

SweepSmart!

# Smart Inclusive Waste Management India

Sustainable entrepreneurship: Business Model Canvas

Project group 17  
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# INTRODUCTION

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## CASE STUDY\*

SweepSmart! is a social entrepreneurship that aims to help clean India's streets by incorporating western waste management knowledge into the local waste sector in order to improve the quality and efficiency and waste sorting and collection. Where social entrepreneurship is defined by Seelos and Mair (2005) in *Business Horizons* as an organisation that "caters to basic human needs that existing markets and institutions have failed to satisfy" and "combines the resourcefulness of traditional entrepreneurship with a mission to change society". This project fills this gap that the institutions have failed to satisfy by diminishing the waste problem India has while at the same time involving the poorest of the community. As mentioned by Vastbinder, Blom, and Kroesen (2012) social entrepreneurship can in this way lessen the void between high-income and low-income economies by giving people a stable income they can generate a living with.

This project involves the introduction of a conveyor belt and baler to the site, as well as the logistical collection and site optimisation. In the period of November to February a pilot will be launched at 2 waste sorting sites in Bangalore, that have been carefully selected, to prove the viability and scalability of the project. During the pilot of 3 months, a team of 4 students from the Delft University of Technology and 2 young entrepreneurs will focus on the on-site logistics and operational efficiency of the waste sorting centres. The project is especially interesting as it takes place in India. As mentioned by Prahalad (2002) in his book *The fortune at the bottom of the pyramid*, countries that still don't have the modern infrastructure or products to meet basic human needs are an ideal testing ground for developing environmental sustainable technologies and products, making India a perfect fit for this project to flourish.

## BUSINESS MODEL\*

The following business model aims to demonstrate the theoretical viability of the project and identify and eliminate potential threats and problems prior to starting the project. Additionally, it aims to realise the feasibility of the project by evaluating financial incomes and outcomes. The model is developed with respect to the period in which the pilot will take place from the perspective of the waste pickers cooperatives with whom the team will be working, Hasuridala. The reason this perspective was chosen is because the project is highly dependent on the cooperation of the waste-picker's cooperatives, and hence all aspects in which they are concerned must be prudently considered.

One very important aspect of this business model that has to be considered is that markets work different for social entrepreneurs than for business entrepreneurs. Dees (1998) argues that the markets social entrepreneurs usually operate in the market usually fail in valuing the social improvement. This way it is much harder to determine whether the sustainable entrepreneurship is creating sufficient social value. The survival of the company is only a weak indicator at best whether or not the enterprise is improving social conditions. However it is hard to determine, this business model will define the social value created as clear as possible as it is an essential part of the project.

## HASIRU DALA\*

Hasiru Dala is the name of the waste-picker's cooperative from which the business model's perspective is written. They were established in Bangalore in 2013 and already consist of 7500 waste pickers and are gradually expanding to other cities in the vicinity. Their mission is: "An inclusive society for waste pickers and other informal waste workers, free of discrimination based on their caste, religion, occupation, gender and sexuality." (Hasiru Dala, 2016). They try to create recognition of waste pickers as important contributors to urban economy, as their work is necessary for mitigation of climate change. Hasirudala trains waste pickers so they can provide more services to the citizens of Bangalore and in the future for whole India.

Hasiru Dala also gives the workers access to social security benefits, such as receiving government issued occupational ID cards that give workers a sense of identity. Additionally, they are provided access to health insurance, educational scholarships and loans for their children's education and loans for setting up their own business. During the pilot in India the waste-pickers with whom the team will cooperate with at the waste sorting sites will be associated Hasiru Dala to allow the team to get to know their current way of waste management. (Hasiru Dala, 2016)

<p><b>Key Partnerships</b></p>  <p>LOCAL GOVERNMENT IGOTGARBAGE SWEEPSMART!</p>	<p><b>Key Activities</b></p>  <p>WASTE COLLECTION SORTING PROCESS OPTIMISATION</p>	<p><b>Value Propositions</b></p>  <p>REDUCED WASTE</p>	<p><b>Customer Relationships</b></p>  <p>COMMUNITY BASED LONG TERM</p>	<p><b>Customer Segments</b></p>  <p>LOCALS</p>
<p><b>Key Resources</b></p>  <p>TRUCKS SMARTPHONES WASTE PICKERS CONVEYOR BELT/ BALER SWEEPSMART!'S WASTE MANAGEMENT KNOWLEDGE</p>	<p>TRASH SORTING SERVICE</p>	<p><b>Channels</b></p>  <p>WELL SORTED TRASH IGOTGARBAGE APP TRANSPORT SYSTEM PUBLICITY</p>	<p>RECYCLING CENTERS</p>	
<p><b>Cost Structure (Financial)</b></p>  <p>CONVEYOR BELT AND BALER Waste picker salary Waste collection</p>		<p><b>Revenue Streams (Financial)</b></p> <p>Sorted waste sold to recycling centres GOVERNMENT SUBSIDIES</p>		 <p>Companies (SweepSmart!)</p>
<p><b>Social Costs</b></p> <p>Job loss</p>	<p><b>Ecological Costs</b></p> <p>Electricity for conveyor Pollution from trucks</p>	<p><b>Social Revenues</b></p> <p>Improved working conditions Steady income</p>	<p><b>Ecological Revenues</b></p> <p>Reduced pollution Cleaner streets</p>	

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# BUSINESS MODEL CANVAS

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The business model canvas follows two streams of two customers of the waste pickers cooperatives, the locals and the recycling centres, which are green and blue respectively. Each customer stream will be elaborated on in the following section.

## DESCRIPTION OF TERMS\*

- *The waste-picker's cooperative* is a group of waste pickers who work together at particular waste sorting centre.
- *Locals* refers to the citizens of that area or municipality, in which waste is collected and brought to that particular sorting centre.
- *Recycling centres* are the businesses that purchase particular streams of trash, such as metals, plastics and papers from the sorting centres.
- *Community based* means that the customer relationship relies on the communication with the community. The community has to collect waste at home instead of throwing it out of the window in order to make it easier to collect the waste.
- *Long term* means that the communication between the customer and the waste picker's cooperative will last longer than the three months of this pilot.
- *IGotGarbage App*: The households use this app to show what kind of garbage they have and where it is located so the waste pickers can work more efficiently.
- *Transport* refers to the trucks and bicycles needed to transport the waste
- *Publicity*: is needed to make the household aware of this new development
- *Reduced waste*: by implementing this business model more waste will be processed in a shorter period of time reducing the amount of waste
- *Trash sorting service*: Hasiru Dala sorts the waste into different streams.
- *Waste collection*: The waste will be collected from households and businesses
- *Sorting process optimisation*: By creating a conveyor belt and reorganising the site the process will be faster
- *Trucks and smartphones* are needed for waste collection
- *Waste pickers* are needed to collect waste and sort the waste at the sorting centre
- *Conveyor belt*: is needed to optimise the sorting process
- *SweepSmart's waste management knowledge*: This Dutch start-up will help reorganise the site and will design the conveyor belt
- *Local government*: the local government is needed to collect the money from the household through their electricity bills.
- *IGotGarbage*: developed the IGotGarbage app
- *SweepSmart!*: Dutch start-up that will help reorganise the site with European waste management knowledge.

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# BUSINESS CASE

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## CUSTOMER SEGMENTS\*

“A market consists of all potential consumers sharing particular need or want who might be willing and able to engage in exchange to satisfy that need or want” is stated by Sarasvathy (2001). In this business model this ‘exchange’ mentioned is considered when customers pay for the value proposition. Waste-picker’s cooperatives serve two independent customer segments, as there is no relation between the needs of locals and those of recycling centres, with the exception of an increased amount of streams. Each segment however has a completely different reason for wanting a larger diversity of streams, which are profit and environmental based for the recycling centres and locals respectively.

The recycling centres are customers that purchase the sorted waste from the sorting centres, which is run by the waste-picker’s cooperatives. They benefit from large quantities of precisely separated waste from different streams as they are then able to manipulate it into a new material or product and generate income. As more streams of waste the waste-pickers cooperatives are created more recycling centres will be reached as customers. Additionally. A higher precision in waste separation means that the recycling centres can also more easily process the waste as well as purchase the waste at a cheaper price due to a reduced weight from impurities.

On the other hand, locals pay the government in the form of taxes on top of their electric bill, to have their waste collected and sorted. This money then is then given to the waste-picker’s cooperatives in the form of a subsidy. They pay this money in order to ensure that the streets in their municipality/area are cleaned, as well as reduce the pollution in the neighbourhood caused by the burning of the remainders of poorly sorted trash.

## VALUE PROPOSITION\*

In *Creating Shared Value* (2011) Porter states that the key for social entrepreneurship lies in the principle of shared value, which involves creating economic value in a way that also creates value for society by addressing its needs and challenges. This projects does this by delivering value to the customer in the form of two ways of value creation. The two values added to the customers are waste provision, a form of convenience and accessibility, and reduction.

Recycling centres recycle materials to form new reusable materials or products and the waste-picker’s cooperatives is an agent in this process, which allows the centre to focus on the optimising of the recycling process and the resulting product. Waste-picker’s cooperatives make it convenient for recycling centres to access waste in separated streams, which would not be available without them. If not for the waste pickers, the centres would have to individually invest in hiring specialists and waste-pickers to search for particular materials. This would be a costly and complex expansion for them and highly inefficient as different recycling centres recycle different materials and they would each be sending out their own collectors.

Locals benefit from a drastic reduction in waste that fills the streets and pollution from the burning of waste. The waste is not only an environmental problem, but also a barrier to transportation, hazardous for health and disturbing visually and smell-wise. By collecting and separating waste, waste-picker's cooperatives diminish the environmental problem from all aspects.

### CHANNELS\*

Recycling centres are simply reached through awareness of the particular material streams that are separated and are prepared for pick-up on site in blocks made by a baler. The channel phase in which materials are purchased by the recycling centres from the waste-picker's cooperatives is a B2B, business to business, implicating a direct transaction between the two businesses. A partner channel may be involved in the transportation of the materials from the sorting to the recycling centre, but this is dependent on the recycling centre. If the streams were to be separated to a point that they are too diverse partner channels could be utilised to expand to different recycling centres than those previously available.

Locals are reached through awareness, with the help of the government who has implemented new laws and regulations regarding a new tax fee for waste collection and separation along with standards for separating waste domestically. The tax could be considered a means for customers to "purchase" the service provided by the waste-picker's cooperatives indirectly. Trash is currently collected by trucks and bikes with different sections for different types of trash, and will continue to be collected in this manner but more efficiently through the use of the IGotGarbage application. This smartphone application allows the locals to directly communicate when they have trash to the collectors, such that an optimised route can be taken by the collector to collect as much trash as possible in a single route.

### CUSTOMER RELATIONSHIPS\*

The relationship between the waste-pickers cooperatives and the recycling centres is purely due to the "niche" nature, of being able to sell particular streams of waste. The relationship is long term and "personal" as the recycling centre's income is dependent on the streams of waste that they purchase from the cooperatives and vice versa. At the end of the pilot, it is expected that the cooperatives will continue to maintain their relationship with the recycling centres.

The relationship between the waste-picker's cooperatives and the locals is community based as they are providing a cleaner environment for the locals in that area. They are expected to actively cooperate by separating trash at home and allow collectors to pick it up accordingly as well as pay the expected taxes, which fund the collection and separation of trash. The relationship could also be considered co-creative as the waste-picker's cooperatives share the knowledge they obtain from SweepSmart! with locals to work together to reduce waste.

### REVENUE STREAMS\*

The waste-picker's cooperatives generate revenue through the sale of assets, the sorted trash, to the recycling centres and through "subscription" fees, in which the collecting and sorting of trash is the service provided to which the locals subscribe with the government as an intermediary. Lastly, the waste-picker's cooperatives will also thrive on one-time funding from SweepSmart!, who will help finance the implementation of a conveyor belt, baler and system optimisation plan.

The revenue from waste is volume dependent and depends on the material stream and quality. Higher quality separation will also allow the waste-picker's cooperatives to increase their price per tonne, as this means there is a reduced weight of impurities. Fortunately, as stated earlier, the market could be considered "niche" as there is not a lot of competition for trash sorting, with the exception of more sorting centres. Nonetheless, the recycling centres will generally want to maximise waste purchase to maximise end product. A tonne of separated paper is worth approximately €50, plastic bottles €200, cans €175 and so on. The prices paid by the recycling centres are negotiated dependent on the quality and quantity. Based on the waste statistics for Bangalore (State of the Environment Report, 2003) The daily worth of waste that comes in is over 2 million euros, however only a small portion of the waste that builds up much more rapidly than it gets sorted, is separated. This means only €458,793 worth of waste is separated (19%). In the pilot the goal is to double the amount of separated trashing giving a revenue of almost 1 million euros. The expected revenue from selling the sorted waste, after the pilot proves a success, in the long term over 5 years, is expected to reach 300 million euros (not for a single site, but after expansion to up to 350 different sites in 8-10 municipalities).

A list price is set to determine the fee paid by locals to cover the costs of collecting and sorting trash, which is acquired in the form of tax by the government and passed on in the form of a subsidiary. The average waste produced per household per month can be taken and the average profitable segregated waste can be taken to calculate a suitable list price. This would give the average incoming waste and useful outgoing waste, which then shows how much revenue is generated. Consequently the costs of the month can be taken and subtracted from the revenue. The list price must be minimal as to build-up the support of locals and motivation to participate in the required domestic sorting. It is currently set at €8 per month with 150 paying households generating a revenue of €1200.

### KEY RESOURCES\*

There are several resources required to be able to provide the recycling centres and locals with sorted waste and the collection service. For the recycling centres these are a conveyor belt, baler, SweepSmart!'s waste management knowledge and of course the waste pickers themselves. For the locals these are the trucks/bikes and smartphones made available to them.

The recycling centres rely on a combination of physical, human and intellectual resources that determine the quality of the end product, well and efficiently sorted waste. Generally, it is the intellectual resource, SweepSmart!'s knowledge of waste management which initiated the introduction of a conveyor belt, baler and new roles for the waste-pickers themselves on site. The conveyor belt plays a vital role in increasing the efficiency and grade with which trash gets sorted. It works such that the trash is loaded onto it and vibrated to spread the trash, followed by a simple conveying at which point waste pickers may stand alongside the belt and filter out particular material streams. This technique of sorting eliminates the prior form of waste picking where waste-pickers search through heaps of trash individually, which is far less effective than allowing waste pickers to work together. Nevertheless, waste-pickers must agree with the suitability of the new technique and settle into the new roles at the sorting centres. According to SweepSmart! it is expected that the new method can increase the quantity waste sorted per day by up to 5-6 times. The baler is used to compress the sorted material such that it is easy to collect and transport by the recycling centres. Co-creation with stakeholders, in this case the waste pickers, can help give meaning

to sustainability, speed up strategy development, channel initiatives into a clear strategy to achieve maximum added value and raise commitment within the organization (Zanten, 2015)

In order to achieve the project's long term customer relationship, the government must actively help publicise the accessibility of the trucks through the IGotGarbage application, in such way that locals can easily use the service provided by the cooperatives. On the other hand, the waste-pickers must be foreseen of smartphones to access the applications themselves and of vehicles (trucks and cart-bikes) to collect trash from the locals. Waste-pickers are extremely important as they are a key to development on a higher level. As emphasised by London (2007), to make markets work for poor it is necessary for those in poverty to actively contribute to this process. The poor are not well served by the private sector, however for this enterprise it is an opportunity that should not be mistreated or neglected as the waste pickers are the beating heart of this project. These are the channels through which locals can directly communicate with the cooperatives and deliver their trash to the collectors. Finally, funding also plays a significant role in the realisation of the project. This is collected from social enterprises like SweepSmart! and with help from the local government and given to the cooperatives in the form of a subsidy.

### KEY ACTIVITIES\*

There are two key activities required to produce well and efficiently sorted trash and reduce waste, these are the optimising of the sorting process and the collection of waste. In other words the key activities are to research, design and develop a system such that the total amount of waste collected and sorted is significantly larger than before.

At the sites themselves the execution of a new system of waste sorting will produce a higher outcome of processed waste and a higher income of waste. The current system will be optimised by the cooperatives with assistance of the key resources listed above, which will eventually serve the recycling centre beneficially. The goal is to produce larger quantities of sorted trash daily with an increased precision for the recycling centres to purchase, which will simultaneously decrease the amount of trash on the streets and on the sites. In cooperation with SweepSmart!, the aim to improve the site operationally in the pilot is set at handling twice as much waste per day and reducing the costs per kilo by 40-50%.

The collection of waste works through the IGotGarbage app, which serves as a platform for locals to communicate directly with locals to have waste picked up by the collectors in the cooperatives. By doing so the waste is automatically drastically reduced, seeing as this is an alternative to the initial fashion of discarding trash through a window and littering the streets. Furthermore the new manner of collection also lessens the work effort required to separate the wet waste from the dry waste which is then separated into material streams on the belt. Hence, not only is the quantity of waste on the streets reduced, but also the quality and efficiency with which waste is sorted is increased, to the advantage of both the locals and the recycling centres.

### KEY PARTNERSHIPS\*

The waste-picker's cooperatives' key partners are SweepSmart!, the local government and IGotGarbage, the company. SweepSmart! is crucial in the site itself and the process optimisation, whereas IGotGarbage and the local government are closely intertwined with the locals who want the waste on the streets reduced.

SweepSmart! provide the waste-picker's cooperative with the key resource, knowledge of working waste management systems, each with the motivation to optimise the sorting process, which could be considered a strategic partnership. Both parties benefit from the partnership as they each have the same goal to maximise the quantity and quality of trash sorted per day and the cooperation reduces costs for the waste-picker's cooperative to have to carry-out their own research or hire their own experts. In addition, SweepSmart! doesn't have to construct an entirely new sorting centre to start from scratch and build relations with purchasers, or find and train employees to work for them.

IGotGarbage and the local government on the other hand are partners that directly connect the locals to the waste-picker's cooperative in collection and funding respectively. IGotGarbage provides the application that is currently being used to guide collectors to pick-up destinations, signalled by the locals, via allocated routes. It is also a strategic alliance that focusses on the acquisition of knowledge of the location at which trash can be picked up, which gives the collectors access to their customers, the locals. Likewise, the local government and the waste-picker's cooperatives form a strategic alliance in gathering funds to finance the collection and separation process, and is formed to acquire money from the locals.

### COST STRUCTURE\*

The waste-picker's cost structure cannot simply be classified as either cost or value driven, as the activities revolve around optimisation and collection, which are value-driven, but as they are a social enterprise working in an environment where supplies are meagre, costs must be reduced.

To optimise the sorting process a conveyor belt and baler must be designed and manufactured with materials locally available or purchased. The pilot plan aims to prove the viability and scalability of the project, which means that the resources required need to be readily available and easy to duplicate at other sites. In addition to the acquisition of machinery, waste-pickers and collectors must be paid in salaries, which is a huge transition from the previous payment structure, where pickers were paid based on the waste they collected. This implicates a change from a variable cost to a fixed cost, given the number of waste-pickers remains the same. The waste-picker's cooperatives may benefit from economies of scope as they broaden the diversity of the material streams, giving them more recycling centres to sell to, increasing income and hence reducing costs.

To collect the waste, trucks, bikes and collectors must be hired, and smartphones distributed. Each of these resources can be quite costly to obtain, and are variable as they are dependent on the amount of trash that needs to be collected. The hire of trucks and bikes cost approximately \$50 per day and can collect up to 7,500 tonnes of waste per day and the salaries for 50 waster-pickers are \$300 per waste-picker (over 5 times as much as their current pay due to the increment in processed waste), whereas the investment required to acquire a conveyor belt and baler are expected to cost up to €30,000, which is significantly more. (IITK, 2016 and SweepSmart!) Lastly, smartphones can be made available to waste-pickers through the newly introduced \$4 smartphone, which can easily be purchased for the 50 waste-pickers in the pilot for \$80.

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# SUSTAINABILITY

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## SOCIAL COSTS\*

Due to the changes in the current system that will be made, there will be a shift in hierarchy and a shrinkage in process steps, such that particular processes will be excluded and thus particular functions will no longer be required. Unfortunately, the implications are that certain people will lose their jobs, however, as a social business, these people will be offered a new position with a different function as a compensation. The only difficulty is that some people may have a preference for their prior job as opposed to the new job as a potential waste-picker, collector or site manager.

According to current research, the informal waste-pickers currently are structured such that collectors receive individual fees and waste-pickers sell their sorted trash to middlemen who transport and sell the trash to the recycling centres. The middlemen for example, will be dismissed from their task as the result of the new structure that will be brought into the sorting process. They will be offered a position as a delivery man for the waste-picker's cooperatives, but due to the new expected collaboration they may see this as a lesser position and assume they will make less money since the payments go from quantity based to fixed salaries.

## ECOLOGICAL COSTS\*

Firstly, the trucks implemented for the collection of trash emits carbon dioxide, secondly, the conveyor belt and baler use electricity and thirdly there is a hazardous emission of gasses from the unrecyclable waste. Each of these is inevitable in the current pilot of the project, as neither the cooperatives nor it's funders SweepSmart! have the means to invest in costly electric powered trucks or ones with a lower carbon dioxide emission or environmentally friendly power because these resources simply are not widely available in Bangalore. Finally, a large investment would be required to fund an elaborate research and design team to think of alternatives for burning trash that cannot be recycled. In the Netherlands, this trash is used to make dikes, which is basically heaps of trash which are then covered with layers sand, dirt and other materials. This is not a possibility in Bangalore however, and the transportation costs would be enormous and technology required to do this in India is not yet easily accessible.

Due to the value propositions of this business model, the current focus of the project lies on collecting and sorting waste such that it can be recycled and the ecological costs are a point to be considered once the project has been further developed. Additionally, India as a country simply is not as developed in comparison to European countries like the Netherlands, and priorities must be chosen and carried out step by step in such a large, populated country.

## SOCIAL REVENUES\*

Blowfield (2012) states in *Business and Development* that increasing attention is being paid to the idea of business as a solution to poverty beyond simply being a generator of wealth in the conventional sense. Instead of incidental developmental benefits, there is a belief that business can consciously invest in ways

that are simultaneously commercially viable and beneficial to the poor. This business model does so by giving the 'untouchables' of the society a job with a stable income, not only giving them more security in life but also more dignity. By investing in the bottom of the pyramid this business model could lift many people out of poverty and desperation and by doing this avert social decay (Prahalad, 2002).

The pilot will give 150 waste-pickers a stable, increased income and if proved successful up to 25,000 waste-pickers upon expansion over a 5 year period from \$0.5-2 per day to up to \$8-10 per day. Additionally it could eventually serve up to 3.5 million households with a door to door collection service, giving them a clean environment and reduced health risks from pollution. If the families of those involved are taken into consideration, because a change in circumstances for a single waste picker will benefit the entire family, then over 150,000 people will profit from the system. Thus meaning that the pilot has a high social return on investment.

### ECOLOGICAL REVENUES\*

Fortunately, in opposition to the negative environmental impacts mentioned previously, the ecological revenues hugely outweigh the costs. Considering that 133,760 metric tons of waste are produced daily in municipal areas, of which only 68% , 91,152 metric tons, is collected and 19%, 25,884 metric tons, treated leaving 100,000 tonnes of trash scattered on the streets. The pilot's expected long term impact, over a period of 5 years, of collecting over 2 million tonnes of waste, of which 1.1 million tonnes more than the current amount will be recycled which prevents 1.8 million tonnes of carbon dioxide and GHG from being emitted. This is a potential result of an increment in sorting efficiency, diversity and quality of about 500% to 600%.

Ruijter (2011) argues that social entrepreneurship is not just business with benevolent intent or charity with a product for sale on the side. Rather it is evolving into an entirely new hybrid business model that explicitly pursues the creation of non-financial assets: human wellbeing and environmental sustainability.

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# SWOT ANALYSES & CONCLUSION

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## VALUE PROPOSITION ASSEMENT\*

The value propositions are well aligned with the customer needs as they were tailored to suit the needs of the customers. These are reduced waste for the locals and an optimised trash sorting service (provision of sorted waste) for the recycling centres, which are intertwined. An optimised trash sorting service will result in reduced waste satisfying both customers simultaneously. The project has a strong network effect and synergies because it's success is dependent on the amount of people collaborating to support the pilot. The more locals and waste-pickers/collectors make use of the application the better routes can be optimised to maximise waste collection and minimise waste on the street. Additionally, the more waste-pickers decide to cooperate, the more trash can be jointly sorted, resulting in an increased efficiency and capacity. Lastly, the waste-picker's will receive higher more stable wages and better working conditions in their new positions and the recycling centres will have access to larger quantities of material, increasing their income. The downside nevertheless, are the waste-picker's that refuse to adapt to the change and participate in the other system as they will be disadvantaged by the new system.

Besides collecting and sorting waste, there are possibilities for expansion in the cleaning of the sorted trash, which will further raise the value of the sorted waste for recycling centres. Also sorting into more different streams, as mentioned earlier, gives room to make more revenue as these can be sold to specific recycling centres or simply again raise the value of the sorted trash due to less impurities. If the pilot plan proves successful, the collection process could also be expanded to including actually sweeping and collecting on the streets, which will further reduce waste and increase waste income and thus more waste to be sold. Other areas are looking into the development of a non-polluting way to dispose of unrecyclable materials, and bringing these costs into the tax that is collected from the locals. Fortunately, there is not much competition meaning that waste-picker's new jobs are not being threatened, with the exception of waste-pickers that decide to not participate in the new process. Nonetheless, the waste-picker's cooperatives efforts for improvements mean that recycling centres are guaranteed large amount of material as opposed to purchasing from individual pickers or collectors.

## COST/REVENUE ASSEMENT\*

Though the margins are mediocre, the revenues are predictable, sustainable and diversified. As the final product is sorted waste and the service is the collection of trash, it is difficult to have a maximised revenue and maintain a social business. If the pay of the workers was left volume dependent or a wage based on their current earnings the incentive to support the pilot from both the cooperatives, locals and government would be lost. Also, the recycling centres would return to purchasing sorted trash from individual waste-pickers who sell for a lower price. The advantage of giving the waste-pickers wages instead of performance based pay is that the costs remain predictable along with a set amount of trucks

and collectors that aim to collect 7,500 tonnes of trash daily. The conveyor belt and baler require a high one-time investment but the progress after implementation should cover the costs as well as the income from the government subsidy, SweepSmart! and raised income from trash sorting. The waste-picker's cooperatives generally do not benefit from economies of scale as waste is effectively free and the cost is purely the collection and transportation of it, a service. No raw materials are bought and the daily capacity of incoming trash is fixed.

A portion of the income is from SweepSmart! and government subsidies, if the pilot proves to be effective, more companies and governments of other municipalities will be willing to invest in the implementation of a similar pilot and project at local sites. This is the room for expansion created by the desperate need for waste reduction throughout the entire country by locals as well as government, as the waste is forming a serious obstacle throughout the country. The current partners are IGotGarbage own the application used to collect waste, to reach more households the project could in its future development also include the \$4 smartphones in the tax fee, which funds the collection to remove the barrier of not being in possession of a smartphone. Costs can be reduced by constantly working on the efficiency of the routes of the trucks and separating of the trash as this would mean the same workload could potentially produce more revenue. There are not a lot of threats present, because the waste problem is so huge in India and the growing need for recycling of materials throughout the world. The initial investment required however is a large risk, as there it is a substantial amount that is required and if the machinery breaks more capital will be needed for reparation.

### INFRASTRUCTURE ASSESMENT\*

Due to the "niche" nature of the project neither our key resources, nor our key activities are easily replicated. Especially since the project is carried out in cooperation with the waste-picker's cooperatives who are based at the sorting centres at the dump sites. A competitor would first have to find another suitable site and conduct the same research and before being able to compete. The research done prior to the trip gives the team an in depth view of the circumstances and materials they will be working with on which the key resources and activities are based. Regardless, the many partnerships formed with local companies, and potential benefits, making connections with the waste-pickers and keeping the system as transparent as possible is a priority. The cultural differences from which the ideas originate are a huge barrier, and it is not possible to estimate the degree of cooperation from individual workers, which will determine the execution quality and finally the product quality.

The most expensive resources are the conveyor belts and baler, which are of uttermost importance in the success of the pilot. By designing and manufacturing the machinery such that a minimal amount of maintenance is required, is simple to construct with readily available materials and is easy to control several unforeseen costs can be prevented. The reason the initial cost is so high is because it is a pilot, and the budget takes into account the large possibility of miscalculations or unpredicted faults such that the prototype can be repaired and improved constantly. Partnership with the local government is also essential for the subsidy and cooperation of the locals as they have the best access to the people in the municipality, and hence the business is reliant on them for communication with the locals. This dependency is highly risky as a failure in the pilot or dissatisfaction can immediately end the project.

## CUSTOMER INTERFACE ASSESMENT\*

As the streets get cleaner, and the pilot develops it is expected that more people will be less reluctant to start sorting trash domestically and making use of the IGotGarbage application. Providing all locals with smartphones with the tax fees paid to collect trash will also eliminate the barrier of access to the needed resources. Though the application, transportation system and sorting system are well developed, the publicity is also key in the success of the pilot and is again dependent on the partnership with the government. The transport-system is made up of trucks and bike-carts in order to access small streets impassable for trucks and the IGotGarbage app is managed by Mindtree who have IT employees constantly working on improvements. The needed publicity can be reached by motivating mouth-to-mouth spreading of the app and the community's self-motivation, where locals participate out of a communal obligation/motivation. A successful pilot will result more support from partners like SweepSmart! and the government, who give a basis for co-creation, which allows each parties to benefit from the changed system and means that the customer relationship can be sustained in the long run.

Besides expanding to other municipalities and sorting sites they could create a new customer base, which is not solely collecting domestic and industrial waste, but also to companies that generate large amounts of waste. Consider a restaurant and the large amounts of food and drink packaging that can all be found in large quantities in a single place, or in hotels and shops where packing or used products are constantly thrown out that can be recycled. Once the system is in place, channel efficiency could be improved by for example setting approximated times at which locals should dispose of their trash so that they don't have to wait for a truck or bike cart, but merely take into account when trucks are expected to pass their area as an additional service. This would mean that certain trucks follow fixed routes and others react to requests via the application, or it could be made available that locals choose a fixed time they would like their trash picked up. If further optimisation and development was a target, optimisation could also come from creating a database of customers and realising patterns such that the collectors would know when to expect trash from households. Currently, the customer interface does not face any serious threats, but success of the pilot may inspire people to attempt to replicate the idea. This chance however, remains small due to the required initial investment and the nature of the market not commonly being seen as a popular one to generate large profits in proportion to the workload in carrying out the project.

## CONCLUSION

This business model gave us a reason to look into this business from every different angle and therefore showed us all the different aspects that are needed to make this business model into a success. This business model will be used to make sure that the business doesn't lose its focus on the value propositions that it want to deliver and will make it easier to take all the stakeholders of this business into account. However, it should not be forgotten that many of the aspects of the canvas are based on assumptions. At the actual site the waste pickers might be scared of the conveyor belt or they might be very hesitant to change. That is way it is necessary to see this business model as a guideline rather than very strict business plan, as changes can occur at any time. In addition, some blocks in the business model still need more research, as for example how much the households would need to pay in order to make the business work, or how much the site will cost to maintain. This will need to be researched during the pilot.

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