

Simple Solution to Logistics Problems for Microbusiness— A Case Study at Recycling R US

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Recycling R US (RRU) is a small recycling business owned and operated by two enthusiastic young individuals. They provide recycling service to a medium size city in the southern part of United States. More than financial interest they have strong commitment to reduce waste and provide this essential service to the residents of the city. Customer service and responsibility towards future are at the heart of their mission. They are keenly interested in reducing waste and its impact on the city's landfills.

City they serve has population of approximately 85000 residents. It is isolated from major national highways. It is located few hundred miles away from major metropolitan areas. City provides water, trash and sewage service to its residents. No recycling service is provided although it has always been in talks. Currently trash is dumped in landfills located on the outskirts of the city. Residents are concerned about its impact and recognize need and importance of having recycling service. But at the same time city is very tight on its budget and residents are concerned about any additional cost that they have to pay for the service. City has elected young and a very dynamic mayor who understands the importance of recycling and believes that there should be more grass root level movement that will change public opinion. Talking with him provide a positive hope that such service would be offered to the residents in future.

For many residents, though cost is a concern, it has not stopped them from doing recycling. From the local initiatives, a non-profit organization has been established. Purpose of this organization is to accept recycling materials from residents at no cost. Many volunteers are working free for this

organization. In addition there are generous people who support it through donations. Residents wanting to recycle have to drive to recycling center of this organization, sort recycling material on their own and discard them in appropriate containers. This facility has drive way type of design and it does not take more than 5 minutes for a resident to discard all recycling material if it is already sorted.

Other option for residents is to pay for private recycling service from RRU. For a fee of \$20 per month, RRU provides residents once a week home pickup service. No sorting is required. RRU see a small but growing market of residents who are committed, concerned, busy and can afford paying for this convenient service. They recognize that there is a delicate balance between the cost and convenience when residents can recycle for free by driving to recycling center or just discard it in trash at no extra cost. After all there is no financial incentive to the residents who decide to do recycling. Rather it is an added cost or inconvenience. Thus motivating, educating, and raising awareness for the environment is the key for their survival in the business. Their marketing strategy revolves around that. Being microbusiness they can hardly afford to invest in advertising. They rely on free social networking sites such as Facebook to raise awareness and promote their business. They contact apartment rental offices, include information of their business in the monthly newsletter to reach out to the residents. In addition they provide free bins and recycling pickups during social events of public interest organized in the city.

Their business is simple. They own a small one room office space, telephone, a computer and internet connection. To collect waste they have a truck and trailer, no warehouse or garage. Every day is full of hard work and challenge. On working day they will start at 7:00 am. First duty is to drive truck and trailer to their customer's warehouse—Southern Point Recycling (SPR) and dump recycle material collected on earlier working day from residents. Then as per predetermined schedule, they service residents one by one.

When the residents sign up for the service, a bin with business logo is provided to put recycle material. They can put newspaper, magazines, cardboard, plastic, glass, tin and aluminum all in one. No sorting is required. Based on location in the city, pickup day is assigned. This day should be different from trash pickup day as in the past recycling material was picked as trash in error. Keeping separate schedule is the best solution to avoid confusion.

On the day of pickup, residents have to put bin outside their house by 8 am. During pickup, bin is taken to the trailer and materials are sorted. Sorted material is then transferred into larger containers, one for each type of material (e.g., plastic type 1, plastic type 2, glass), that are present in the trailer. 'No Sorting' is convenience for the residents but it poses challenges for RRU. Sorting on the spot is time consuming. It delays the pickup and sometimes they have to work overtime to complete all scheduled pickups. Delaying the sorting after picking up from all residents will require warehouse or sorting space which RRU cannot afford. Lot of time material that should go in trash (pizza slice found in the box) or materials that cannot be recycled (certain types of plastic) is found in bins. People are throwing the cans with food and bottles with leftover drinks. Such material is not acceptable at SPR as it creates hygiene problems in warehouse. This increases RRU's responsibility to perform some cleansing in addition to sorting on the spot. Trash can is always necessary during pickups.

Collected recycle material is kept locked overnight in the trailer and then is delivered at SPR on next working day. Separate log is kept for each type of material delivered. RRU gets paid monthly based on weight of material delivered. This recycle material is supplied to the processing plants which are all located in major metropolitan areas. There is huge variation in the costs of recycle material in the market. Aluminum is most expensive (\$900/ ton) and magazine (\$10/ton) is the least expensive. Market is dynamic and costs are often fluctuating. Location of the city adds to another problem. Being isolated from national highways and hundreds of miles away from processing plants, logistic provider are

unwilling to serve SPR. High cost of transportation further decreases what SPR can afford to pay to RRU. With the downturn in economy there is almost no demand for certain materials and SPR has to sell them at very low cost making it uneconomical to do recycle these materials. SPR is hopeful that prices will go up in future and they are collecting the inventory in warehouse to sell it in future. But this leaves RRU with either option of not to collect and recycle certain type of materials or to wait to get paid when SPR will be able to sell material at affordable cost.

RRU has recently started targeting businesses. They are very few (approximately 15) compared to number of residents. This includes mostly restaurants and bars. Businesses provide bulk of recycling materials, less sorting efforts and transportation. It is advantageous as businesses pay higher fees but there is a limited growth potential. City has very few manufacturing industries. Big industry players, retailers and university do their own recycling. Most of the other businesses are agriculture related. Service sector is struggling and increasingly finding ways to cut down costs. For logistics reason, RRU serves all its businesses on separate day. Sometime they have their trailer full and have to make two trips. There was a thought of getting bigger trailer but due to lack of funds it is ruled out.

RRU is increasingly facing the financial crunch. Amount received from selling material is almost insignificant. They are afraid of raising prices as it may lead to loss of residents and eventually revenues. Rising gas prices adds to their woes. Old trailer and truck is demanding more maintenance. Inefficiencies in the transportation and sorting are making the collection operation uneconomical. Their monthly revenues from this business are not more than \$5000. In that they have to take care of operation expenses (gas, insurance, and vehicle maintenance), office supplies and utilities, and some marketing expenses which leaves very little to pay for their own salaries.

Currently they have around 165 residents which are dispersed all over city. On a given day they can serve no more than 45 customers. RRU spends 4 days to serve its residents. There is potential for

growth but operations are consuming all time and capacity. To serve increasing demand they will require more manpower, additional truck or at least a bigger trailer. Another option is to increase the efficiency of sorting operation. There are sorting machines in the market but it requires heavy investment. Potential for increased demand is not sufficient enough to justify additional investments in machines or trailer. In the current scenario future of the business is gloomy. RRU is looking for help to improve its logistics efficiency. If they are able to succeed then they can pick up additional demand at no extra investment. They are looking at other industry benchmarks, for example, average time to deliver parcel to the customers by UPS, and finding that there is room for improvement. Currently they are using simple judgment to divide customers into four groups and then sequence the customer in each group. There are advance software available in the market (based clustering algorithms, travelling salesman algorithm) but RRU is unwilling to make any investments as they are not certain about its benefits. What they want is simple solution or algorithm that will

- i) Divide residents in the given number of groups
- ii) Then Sequence residents in each group

So that the total time required to travel will be minimized. They cannot afford any additional investment, nor interested in the solution that will require lot of technical / computer expertise. They have Excel spreadsheet with list of customer and their addresses to share with you. They are looking forward to you and can you help?

Questions:

- a. What challenges are faced by the company?
- b. Suggest how company should market their business?
- c. Develop simple solution (algorithm) to solve logistics problem addressed in the case. Assume you have been provided addresses of 165 residents randomly distributed in the city.

- d. Apart from logistics what other initiative RRU should undertake to cut down the expenditure and increase revenues.