December 2013

Blue Sky Recycling Programme

Archit Santosh Parmanand
Worcester Polytechnic Institute

Brendan James McKeogh
Worcester Polytechnic Institute

Kelsey Elizabeth Stergiou
Worcester Polytechnic Institute

Steven Gerard Como
Worcester Polytechnic Institute

Follow this and additional works at: https://digitalcommons.wpi.edu/iqp-all

Business Sustainability in Blue Sky Recycling Programme

Assessing Financial, Environmental, and Community Sustainability Through Process Design, Financial Upgrading, and Infrastructure Management

An Interactive Qualifying Project submitted to the faculty of Worcester Polytechnic Institute in partial fulfilment of the requirement for the Degree of Bachelor of Science.

ABSTRACT

Blue Sky Recycling (BSR) is a programme that provides a livelihood for over 1,500 waste pickers throughout the informal settlements in Cape Town, South Africa. Blue Sky pays pickers for collecting recyclables and then sort and resell them to collection companies. The focus of this project was to discover opportunities for growth in Blue Sky's current business operations so as to improve their self-sustainability as a NGO. Methods that we used to develop our project included interviews with pickers, observations of both the facility and working processes, and collective planning and action with our liaisons to realize the areas of potential. Outcomes included a plan for implementation of a mechanical hoist, launching a phone app for better financial organization, rebranding for public relations, educating the community about Blue Sky's opportunities through flyers and brochures, and organizing current finances through consolidated spreadsheets. In order to meet these goals, our group made contacts throughout South Africa to set up connections for Blue Sky to pursue even after our departure. Through collaboration with Blue Sky, we enhanced Blue Sky's business model to establish maximum efficiency through quicker pickups, better working conditions, and increased publicity as a major step towards complete sustainability.

For our full project report, visit: http://wp.wpi.edu/capetown/projects/p2013/blue-sky-recycling-programme/
For more information about the WPI Cape Town Project Centre, visit http://wp.wpi.edu/capetown/

AUTHORS	PROJECT ADVISORS	LIAISONS
Steven Como	Professor Lorraine Higgins	Gershwin Kohler
Brendan McKeogh	Professor Scott Jiusto	John McKerry
Archit Parmanand	Sidharth Rupani	
Kelsey Stergiou		

PROBLEM STATEMENT

South Africa faces challenging waste management problems with only three landfills that are rapidly being filled. Up to 20% of landfill waste could be avoided if appropriate materials were recycled or repurposed. (Coetzee, 2008). The cost of waste removal is much too high for the majority of the general population, and therefore many recyclable items find their way into the landfills. Blue Sky Recycling is a socially-based business that aims to create a cleaner environment and bluer skies for South Africa by connecting an informal work force of pickers to the formal recycling industries.

BACKGROUND

Prior to arriving on site in Philippi, our team spent seven weeks researching Blue Sky Recycling and general waste management in South Africa. We also collected information on recycling processes in countries with similar socio-economic demographics.

"Blue Sky is here for the sustainability and benefit of the community as a whole."
-Blue Sky Recycling Mission Statement

Blue Sky Recycling is an NGO located in the informal settlement of Philippi that provides a livelihood for over 1,500 waste pickers. They buy recyclables that informal waste pickers collect throughout the Greater Cape Town Area. Blue Sky is currently operating at about 60% sustainability, relying on the support of the Community Organisation Resource Centre (CORC) to cover additional expenses. The purpose of this project focuses on taking advantage of business opportunities for Blue Sky to maximize efficiency while working towards their goal of 100% sustainability. Blue Sky works with individual pickers throughout the informal settlements. Pickers play a key role in the recycling world and they are comprised of a wide range of demographics (Shenck, 2011). These pickers work each day to collect recyclable materials from their surrounding area. These materials are then stored at their residencies until Blue Sky sends their trucks around to collect the materials. Pickers do their jobs via four main schemas: municipal picking, informal settlement picking, door-to-door propositioning, and landfill recovery (Wilson 2006). Informal settlement picking generally involves collecting recyclables found throughout the informal settlements. Door-to-door picking occurs in suburban areas where pickers will pick up waste from each household. Landfill recovery namely occurs after a fresh layer of landfill has been placed and still contains anywhere from 15-20% recyclable materials; pickers use this time to scavenge through and remove recyclables.

Blue Sky's interaction with pickers is somewhat unique in that there is no contractual agreement that pickers must pick for BSR. However, pickers are paid cash upfront for supplied material. Blue Sky focuses mostly on the recycling of glass products. Glass falls into two main categories: "cullet" and "reusable" glass (mostly bottles). Cullet glass consists of broken glass shards. Blue Sky also takes in plastics, paper, and tin cans. A minority of material is paper and cardboard from boxes and general office scrap.

Blue Sky Recycling operates as a middleman in the recycling process. Material is picked up from buyback centres and pickers, then sorted and stored in Blue Sky's yard until trucks are prepared to move them to larger recycling distributors. Blue Sky workers go out into different informal settlements several times each day with two trucks and a trailer to collect the materials from the pickers. As of now BSR services about 20 different recycling companies. The collected materials undergo minimal processing on site, limited to crushing and consolidating for sorting and transport. Collected recyclables undergo the resorting process as the buyback materials upon arrival at Blue Sky's yard. All of the sorting at the facility is
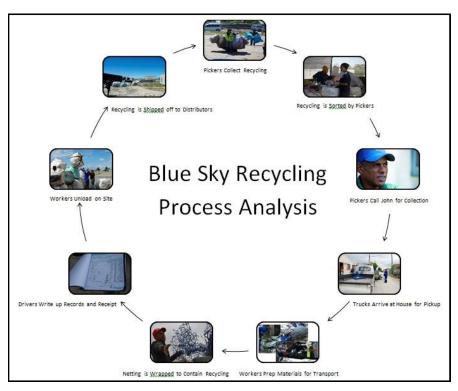
accomplished by a single worker in his mid-60s who is solely responsible for this overwhelming task. This is a cyclic process that fluctuates throughout the seasons, creating certain instabilities in Blue Sky's finances, as material has to be bought in order for them to sell to larger distributors. This is problematic, as Blue Sky also needs the funds from selling the materials in order to be able to pay the pickers.

MISSION STATEMENT AND OBJECTIVES

The goal of this project was to collaborate with Blue Sky to form a more sustainable business model. Sustainability is the pursuit of a long-lasting, positive impact that can be achieved through environmental service, economic opportunity, and social justice. Our objectives were to:

- Develop an understanding of Blue Sky's recycling operations
- Work with Blue Sky to identify opportunities for change
- Cooperatively design and implement a mechanical hoist for their pickup needs
- Develop a phone application to better organize and facilitate on-site finances, and
- Rebranding Blue Sky's name with visible logos, flyers, and website updates

Blue Sky Recycling Process Analysis

Pickers Collect Recycling

Recycling is Shipped off to Distributors

Recycling is Sorted by Pickers

Workers Unload on Site

Pickers Call John for Collection

Drivers Write up Records and Receipt

Trucks Arrive at House for Pickup

Netting is Wrapped to Contain Recycling

Workers Prep Materials for Transport

METHODOLOGY

To accomplish our objectives, we conducted field observations and interviews with our liaisons, Blue Sky pickers, and yard employees. This knowledge was the foundation for our Process Analysis that helped identify inefficiencies and potential solutions to be addressed later on. We regularly brainstormed ideas that were shared, edited, and planned with Blue Sky's staff. Each step of our progress was discussed and approved in weekly meetings to ensure transparency on both ends.

PROJECT OUTCOMES

Upgrading the Infrastructure

After going out to observe the pickups, our team realized the amount of back-breaking labour that goes into the collection of materials. The bags of recyclables can weigh upwards of one ton, and each one must be weighed in order for the picker to be paid. Watching the workers struggle to lift these giant containers and take hours to record the volumes emphasized just how much easier this job could be with a mechanical solution.

In our first conversation with Gershwin, the CORC correspondent for Blue Sky, he emphasized the impact that a truck-mounted hoist would have in the reduction of physical labour and collection time. Once in Cape Town, our team researched and visited local hoist companies to find a suitable option. We created SolidWorks models to show the proper mountings and how it would function to pick up bags and place them on the truck or trailer. We realized that mobility and proper power application methods would be ideally solved with the installation of a ratchet hoist. This type of hoist would be able to lift as much as a few tons with little work applied. Our team wanted to find the right hoist for Blue Sky's collection process in order to ease the workload of the workers (Feare, 2000). Proper funding was not available at the time a finalized quote was procured; however, our team compiled a proposal to aid in securing funds for a hoist to begin the new year.

Recycling Blue Sky's Business Mindset

Financially, Blue Sky relies on CORC in addition to its income from recyclables. These expenditures cover much of the transportation and maintenance cost incurred from the movement of multiple tons of material. Blue Sky's overarching goal for sustainability is to reduce its reliance on CORC funding and become 100% fiscally independent. In order to create a model of sustainability, it was necessary to research other companies' business models. From here, our team identified Blue Sky's current business setup and elaborated on they might maximize their efficiency and draw in more income. This process involved extensive research into successful models of a similar nature that could then be adapted for Blue Sky's needs. For Blue Sky to increase income and expand, we collaborated on the following projects:

Digitizing Data Collection: Blue Sky Goes Mobile

While watching the Blue Sky employees during pickups, we observed their current paperwork system. Each bag of recyclables is weighed and the mass is jotted down in a notebook. All of these numbers are added together, multiplied by the rate of pay, and painstakingly rewritten in a receipt book. This process involves burdensome calculations that leave room for error. This receipt lists the mass of each material and the amount of each returnable bottle collected. From each of these receipt pages, a daily log of collections is written out in a spreadsheet format. This process, while thorough, could be simplified electronically.

To address this area of opportunity, we met with Chester Kwak of Dimagi, a technology-based company that creates applications and is currently piloting a new programme called CommSell. Our team utilized their software to design a mobile app that could take the place of all the handwritten records as described above. We devised two main forms: one to register a picker's name, address, and suburb,

and the other to document the amount and type of material collected. Another form was also made to log material resale at different drop off sites. These forms are used on Android-based phones, are also functional on Java phones. The system automatically uploads the entries into a main database, which then tracks picker progress and shows how much material was collected on a daily basis. After producing this application, our team field-tested it with the Blue Sky drivers and made improvements based on their recommendations.

Branding and Marketing Possibilities

When we arrived at Blue Sky on our first day, we actually did not realize that we were at the facility because there were no signs or logos anywhere. After chatting with our liaisons, we learned that the name Blue Sky Recycling was not well defined in the community and for other businesses. Pickers themselves would sooner connect their livelihood to John, Blue Sky's manager, and Gershwin, Blue Sky's CORC representative, than they would to Blue

Sky. After a brainstorming session and multiple design efforts, we developed a logo that defined what Blue Sky stood for and would be simple enough to be put on field apparel, online media, and physical advertising.

New Ways To Use Old Materials

One of the ways to increase Blue Sky's profit margin would be to add value to the materials being recycled. Reprocessing would be a way to do this and our team researched different methods such as glass crushers and balers. These compressing methods would allow Blue Sky to have more storage space and also sell the more finely processed glass at a higher price (Blengini, 2012). We designed mechanisms that would cut the aluminum tops out of cans in order to separate the aluminum from the tin, increasing buy back value. Although these processes are in the conceptual phases, future investments could allow these models to significantly increase Blue Sky's profit margins.

Making the Books Electronic

In addition to making the pickup data digital, it was important to reformat Blue Sky's finances into spreadsheets for ease of use. The previous format included monthly reports stating individual expenses and income sources that detailed profits and bank balances as well. Our team created and tested a simplified Excel file for expenditure and income. This format automatically takes income and expenditures and summarizes them neatly, also allowing for data summation over a period of time.

Crossing Communication Barriers in Communities

John and Gershwin as well as Blue Sky's employees speak Afrikaans, but many of their pickers are Xhosa speakers. With this language barrier, there is some difficulty communicating what exactly Blue Sky would like their pickers and partners to know. In order to facilitate communication, our team created visually aided brochures and flyers to give to pickers, buyback centres, and businesses and promote general knowledge about the programme and expectations. The flyer for the picker clearly displays rates for all types of materials and a step-by-step process on how pickers should pre-sort their collected recyclables for Blue Sky. We recommend this version in Xhosa and other necessary languages to appeal to all Blue Sky pickers.
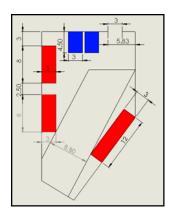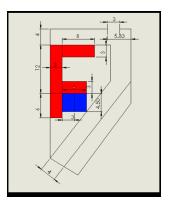

Information Flyer for Pickers

Promoting Transportation Flow Through Yard Reorganisation

As we walked around Blue Sky's collection yard, the enormous bags of sorted material and huge, scattered storage containers did not allow much room for the trucks to manoeuvre around. From experience, we knew that it was an elaborate process for more than one vehicle to be driving in the yard at any given time. John drew us an example of how he would like the yard to look, and we created multiple computerized models to comply with these needs. The setup would be arranged to accommodate a better flow for sorting the materials and to maximize driving space as shown below.

Current Yard Design depicts truck route and container locations, where the blue represents glass skips and the red correlates to the other material containers.

New Yard Layout Design

LOOKING TOWARDS THE FUTURE

This project resulted in many accomplishments, including a plan for the future. One of the main priorities is the installation of a hoist. Although Blue Sky does not presently have the funds allocated to implement the hoist, the design work and contacts have been set up. Installation can take place as soon as Blue Sky is able to obtain the necessary funds, and our group has established a presentation proposal for this investment opportunity. Additionally, research has been conducted on the purchase a new truck that would further expand Blue Sky's business. A larger vehicle will increase the number of pickups that can be done daily. Another hoist option for consideration is an on-site hoist for yard use or potentially a hyster for heavy lifting around the yard. These options have been documented and priced.

For organizational and time saving purposes, our group developed a phone app using the platform called CommSell. This system has been put into place and is fully operational. Functionality has been successfully tested and can be expanded to include mapping and SMS messaging. We recommend periodic updating and further testing for future versions of the application.

Blue Sky's rate for material sales directly affects the rate at which they are able to pay their pickers. By looking into various reprocessing techniques, we were able to conceptualize processing equipment that could significantly increase the pay-out for Blue Sky on certain materials, specifically, cans and cullet glass. Because Blue Sky now has these designs, it can pursue the development of these models and ways to sell the products at higher prices for various applications such as tile making.

REFLECTIONS AND CONCLUSIONS

Through intensive collaboration with Blue Sky Recycling, our group learned a great deal about Shared Action Learning and the art of communication between organisations. Since no past groups have ever worked with Blue Sky,

we were off to a slow start as we tried to understand the processes that make up Blue Sky's business. This required field observations to discover opportunities for growth at Blue Sky. However, we encountered and learned to adapt to a few obstacles which included difficulty obtaining information given the language barriers, time constraints of those we interviewed, and the incompleteness of Blue Sky's former website.

Determining major priorities for the project given the variety of opportunities for focus was also challenging. Additionally, a lack of communication forced our group to do all preliminary research through Blue Sky's website, which we found to be outdated and limited in information and functionality. This was the springboard to adapting Blue Sky's website as one of the final outcomes for our project.

Our liaisons at Blue Sky equipped our team with a great opportunity to learn,

collaborate, and truly help their business become more efficient and sustainable. They provided the enthusiasm and ideas necessary to make such an ambitious project develop quickly and in turn produce many deliverables as an outcome. In addition, we compiled a list of items that were not achievable due to financial constraints but are fully conceptualized and ready to be implemented upon acquiring the necessary funds. The documents, process analysis, and plans we developed will continue to help Blue Sky grow and develop in the future.

REFERENCES

Blengini, G. A., Busto, M., Fantoni, M., & Fino, D. (2012). ECO-EFFICIENT WASTE GLASS RECYCLING: INTEGRATED WASTE MANAGEMENT AND GREEN PRODUCT DEVELOPMENT THROUGH LCA. *Waste management (Elmsford), 32*(5), 1000-1008.

Coetzee, B. (January 21, 2008 Monday). The city is making progress on recycling. Cape Times (South Africa), Retrieved from www.lexisnexis.com/hottopics/lnacademic

Feare, T. (2000). Hoists: Weight lifters in all load classes. *Modern Materials Handling, 55*(14), 79-81.

Schenck, R. (2011). The Work and Lives of Street Waste Pickers in Pretoria—A Case Study of Recycling in South Africa's Urban Informal Economy. Urban forum (Johannesburg), 22(4), 411-430.

Wilson, D. C., Velis, C., & Cheeseman, C. (2006). Role of informal sector recycling in waste management in developing countries. *30*(4), 797–808. doi: 10.1016/j.habitatint.2005.09.005