disposal of this bulky waste
- Technologies available for the beneficial use of this waste

2.2 Foundry Sand

Foundry sand is a silica sand mixed with chemicals and lubricants and used for the casting and moulding of various metal items. Due to the chemical and metal contaminants, foundry sand is classified as a hazardous waste in South Africa (*NEM:WAA, Act 26 of 2014*).

Although there are at least fourteen foundries in the province, most of them use die casting, leaving only five that use sand mould casting techniques. Based on data collected by WISP, the annual foundry sand to landfill from these foundries is 73 332 tonnes, although the vast majority (98%) of this comes from a single source.

There are two main kinds of foundry sand, namely green sand or chemically bonded sand. Foundry sand is generally discarded after one or two moulds.

Although classified as hazardous in NEMWAA, foundry sand may conceivably be delisted as hazardous, based on work that is currently being done for the South African Institute of Foundrymen by WITS University. Although there are a few alternative options being explored by the majour players, foundry sand is mostly being disposed of to landfill where it is sometimes used as cover material. This is an underutilized resource and could be used in different value adding applications, namely cement manufacture, brick making, road building, foundation filler and other cementitious applications.

The challenges associated with entering the market to recycle foundry sand include:

- Legal barriers associated with delisting and licensing
- Strong competition in the market with the quarrying and sand mining industry
- Some competition has been noted by WISP for access to the material although none of the solutions have been implemented yet.

The opportunities to enter the foundry sand recycling industry include:

- Large unused volumes available
- Concentration of the material, with 98% of the material arising from a single foundry
- Technology exists which has been successfully implemented in other parts of the world.

2.3 Coffee Grounds

There are numerous restaurants and coffee shops in the greater Cape Town area, each using coffee grounds to brew their specialty for their customers. There is upwards of 276 tonnes per year of roasted coffee beans produced in Cape Town each year. The figures for coffee in Cape Town were collected from the coffee roasting companies, as the importers were distributing widely beyond the city and there were too many commercial coffee buyers to survey. Some of the roasteries were not willing to share information on the volumes produced, however the data attained accounts for five of the most prominent roasting companies in the City. That said, due to the absence of data from importers, the numbers provided here is an underestimate of the potential.

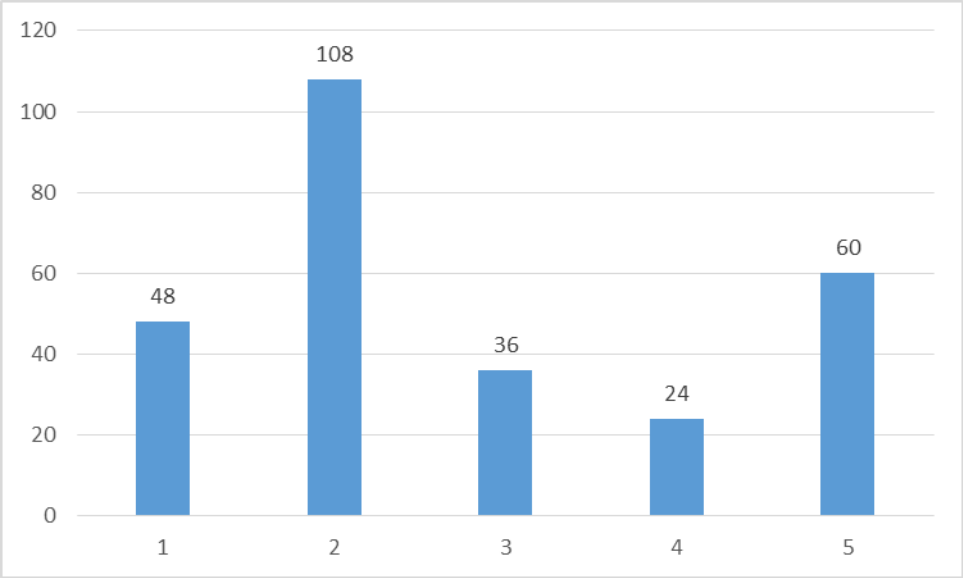

Figure 2: Tonnes of coffee roasted annually from five coffee roasing companies in Cape Town

Since coffee grounds are consumed in relatively small volumes in multiple different locations, it forms part of the general waste stream to landfill. If it could be separately stored and collected, this resource offers great opportunities in businesses like mushroom growing, rose gardening and composting. It could even be used for heating or energy production.

Locally there have been sporadic and once-off collections of used coffee grounds for small scale uses. However, there has not been a successful large scale project to collect and recycle coffee grounds in the city. Most coffee grounds are mixed with general waste and taken to landfill.

Overseas, solutions for used coffee grounds have been quite creative and innovative with the Back-to-the-Roots programme in the USA making gourmet mushroom home-grow-kits (Pauli, 2010) and the Bio-Bean

business in the UK making combustible briquettes and pellets from used coffee grounds (Ellen Macarthur Foundation, 2015).

Challenges with these ideas include:

- Collection and logistics, as the material is widely distributed and mixed
- Financial feasibility, as the value of organic material (but possibly not the products) is low
- Competitiveness: for many of the potential uses, coffee grounds could be replaced by an alternative, like saw dust.

Opportunities associated with used coffee grounds include:

- Lack of competition for the material
- Could double up with other collection programmes (e.g. buy-back centres or recyclables collection)

2.4 Polyurethane

Although the market for plastics recycling is highly complex and fluctuating, there is one plastic type (other than plastics in most multi-layer packaging) which is currently not being reused or recycled. Polyurethane in its thermosetting form is used for insulation and moulds. Off-cuts and rejects of this material are currently sent to landfill without exception.

Based on data collected by WISP, there are currently 142.5 tonnes per year of this material being disposed of from five sources in the province, of which more than 90% of which comes from a single source.

According to the manufacturers, this material is homogeneous and although it cannot be melted or extruded into new shapes, could potentially be used in other insulation and filler applications. If ground into a powder, it could be used as an insulating filler material or added to resin mouldings. Alternatively, polyurethane can be incinerated for heat recovery purposes (Ashby & Johnston. 2014).

Challenges associated with polyurethane recycling include:

- Logistics costs due to low density and high volume of the material
- Technical challenges associated with recycling of thermosetting plastic
- Low value material

Opportunities in polyurethane recycling

- Concentration of material at a single source
- Significant volumes available

3. ELEMENTS OF A BUSINESS START UP

Once an opportunity in the form of an under-utilized resource has been identified, as is done in the sections above, and an entrepeneur is interested in examining the opportunity, it is necessary to commence with a thorough business-planning phase. Although most established companies have their own methods for exploring new business avenues, this section offers a brief overview of some of the necessary steps in starting a successful enterprise. There are variations to the approach, but the concept remains the same.

The elements of a business planning approach (based on Bys and Mbewana, 2007 and Ries, E. 2011) are as follows:

- The Value Proposition or Business Concept is a basic outline of what the business does, what product or service it provides and a description of the benefits, uniqueness and competitive advantage thereof.
- A Market analysis should be added to understand where the product fits into the economy. This section would outline the market being served and make a profile of the target customer to understand what solutions the product provides. Having a secured off-take agreement for the product before production starts will almost guarantee the short-term success of a business.
- Financial features and requirements such as a cost structure to predict the fixed and variable costs required to operate the business. A calculation of foreseen profits, start-up capital requirements, cash flows and returns on investment will reveal the feasibility of the business idea. A sales strategy and the channels that will be used to sell the product should be used to make revenue stream predictions.

- Key physical resources such as material supplies, commodities and all essential material elements of the business.
- Key partners are the other existing companies and enterprises that will support the start-up

All of these factors will hopefully culminate into a validated market opportunity that could then be taken as a proposal to potential investors

4. CONCLUSION

While it cannot be established if the four resources described in the chapters above can be recycled in a financially viable manner to create new enterprises, they have been flagged as ideas that may offer economic returns.

It is important to note that although there may be an opportunity in one of the underutilised resource categories and a promising business plan has been devised, there must also be a good match between the entrepreneur and the opportunity. A business owner who does not have a passion for the idea is unlikely to do the hard yards to make it work and weather the ups and down. Neither would one who does not understand their product, process or market be able to adjust to changing market conditions. Business assistance can thus only be of value to a limited degree.

Herein lies a key dilemma for enterprise development through industrial symbiosis: entrepeneurs are typically motivated and committed to their own ideas; the opportunities identified through IS are ideas without entrepeneurs. Such ideas are difficult to turn into viable businesses without entrepeneurs who take ownership of the ideas and the opportunity. This has made enterprise development, a key potential inherent in IS, difficult to realise.

It is the intent that this paper be the spark for a potential entrepeneur to look to IS programmes and opportunities for a business idea, and to draw on the support available (includling that links that can be faciliated by IS programmes in South Africa) to launch successful businesses that will realise the potential economic and job creation value inherent in materials currently going to landfill and thereby supporting the shift to a circular economy.

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