RECOLOGY AN ECO-WISE –A START UP PROJECT

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By

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CERTIFICATE

This is to certify that the project entitled, **"Recology an Eco-wise – A Start-up Project"** is a record of research work done by **Mr. ARAVINDH.A.S (16PBA256)**, during 2016-2018 at St. Joseph's Institute of Management, (School of Business Management), St. Joseph's College (Autonomous), Tiruchirappalli District - 620 002, Tamil Nadu, India, and that this project has not been previously formed the basis for the award of any degree, diploma, associateship, fellowship or any other similar title to anyone and that the project represent entirely an independent work on the part of the candidate.

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External Examiner

DECLARATION

I, Aravindh.A.S, hereby declare that the project entitled **"Recology an Eco-wise – A Start-up Project"** is a bonafide record of research work done by me under the supervision of **Dr.G.Amudha**, St. Joseph's College (Autonomous), Tiruchirappalli District-620 002, Tamil Nadu, India, for the PG programme at St. Joseph's Institute of Management, (School of Business Management), St. Joseph's College (Autonomous), Tiruchirappalli. I further declare that this work has not been previously published or formed the basis for an award of any degree, diploma, associateship or other similar title.

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Abstract

The Start-up on Waste management is to collect the waste from household and industries on daily basis. Waste collected from the suppliers are made use and converted it into a useful output as Manure, Bio gas and pray products from which the revenue is generated. Initially the waste collected is segregated according to its category, bio degradable and non-bio degradable, mixed waste. The process initiates from households and industries, from the segregated waste the vegetable and food waste is taken and given as the input to old cows which are not in productive process of milking giving. The cow dung is then collected and put in the bio gas plant and allowed to process for a certain period of time. The full efficient from the cow dung is extracted in the form of bio gas and stored. Then the dry cow dung is collected and mixed with the soil, this set up is put under earthworm processing. The earth worm with in the mixture ensure us producing the quality output, the Natural Manure – Organic Fertilizers. This complete setup of producing the Organic Fertilizer is known as Vermicomposting and the process is Vermiculture. The preparation of Bio gas involves anaerobic process the bacteria formation, it mainly consist of methane, the. This start up plan is an initiative to promote the organic farming helping the rural famers to increase their productivity without affecting the natural phenomena. This project is completely involves in the complete setting up the plants for biogas and vermicomposting with their requirements and dealing with the output and revenue that could be beneficially made out of the system.

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Chapter 1 – INRODUCTION

A business plan is a concept that gives financial gain that is usually cantered on a product or service that can be offered for money. An idea is the base of the pyramid when it comes to the business as a whole. Any business idea has to solve a problem that has a significant impact in the lives of the people. This description is about the ideas and the problem that need to be solved. The chapter also includes the scope of the solution of the problem and how the idea can be used in generating the revenue.

1.1 Description of the Start –up Idea

The semi urban areas are not developed with proper installation of waste management system. Most of the domestic wastes are used less for recycling process. This project makes the domestic wastes to be converted into useful organic manure and electrical energy. The wastes are separated into biodegradable wastes where they are given to cows which in turn give the organic manure extracted from the cow dung. Through cow dung, the extraction of bio gas takes place and the remaining cow dung is used in the production of organic manure. Waste management is collection of domestic wastes which is bio degradable in households and industries. After collecting the wastes, there will be segregation process of biodegradable wastes and non-biodegradable wastes. The bio degradable wastes are given to the aged cows and from which gases are extracted from the cow dung. After taking the biogas out of the dung, it is then converted into manure which can be sold to farmers where they can use it as organic fertilizers. The conversion process is stimulated by the cultivation of earthworms, especially in order to use them to convert into organic manure. Biogas is a biofuel produced from the anaerobic fermentation of carbohydrates in plant material or waste (eg: food peelings or manure) by bacteria. It is mainly composed of methane, with some carbon dioxide and other trace gases. Theoretically, biogas can be converted directly into electricity by using a fuel cell. However, this process requires very clean gas and expensive fuel cells. In most cases, biogas is used as fuel for combustion engines, which convert it to mechanical energy, powering an electric generator to produce electricity. The project is mainly concentrated on tire two cities and towns where there are both domestic wastes and possibility of farming at a higher level.

The project is done by taking the kitchen wastes and food wastes which can be given to aged cows. In return we can obtain biogas from cow dung which can be used as organic manure. The business has competitions from chemical fertilizers which can be preferred by the farmers for higher return. The progress will be less productive in the initial stage approximately two years but the cultivation will be a healthier one and the cultivated products can be taken as organic foods. There is also a challenge of processing cost of extracting biogas from the cow dung and also conversion of manure into fertilizer which involves the process of vermiculture. The uniqueness of the project is the integration of waste management with energy production and production of fertilizers. The unfair advantage is that none of the company has come up with any of the integration of waste management, energy production and organic fertilizer production. The interdependency may cause the time lag in production and also the output will be of less income in the initial stages. The domestic wastes and institutional wastes can also be collected and if people were given awareness just regarding the segregation of the biodegradable and non-biodegradable wastes, the input process becomes very much easier. The process deals with only domestic food wastes and hence the process should be of day to day bases. The organic fertilizers marketing strategies should be formed and the farmers should be negotiated and the miniature biogas plant will also require eligible candidates to process the biogas into electricity. The electricity can be fed to the nearby areas and that can also be a source of income apart from fertilizers selling. The project involves setting up of plants and a farm for old cows and approachable farmers who are looking for natural farming techniques. In a common man's eye anything that is unwanted or not useful is said to be garbage or waste. However scientifically speaking there is no waste as such in the world. Almost all the components of solid waste have some potential if it is converted or treated in a scientific manner.

There is a chance of making the organic cultivation popular and beneficial in any developing country, if the wastes of the country are taken into consideration. The outcomes might take time but the products can be categorised at premium costs which generates high revenue along with the energy applied. This project has its social benefits and a long term run in the market because of the diversity in the process and various ways in revenue generation. Generation of waste is inevitable in every habitation howsoever big or small. Since the dawn of civilization humanity has gradually deviated from nature & today there has been a drastic change in the lifestyle of human society. Direct reflection of this change is found in the nature & quantity of garbage that a community generates. We can dispose the waste or reuse

the waste and can earn money through proper management. Indian cities which are fast competing with global economies in their drive for fast economic development have so far failed to effectively manage the huge quantity of waste generated.

Existing waste management situations in India:

Major environmental challenges are being associated with waste generation and inadequate waste collection, transport, treatment and disposal. Disposal of residual landfill sites or investment in waste-to-energy facilities depends upon the individual. Current systems in India cannot cope with the volumes of waste generated by an increasing urban population, and this impact on the environment and public health. A priority is to move from reliance on waste dumps that offer no environmental protection, to waste management systems that retain useful resources within the economy. The challenges and barriers are significant, but so are the opportunities. Waste segregation at source and use of specialized waste processing facilities to separate recyclable materials has a key role. The potential for energy generation from landfill via methane extraction are shortage of qualified engineers and environmental professionals with the experience to deliver improved waste management systems in India.

1.2 Need Analysis:

Effective waste management is a major challenge in cities with high population density. Achieving sustainable development within a country experiencing rapid population growth and improvements in living standards is made more difficult in India because it is a diverse country with many different religious groups, cultures and traditions. Waste management is a major problem for many urban local bodies in India, where urbanization, industrialization and economic growth have resulted in increased waste generation per person.

Despite significant development in social, economic and environmental areas, waste management systems in India have remained relatively unchanged. The informal sector has a key role in extracting value from waste, with approximately 90% of residual waste currently dumped rather than properly land filled. There is an urgent need to move to more sustainable waste management facilities. Development in infrastructure are required for India to become a world leading economy. Developing high quality infrastructure that meets the needs of the people and protects the environment is fundamental to achieving effective economic growth. Waste management infrastructure has an important role in delivering sustainable development. Rapid population growth in India has led to depletion of natural resources.

Wastes are potential resources and effective waste management with resource extraction is fundamental to effective waste management. Value extraction from waste can be materials, energy or nutrients, and this can provide a livelihood for many people. The transition from wastes to resources can only be achieved through investment in waste management as this depends on a coordinated set of actions to develop markets and maximize recovery of reusable/recyclable materials. Materials, energy and nutrient recovery must be the aim of future waste management infrastructure development in India. Resources can be recovered from wastes using existing technologies and India has an extremely effective recycling tradition.

Waste picking is often the only source of income for families, providing a livelihood for significant numbers of urban poor and usable materials to other enterprises. Waste pickers in Pune collect organic waste for composting and biogas generation. Waste pickers also make a significant contribution by keeping cities clean. Waste collection, storage and transport are essential elements of any waste management system and can be major challenges in cities. Improvements to waste collection and transport infrastructure in India will create jobs, improve public health and increase tourism. Local bodies spend around Rs.500 – 1000 per tonne on waste management with 70% of this amount spent on collection and 20% spent on transport. Waste management disposal is at a critical stage of development in India. There is a need to develop facilities to treat and dispose of increasing amounts of waste management. Properly engineered waste disposal protects public health and preserves key environmental resources such as ground water, surface water, soil fertility and air quality.

Waste dumps have adverse impacts on the environment and public health. Open dumps release methane from decomposition of biodegradable waste under anaerobic conditions. Methane causes fires and explosions and is a major contributor to global warming. There are also problems associated with odour and migration of leachates to receiving waters. Odour is a serious problem, particularly during the summer when average temperatures in India can exceed 45 degree Celsius. Discarded tyres at dumps collect water, allowing mosquitoes to breed, increasing the risk of diseases such as malaria, dengue and West Nile fever. Uncontrolled burning of waste at dump sites releases fine particles which are a major cause of respiratory disease and cause smog. Open burning of waste management and tyres emits 22000 tonnes of pollutants into the atmosphere around Mumbai every year. The impacts of poor waste management on Public health are well documented, with increased incidences of nose and throat infections, breathing difficulties, inflammation, bacterial

infections, anaemia, reduced immunity, allergies, asthma and other infections. Properly managed engineered landfills should replace dumps in India. This would significantly reduce the environmental impact of waste.

The Problems associated with improper waste disposal could be significantly mitigated by requiring material recovery. Source separation of inert and high moisture content fractions would maximize the potential for thermal recovery and other treatment options in India. The waste processed in thermal recovery is residual waste that remains after all commercially viable recyclable materials have been extracted. Waste-to-energy technologies produce energy; recover materials and free land that would otherwise be used for dumping. The composition of residual waste is important for energy recovery and waste composition is changing in India, with the amount of high calorific waste generally increasing. A significant increase in the use of waste-to-energy technologies has been proposed, but this depends on location, climate, demographics and other socioeconomic factors.

Waste-to-energy development in India is based on a build, operate and transfer model. Increased waste-to-energy would reduce disposal to land and generate clean, reliable energy from a renewable fuel source, reducing dependency on fossil fuels and reducing Greenhouse gas emissions. In addition, generation of energy from waste would have significant social and economic benefits for India. However, the track record of waste-to-energy in India highlights some of the difficulties. The current status of waste management in India is poor because the best and most appropriate methods from waste collection to disposal are not being used. There is a lack of training in waste management and the availability of qualified waste management professionals is limited. There is also a lack of accountability in current waste management systems throughout India. Municipal authorities are responsible for managing waste management in India but have budgets that are insufficient to overcoming the costs associated with developing proper waste collection, storage, treatment and disposal. The lack of strategic waste management plans, waste collection/segregation and a government finance regulatory framework are major barriers to achieving effective waste management in India.

Limited environment awareness combined with low motivation has inhibited innovation and the adoption of new technologies that could transform waste management in India. Public attitudes to waste are also a major barrier to improving waste management in India. Core to the vision for waste management in India is the use of wastes as resources with

increased value extraction, recycling, recovery, and reuse. Urban local bodies need to be responsible for waste management, with the urban local body commissioner and chairman directly responsible for performance of waste management systems. Waste management needs to be regarded throughout Indian society as an essential service requiring sustainable financing. The case presented to a urban local bodies for a properly funded system must demonstrate the advantages of sound investment in waste management.

A strong and independent authority is needed to regulate waste management if waste management is to improve in India. Without clear regulation and enforcement, improvements will not happen. Strong waste regulations can drive innovation. The waste management sector needs to include attractive and profitable businesses with clear performance requirements imposed by the urban local bodies, with financial penalties applied when waste management services are not working effectively. Finance for waste management companies and funding for infrastructure must be raised from waste producers through a waste tax. An average charge of one rupee per person per day would generate close to 50000 crores annually, and this level of funding would probably be sufficient to provide effective waste management throughout India.

Information on future quantities and characterization of wastes is essential as this determines the appropriateness of different waste management and treatment options. State-level procurement of equipment and vehicles is necessary for primary and secondary collection with effective systems for monitoring collection, transport and disposal.The roles and responsibilities to deliver sustainable systems need to be defined, with monitoring and evaluation to monitor progress. Experiences should be shared between different regions of India and different social groups. There are a number of research institutes, organizations, NGOs and private sector companies working on a holistic approach to waste management and future waste management in India must involve extensive involvement of the informal sector throughout the system.

There is a need to develop training and capacity building at every level. All Indian school children should understand the importance of waste management, the effects of poor waste management on the environment and public health, and the role and responsibilities of each individual in the waste management system. This will develop responsible citizens who regard waste as a resource opportunity.

Reasons for choosing this start up

Population growth and particularly the development of megacities is making waste management in India is a major problem. The current situation is that India relies on inadequate waste infrastructure, the informal sector and waste dumping. There are major issues associated with public participation in waste management and there is generally a lack of responsibility towards waste in the community. There is a need to cultivate community awareness and change the attitude of people towards waste, as this is fundamental to developing proper and sustainable waste management must ensure maximum resource extraction from waste, combined with safe disposal of residual waste through the development of engineered landfill and waste-to-energy facilities. India faces challenges related to waste policy, waste technology selection and the availability of appropriately trained people in the waste management sector. Until these fundamental requirements are met, India will continue to suffer from poor waste management and the associated impacts on public health and the environment.

Existing players in the Market:

There are many existing players in the market – Organised and unorganised players. Unorganised players do business in a smaller area and sustain since it is being a growing sector. There are big players do this business in large scale also, some of them are

- Greenobin
- Antony waste Handling cell Private limited
- A to Z group
- Timarpur – Okhla waste Management Private limited
- Vermigold

1.3 Scope and Importance of this Start-up

We have large population in India, so obviously we will get lot of waste (that can be recycled or reduced or reused), so it is the one of the potential area where resources are available in abundance and free of cost in some cases and so many subsidy schemes are there to promote green energy and funds are available easily under START UP grants of India.

World waste production is expected to be approximately 27 billion tonnes per year by 2050, one third of which will come from Asia, with major contributions from China and India. Waste generation in urban areas of India will be 0.7 kg per person per day in 2025,

approximately four to six times higher than in 1999. The problems associated with waste become more acute as the size of communities increase and this provides opportunities for decentralized waste management by self-help groups and NGOs. Waste generation is predicted to be 161 million tonnes, a fivefold increase in four decades. Example of such wastes can be bricks from ash, excess doors from the old papers yards and cloths composting in city waste

Indian municipal solid waste (MSW) management market is expected to grow at a CAGR of 7.14% by 2025 while e-waste management market is expected to grow at a CAGR of 10.03% during the same period. India has planned to achieve a capacity of 2.9 million hospital beds by 2025 which will help bio medical waste management market to grow at a CAGR of 8.41%. Hence, Waste Management in India requires a considerable amount of investment and new ideas to make the most out of the source which are utilized at the very minimal level. If utilized to the optimum level, People can generate high amount of revenues out of these wastes.

Thus this Industry has a wide scope of a wider market for a well prospering in the place of business. The business can be scaled in numerous ways taking up the existing opportunities in the environment after successful withstand in the market as a leader.

Chapter 2 – REVIEW OF LITERATURE

The whole project can be categorized under three wings such as waste management, biogas energy production and organic fertilizers in semi urban areas.

The article that I went through deals with Heating up food waste where there has been a research on the concept of converting food wastes into a high-energy and high-protein animal feed supplement. This conversion required growing and harvesting a single cell protein in the form of thermophilic bacteria. In using this process, the researchers also found that municipal wastewater sludges, manure, and pulp and paper plant sludges could be converted into a nutrient-rich organic fertilizer additive or soil conditioner. The fermentation process relies on thermophilic (heat-loving) and aerobic (oxygen-loving) microorganisms. After the fermentation stage, the end product is dried, formed into pellets and ready to market to feed companies. **(siuru, B. (2001, Feb 2). Heating up food waste. *Waste Age,* p. 16.)**

The next article deals on forecast analysis on fertilizers consumption worldwide. The study aimed to make a review and forecast on fertilizers consumption worldwide in order to provide basal data for the decision-making of fertilizers production and for the environmental impact assessment of fertilizers application. It was found that fertilizers consumption was dependent on human population and the increase of fertilizers consumption was mainly resulted from expansion of human population.General dynamics of consumption of total fertilizers, nitrogenous fertilizers, phosphate fertilizers, and potash fertilizers were similar to each other for the world and most of the regions. Since 1961, world total fertilizers consumption increased rapidly until the mid- 1980s and began to slowly increase since mid-1980s. Compared to the current level, the world's total fertilizers consumption would increase 32.1% and reach 226,150,381 Mt by 2030, an average annual growth of 1.33% by 2030. **(Zhang, W. Z. (2007). A forecast analysis on fertilizers consumption worldwide. *Environ Monit Assess,* 427–434.)**

This article explains the importance of IT in the waste management. IT plays an important role in the transportation of waste. Using spatial database and GIS techniques helps us in decision making and planning of routes in the collection of waste. We can optimize the routes and also forecast the number of transport vehicles needed to transport the waste. Solid waste management involves waste generation, mode of collection, transportation, segregation of wastes and disposal techniques. According to (Nikolaos V. Karadima) in the traditional

Travelling Salesman Problem (TSP), the cost of traveling (distance) between two wastes bins does not depend on the direction of travel. Hence, the cost (distance) matrix representing the parameters of the problem is symmetric. However, the problem, which this work refers to, is modelled as an Asymmetric TSP (ATSP) problem due to road network restrictions. An ATSP problem considers that the bidirectional distances between a pair of waste bins are not necessarily identical. The ATSP problem can be solved to optimality using various algorithms. Application of a Genetic Algorithm for the identification of optimal routes in the case of Municipal Solid Waste (MSW) collection. In 1998, 90% of household waste in Israel was disposed to landfills. That year, due to a serious crisis at landfill sites and a predicted shortage of land for waste burial from the year 2010 onward, recycling regulations were issued. These regulations required municipalities to recycle part of their waste. A graduated chart was introduced, whereby the minimum rate of recycling increases each year, so that by 2007, all municipalities will be obligated to recycle at least 25% of household waste. The regulations include an exemption section that enables a municipality to refrain from recycling if the municipality is able to show that recycling is not profitable in its case. In response to the publication of the regulations, most municipalities claimed that recycling was not profitable for them and therefore requested exemptions. Because the question is empirical in nature, we examine the economic feasibility of recycling by analysing data from large number of municipalities in Israel. The present study conducted between 2000 and 2004, utilizes data from 79 municipalities in Israel (30% of all municipalities) whose waste accounts for over 60% of household waste in Israel. It should be noted that although many types of waste can be recycled, the empirical data available for the purpose of this study concern only some of the recyclable waste components: plastic, paper, cardboard, and glass. These components comprise 40% of all solid waste in Israel. It should be stressed that other types of waste, such as organic waste and tree trims, are recyclable as well. If these are included in the calculation, 85% of all solid waste is recyclable. **(Lavee, D. (2007). Is Municipal Solid Waste Recycling Economically Efficient? *Environmental Management* , 926–943).**

This article deals on an overview of Solid waste management in Kuwait. Available industry information along with the use of monitoring data from a waste management system was used to analyse the generation, type and composition of industrial waste. Industrial activities were classified as follows: crude oil and chemical products industry; food and beverage industry, textiles and leather industry, wood industry, paper and printing industry, non-metallic mineral products; metal industry and other industries. The wastes generated

were classified according to their composition. As from the industries and as a result more than 47,169 tons of industrial wastes are produced every year in Kuwait. It was observed that paper and cardboard, plastic, wood, and metals were the most common types of waste, mainly generated from packaging (45 per cent of the total volume), as well as material used in containers and for wrapping products. In the management of these industrial solid wastes, it was observed in most cases they were disposed of by dumping, and very rarely did businesses resort to reuse, recycling or valorisation. It goes to the landfill because recycling is considered impracticable for technical and economic reasons. The objective of this study was to refute the objections raised against biodegradable municipal waste recycling. Of the 600 tonnes of waste collected daily, 308 tonnes are biodegradable material originating from residences, merchants and shopping centres. To refute the economic objections, the study presents calculations based on compost prices and tipping fees that show a possible revenue of BRL 0.39 per kg of biodegradable waste collected and composted. This compares favourably with cardboard, paper, steel and plastics, which are recycled by market forces alone. The study identifies composting enterprises interested in receiving biodegradable municipal waste. To refute the technical objections, the research produced precedents of biodegradable discards recycling in apartment buildings and restaurants replicable at larger scales **(Alhumoud, J. M. (2008). Analysis and overview of industrial solid waste management in Kuwait. *An International Journal*, 5.)**

The article deals with the progress and prospects of rural biogas production in China. The reason for taking this article is China and India are identical developing nations which can have similar type of geographical entities. Biogas production is an important aspect of China's energy strategy. After decades of application and research, China biogas has achieved considerable accomplishments. This study presents the progress and prospect of biogas technologies and industry in China. Two biogas patterns exist in China, that is, household-scaled digester for scattered farmers and biogas plant for centralized biogas production. Household-scaled digester which is simple and practical has been widely used and fully developed. Biogas plants have being sprung up with different materials, process and biogas utilization technologies. Chinese government promulgated several laws and policies, and gave financial supports to promote the development of biogas. However, some problems such as inferior equipment technology, imperfect policy incentive hamper its wide application and promotion. With the rapid development of economy and the improvement of rural living condition, China biogas industry is expected to advance toward

orientation of socialization, industrialization and commercialization. India also has undergone certain energy reforms in implementing the biogas energy production. This article gave me insights of how things should have been done in India for the effective implementations of Biogas. **(Jian XIE, X. W. (2010). Chemical fertilizer reduction and soil fertility maintenance in. *Front. Agric. China,* 422–429)**

This article deals on the municipal solid waste in India and the reasons cited by the ULBs for the non-compliance. Management of municipal solid waste is a major problem for most of the Indian cities due to the growing urban population and per capita waste generation rate, inadequate public participation and the deplorable organizational and financial capacities of urban local bodies. This article highlights the interventions required for sustainable solid waste management in Indian cities by analysing the waste generation, collection, and disposal scenario of a metro city in India along with the regulatory and institutional frame work. It advocates a phased and integrated approach taking into account the operational hurdles and the capacity building of local bodies with the support of educational organizations. It advocates a phased and integrated approach taking into account the operational hurdles and the capacity building of local bodies with the support of educational organizations.

The reasons cited by the ULBs for the non-compliance include.

• Lack of public awareness, motivation, and education
• Resistance to change and non-cooperation from households and other waste generators
• Lack of consistent efforts to create awareness on benefits of segregation
• Non availability of primary collection vehicles and equipment for segregated collection of wastes
• Paucity of financial resources as well as lack of priority to waste management
• Non-availability of appropriate land to setup waste processing and disposal facilities
• Lack of technical knowhow and skilled manpower for treatment and disposal of waste
• Poor integration of different elements of waste management considerations in land acquisition and implementation of waste processing/disposal
• Poor recognition of waste management as a profession **(J, Mater. Cycles. (2012). Waste Management. *Integrated approach to solid waste management in Chennai,* 75-84)**

This article explains the importance of anaerobic digestion in the production of biogas. Anaerobic digestion treatments have often been used for biological stabilization of solid wastes. These treatment processes generate biogas which can be used as a renewable

energy sources. Recently, anaerobic digestion of solid wastes has attracted more interest because of current environmental problems, most especially those concerned with global warming. Thus, laboratory-scale research on this area has increased significantly. In this review paper, the summary of the most recent research activities covering production of biogas from solid wastes according to its origin via various anaerobic technologies was presented **(Production of biogas from solid organic wastes through anaerobic digestion: a review. (2012). *Appl Microbiol Biotechnol,* 321 - 329.)**

This article deals with the production of biogas from solid organic waste. Anaerobic digestions of organic solid wastes studied have shown to be a renewable energy source that can generate biogas with high methane content. Most of the studies on the anaerobic digestion of solid wastes were conducted on different types of anaerobic reactors at various ranges of operating parameters such as temperature, OLR, and HRT. The effect of these parameters on process performance is very important. From that they tried to conclude the following points

- Anaerobic digestion of municipal garbage showed a high performance in the CSTR and two-stage bioreactors than batch and ASBR with a methane yield in the range of 0.1–0.7 m3 kg−1 VS added and a VS destruction >80 % with HRT ranging from 7 to 25 days.
- Conventional batch, single-stage, and two-stage anaerobic digestion processes have been employed to produce biogas from different solid types of substrates such as municipal solid waste, FVW, FW, etc. The two-phase systems have shown good stability and optimum biogas production. Therefore, more attention should be directed towards the utilization of a two-phase system for optimum bioenergy recovery. However, the operation of the single-phase in the treatment of solid wastes to biogas in the rural areas is another alternative for renewable energy production, especially for developing countries as well as for the developed countries.

(Nasir, I. M. (2012). Production of biogas from solid organic wastes. *Appl Microbiol Biotechnol,* 321 - 329.)

This article deals with Potentials for food waste minimization and effects on potential biogas production through anaerobic digestion where the also emphasize on the waste management with biogas production. A further aim was to investigate the effect on the

national biogas production potential through anaerobic digestion of food waste, considering minimization potentials. A method for waste composition analyses of household food waste, where a differentiation between avoidable and unavoidable food waste is made, was used in a total of 24 waste composition analyses of household waste from residential areas. . (**Parry, D. L. (2013, Jun 6). Analyzing food waste management methods. *BioCycle,* p. 36.)**

The article deals with biogas potential in Canada which emphasize on the potential national biogas contribution -- enough to fuel electricity generators with a capacity of up to 810 megawatts or to refine into 2,420 million cubic meters of renewable natural gas, or bio methane -- would come from on-farm anaerobic digesters. The article also says that this can be implemented in areas which has high population which resembles an Indian context which geographic and density in population. **(Gorrie, P. (2013;, Dec 12). Biogas potential in canada. *BioCycle,* p. 34.)**

This article deals with the Non-biodegradable waste and its impacts on the environment. Waste is defined as discarded material which has no value in normal use or for ordinary use. Solid wastes are those undesirable, useless and unwanted materials and substances that come from human and animal activities. Generation of wastes is inevitable. The management of wastes assumes importance in view of the environmental hazards they pose. According to UNICEF, the solid waste can be classified into biodegradable and non-biodegradable waste. Biodegradable waste, which is completely decomposed by biological processes either in presence or in absence of air are called biodegradable. For example: Kitchen waste, animal dung, agricultural waste etc. Non- biodegradable waste, which cannot be decomposed by biological processes, is called non- biodegradable waste. These are of two types - Recyclable: waste having economic values but destined for disposal can be recovered and reused along with their energy value. e g. Plastic, paper, old cloth etc. Non-recyclable: waste which do not have economic value of recovery. Example Carbon paper, thermo coal, tetra packs etc. Disposal of non-biodegradable waste is a major concern, not just plastic, a variety of waste being accumulated. There are a few ways to help non-biodegradable waste management. In the present study we have discus about the impact of non-biodegradable waste on the environment and also focus on its safe disposal for sustainable environment**. (Alok Bharadwaj1, D. Y. (2015). Non-biodegradable waste – its impact & safe disposal. *International conference on technologies for Sustainability- Engineering, Information Technology, Management and the Environment)***

CHAPTER 3 – METHODOLOGY

This study involves Library research which Involves identifying and locating sources that provide factual information or personal/expert opinion on a research question; necessary component of every other research method at some point. A standard outcome of research is a literature review.

Through literature reviews historical records were analysed mainly to back up the ideas and arguments, presented in the research. After doing the library research for the collection of secondary data, Field research was done to collect primary data. Primary data is collected through Google forms which was focused the people around Tenkasi. Primary Data was also collected through interview method, which gave a real time picture of vermicomposting.

3.1 Formulation of the research problem

Semi-urban areas of India generate tonnes of municipal solid waste and waste generation increases by a considerable per cent every decade. More than 80 per cent of this waste reaches open dumpsites causing public health issues, environmental degradation, and resultant climate change. Plastic and e-waste form the major chunk of this waste, with minimal degrading substances. India needs to find solution to these problems. Waste management is a major problem for many urban local bodies in India, where urbanization, industrialization and economic growth have resulted in increased waste generation per person. Effective waste management is a major challenge in cities with high population density. Achieving sustainable development within a country experiencing rapid population growth and improvements in living standards is made more difficult in India because it is a diverse country with many different religious groups, cultures and traditions.

Though there is a significant development in social, economic and environmental areas, waste management systems in India have remained relatively unchanged. The informal sector has a key role in extracting value from waste currently dumped rather than properly land filled. There is an urgent need to move to more sustainable waste management facilities. Current waste management systems are inefficient, with waste having a negative impact on public health, the environment and the economy. The waste management and Handling rules

in India were introduced by the Ministry of Environment and Forests, although compliance is variable and limited.

The transition from wastes to resources can only be achieved through investment in waste management as this depends on a coordinated set of actions to develop markets and maximize recovery of reusable/recyclable materials. Materials, energy and nutrient recovery must be the aim of future waste management infrastructure development in India. Resources can be recovered from wastes using existing technologies and India has an extremely effective recycling tradition. The informal sector has a very important role in India and this must be integrated into formal waste management systems. The informal sector is characterized by small scale, labour intensive, largely unregulated and unregistered low technology manufacturing or provision of materials and services. Waste pickers collect household or commercial/industrial waste and many hundreds of thousands of waste pickers in India depend on waste for an income, despite the associated health and social issues. Pickers extract potential value from waste bins, trucks, streets, waterways and dumpsites. Some work in recycling plants owned by cooperatives or waste picker association. Waste picking is often the only source of income for families, providing a livelihood for significant numbers of urban poor and usable materials to other enterprises. Waste pickers in Pune collect organic waste for composting and biogas generation. Waste pickers also make a significant contribution by keeping cities clean.

Waste collection, storage and transport are essential elements of any waste management system and can be major challenges in cities. Waste collection is the responsibility of the municipal corporations in India, and bins are normally provided for biodegradable and inert waste. Mixed biodegradable and inert waste is often dumped, with open burning a common practice. Improvements to waste collection and transport infrastructure in India will create jobs, improve public health and increase tourism. Local bodies spend around Rs. 500 – 1000 per tonne on waste management with 70% of this amount spent on collection and 20% spent on transport. Waste management disposal is at a critical stage of development in India. There is a need to develop facilities to treat and dispose of increasing amounts of waste management. More than 90% of waste in India is believed to be dumped in an unsatisfactory manner.

3.2 Title of the study:

The title of the study is "**RECOLOGY AN ECO-WISE –A START UP PROJECT"**

3.3 Conceptual framework of the Business Model

Waste management

Waste management or waste disposal are the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things collection, transport, treatment and disposal of waste together with monitoring and regulation

Biodegradable wastes

Biodegradable waste is a type of waste, typically originating from plant or animal sources, which may be degraded by other living organisms. Biodegradable waste can be commonly found in municipal solid waste as green waste, food waste. Other biodegradable wastes include human waste, manure, sewage, slaughterhouse waste.

Non-biodegradable wastes:

An Object that cannot be decomposed into organic and environmentally safe waste Products. This is unlike biodegradable objects which can easily be decomposed by soil bacteria into organic and safe waste materials.

Biogas

Biogas typically refers to a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source.

Organic fertilizers.

Organic fertilizers are fertilizers derived from animal matter, animal excreta (manure), human excreta and vegetable matter (e.g. compost and crop residues). Naturally occurring organic fertilizers include animal wastes from meat processing, peat, manure, slurry, and guano.

Cultivation of earthworms

The way to begin earthworm culture is to provide a culture medium of earthworm food in some kind of container or bed—a tin can, a small wooden box, a compost heap, or a specially designed culture bed—add a few egg-capsules or worms, and keep the culture thoroughly moist and shaded

Organic manure

Organic manure is a compound highly rich in nitrogen, which prominently consists of animal waste and rotten grass. The natural components are harmless and take long time to be decomposed. However as the time has progressed, manure is also manufactured in the plants under the enhanced effects of temperature and other required conditions for the decomposition to occur.

Fermentation

Fermentation is a metabolic process that consumes sugar in the absence of oxygen. The products are organic acids, gases, or alcohol. It occurs in yeast and bacteria, and also in oxygen-starved muscle cells, as in the case of lactic acid fermentation. The science of fermentation is known as zymology.

Methane

Methane is the simplest hydrocarbon—a single carbon atom surrounded by four hydrogen atoms. It usually forms when larger organic molecules are broken down, either by microbes or by heat. The microbes produce it when they eat dead plant matter in wet, oxygen-poor environments.

Chemical fertilizers

A chemical fertilizer is defined as any inorganic material of wholly or partially synthetic origin that is added to the soil to sustain plant growth. Many artificial fertilizers contain acids, such as sulphuric acid and hydrochloric acid, which tend to increase the acidity of the soil, reduce the soil's beneficial organism population and interfere with plant growth.

Vermi-culture:

Vermi-culture means artificial rearing or cultivation of worms (Earthworms) and the technology is the scientific process of using them for the betterment of human beings.

Vermi-compost

Vermi-compost is the excreta of earthworm, which is rich in humus. Earthworms eat cow dung or farm yard manure along with other farm wastes and pass it through their body and in the process convert it into vermi-compost.

Institutional wastes

Waste material that is generated at institutions such as schools, libraries, hospitals, and prisons.

Different stages involved in the waste management

- Collection
- Reduction of wastes
- Recycling of wastes
- Treatment of wastes
- Production of manure from wastes

Landfills

A landfill is a place where waste is kept. Waste is usually buried in landfills, but it may first be sorted to remove any recyclable materials.

Household waste

Solid waste comprising of garbage and rubbish (such as bottles, cans, clothing, compost, disposables, food packaging, food scraps, newspapers and magazines, and yard trimmings) that originates from private homes or apartments.

Waste segregation

Waste segregation means dividing waste into dry and wet. Dry waste includes wood and related products, metals and glass. Wet waste, typically refers to organic waste usually generated by eating establishments and are heavy in weight due to dampness.

Residual landfill

Residual solid waste (RSW) landfills can accept solid wastes from seven specific industrial categories. The waste streams from these industries are typically generated in large quantities and are generally homogeneous and of low toxicity.

3.4 Research design – Descriptive

There are needs which are to be addressed immediately especially in the semi urban areas. Waste management education is done only in most of the part of cosmopolitan cities. The upgrading towns can be shifted a level up only if there are proper waste management and optimum use of energy. This project is about collecting the domestic wastes which are bio degradable from households and industries. After collecting the wastes, there will be segregation of biodegradable wastes and non-biodegradable wastes. The bio degradable wastes are given to the aged cows and from which the bio gases are taken out from the cow dung. After taking the biogas out of the dung, it is then converted into manure which can be sold to farmers where they can use this as organic fertilizers. The conversion process is by the cultivation of earthworms, especially in order to use them to convert organic waste into fertilizer. The other product, which is biogas is made to convert into electricity. Biogas is a biofuel produced from the anaerobic fermentation of carbohydrates in plant material or waste (eg: food peelings or manure) by bacteria. It is mainly composed of methane, with some carbon dioxide and other trace gases. Theoretically, biogas can be converted directly into electricity by using a fuel cell. However, this process requires very clean gas and expensive fuel cells. In most cases, biogas is used as fuel for combustion engines, which convert it to mechanical energy, powering an electric generator to produce electricity. The project is mainly concentrated on tire two cities and towns where there are both domestic wastes and possibility of farming are at a higher level.

The project is only taking the kitchen wastes and food wastes which can be given to aged cows. In return we can obtain biogas from cow dung which can be used as organic manure. The business has competitions from chemical fertilizers which can be preferred by the farmers for higher return. The progress will be less in the initial stage approximately two years but the cultivation will be a healthier one and the cultivated products can be taken as organic foods. There is also a challenge of processing cost of extracting biogas from the cow dung and also conversion of manure into fertilizer from manure involves the process of

vermiculture. The uniqueness of the project is the integration of waste management with energy production and production of fertilizers. The unfair advantage is that none of the company has come up with any of the integration of waste management, energy production and organic fertilizer production. The interdependency may cause the time lag in production and also the output will be of less income in the initial stages. The domestic wastes and institutional wastes can also be collected and if people were given awareness just regarding the segregation of the biodegradable and non-biodegradable wastes, the input process becomes very much easier. The process deals with only domestic food wastes and hence the process should be of day to day bases. The organic fertilizers marketing strategies should be formed and the farmers should be negotiated and the miniature biogas plant will also require eligible candidates to process the biogas into electricity. The electricity can be fed to the nearby areas and that can also be a source of income apart from fertilizers selling. The project involves setting up of plants and a farm for old cows and approachable farmers who are looking for natural farming techniques.

The process is an integration of waste management, organic fertilizers and biogas energy production. This methodology will be effective in particularly semi urban areas where there is an equal ratio of urban population and rural areas. This project may benefit farmers in their farming where they will provide good quality of crops due to the usage of organic fertilizers.

3.5 Study population and Sampling procedure:

The study sample of the project is about 155. The sampling procedure that used in the project is **Convenience Sampling technique.**

3.6 Sources of data collection (Primary & Secondary Sources)

Type	Method
Primary Data	• Personal interview • Questionnaire • Google forms.
Secondary Data	• Journals • Articles • Magazines

3.7 Tools and process of data collection:

Information you gather can come from a various range of sources. Likewise, there are a variety of techniques to use when gathering primary data. Listed below are some of the most common data collection techniques.

Click the following links to read more about data collection techniques:

- Interviews
- Questionnaires and Surveys
- Observations
- Focus Groups Discussions

3.8 Statistical Package and tools used:

SPSS tool is used for analysing the data collected, which gives more space for comparing the data set and eliminate sorting errors. SPSS is easy since it doesn't involve any formula and its output is completely visualizations, charts and graphs which enhance the learning curve of the solution to the problem.

3.9 Limitations of the study:

- The answer of the questionnaire must be influenced by the environmental factors in the city.
- The survey is taken at random. Hence, it might not reveal the overall picture of the city.
- Time limitation is expected in the project
- Limitation in Implementation of data collection method.
- May yield different results in different cities.
- Limitation in terms of reliability and validity of measuring instruments and tools.
- Prior research studies on the topic

3.10 Time Frame:

The estimated time frame of the project is 4 months, involving all the setup and preplanning of the project till the project starts to be on live. Since the Project has many legal matters to should be followed it wouldn't be that easy to process, hence there can be some variation in time frame.

CHAPTER 4 - BUSINESS PLAN OF THE START-UP

4.1 Data Presentation and Interpretation (Market Survey)

The data collected through various methods are analysed through SPSS tool and findings were made according to our requirement. This analysis will enhance the project need that we should look for before starting into the area preferred for the start-up.

Table No 4.1.1

Number of Persons in Family * Garbage per week Cross tabulation:

Number of Persons in Family	Garbage per week				
	1	2	3	4	Total
2	6	0	3	0	9
3	12	9	9	7	37
4	23	11	16	12	62
5	10	6	7	13	36
6	0	3	3	5	11
Total	51	29	38	37	155

Interpretation:

Tabulation specifies the rough amount of Garbage that can be collected in a week and this will help in assessing the moderate amount of input required for work for our business to work without interruption.

Table No 4.1.2

Occupation * Garbage per week tabulation:

Occupation	Garbage per week			
	1	2	3	4
Farmer	2	1	1	1
Student	23	11	14	17
Government Servant	7	3	4	3
Business	5	6	6	4
Other	14	8	13	12
Total	51	29	38	37

Interpretation:

One bag garbage providers one third of the total, while others contribute two-third of the collected waste per week. Hence concentrating equally on all category of peoples the input requirement for the business keeps intact.

Table No 4.1.3

Occupation * Garden Cross tabulation:

Occupation	Garden	
	Yes	No
Farmer	5	0
Student	36	29
Government Servant	8	9
Business	6	15
Other	19	28
Total	74	81

Interpretation:

The consolidated Data Shows that, Garden waste could be a wavering one since it is equally split across the population. Garden waste will be less then because the working people don't have garden in their home considerably. Thus this should be taken for consideration for our demand in input.

Table No 4.1.4

Garbage per week * Self Disposal Method Cross tabulation:

Garbage per week	Self Disposal Method				
	Public bins	By the Valley/ Lake side/ River	By the road side	In an open space	Burn it
1	39	0	2	4	6
2	21	0	2	1	5
3	33	0	0	3	2
4	22	1	2	8	4
Total	115	1	6	16	17

Interpretation:

Irrespective of Garbage produced in the household, most of them tend to dispose it through public bins, so by having regular method of collection we shall be self sustained in our need of raw material for processing.

Table No 4.1.5

Number of Persons in Family * Public Bin Clearance Frequency Cross tabulation:

Number of Persons in Family	Public Bin Clearance Frequency				
	Daily	Once in 2 days	Once in 3 days	More than 3 days	Other
2	4	4	0	1	0
3	13	9	2	10	3
4	18	14	9	18	3
5	11	10	4	8	3
6	2	6	1	1	1
Total	48	43	16	38	10

Interpretation:

The families with 3-5 persons gives us the sizeable amount of input for the business. Hence the CRM should be good for this larger contributing community.

Table No 4.1.6

Garbage Recycle * Total Waste Cross tabulation:

Garbage Recycle	Total Waste				Total
	1	2	3	4	
Yes	85	34	4	2	125
No	22	7	0	1	30
Total	107	41	4	3	155

Interpretation:

From the analysed sample it is evident that the people are ready to give their garbage for recycling. It is all how we plan and execute our marketing such that we get a greater count of suppliers for the better enhancement of the business.

Table No 4.1.7

Public Bin Availability * Total Waste Cross tabulation:

Public Bin Availability	Total Waste				Total
	1	2	3	4	
Yes	68	28	3	2	101
No	39	13	1	1	54
Total	107	41	4	3	155

Interpretation:

As discussed earlier if we spot a collaboration with government the waste from Public bins can be collected without any problem. It is how much we concentrate on people those who don't have public bins nearby and the management of the team collecting waste in a pattern the available resources are used optimally.

Table No 4.1.8

Waste Disposal Education * Garbage Recycle Cross tabulation:

Waste Disposal Education	Garbage Recycle		Total
	Yes	No	
Yes	91	17	108
No	34	13	47
Total	125	30	155

Interpretation:

People are widely ready to support our business. Our attention should be put on the group which is not willing to give their waste and also on the people those who don't have proper knowledge on the waste disposal. By doing this the contributing strength will increase.

Table No 4.1.9

Garden * Total Waste Cross tabulation:

Garden	Total Waste				Total
	1	2	3	4	
Yes	43	26	3	2	74
No	64	15	1	1	81
Total	107	41	4	3	155

Interpretation:

People having Garden are not only Suppliers, they are our valuable customers too. So Concentrating on the people having garden will help us to sell our products since they know the advantage of the manure since they have quite knowledge on it.

4.2. EXECUTIVE SUMMARY

4.2.1 Problem

The main environmental problem associated with fertilizer use is contamination of water with nitrates and phosphates. The nitrogen from fertilizers and manures are eventually converted by bacteria in the soil to nitrates. These nitrates can be leached into the groundwater or be washed out of the soil surface into streams and rivers. High nitrate levels in drinking water are considered to be dangerous to human health. Phosphorus cannot be readily washed out of the soil, but is bound to soil particles and moves together with them. Phosphorus can therefore be washed into surface waters together with the soil that is being eroded. The phosphorus is not considered to be dangerous, but it stimulates the growth of algae in slow moving water. These algae eventually die and decompose, removing the oxygen from the water causing fish kills. This process is called eutrophication. It is important to remember that there are a number of sources of these pollutants including industrial waste, sewerage disposal, detergents and manures. The problem of high nitrate levels in groundwater was recorded as early as 1860, long before fertilizer use became commonplace. Recent research shows that the main sources of nitrates in groundwater are crop residues and organic matter that decompose and produce nitrates at time when crops cannot make use of them

Modern fertilizer consists of varying amounts of nitrogen (N), phosphorus (P) and potassium (K). These three are believed to be essential for plants to grow, (below, I'll discuss why NPK may not be as necessary as we think.), and are extracted from the soil with each harvest. This is why farmers spread fertilizer on their fields, to replace the nutrients lost. It's certainly not the ideal and sustainable way to farm, but it's thought to be the most efficient for large-scale farms. Strategies like crop rotation and allowing large fields to rest would cut too deep into profits that are based on quantity, opposed to quality.

4.2.2 Solution

Soil, on farms as well as the wild, has nutrients in it. However, the proportion of minerals is different in different places. Within a field, the nutrient content is similarly not uniform. In the wild, plants that are most suitable to the soil and other conditions grow and you don't have any control over their growth. However, since you want to grow only your favoured variety of plants in your garden or farm, you need to add nutrients according to the needs of that variety and availability in your soil. Moreover, in a partially covered piece of land, such as a farm, the soil nutrients are taken up by the plants, but are not replenished when the plants or their leaves die, because you remove them as food, herbs, etc. Hence you require fertilizers to enrich the nutrient-deficient soil and create artificial conditions for higher productivity of the plants. What are these nutrients required by plants? The most commonly required plant nutrients are nitrogen (N), phosphorus (P) and potassium (K). Almost all fertilizers are categorized according to their Nitrogen-Phosphorus-Potassium or N-P-K value. Nitrogen is required for the growth of vegetative parts such as the stems and the leaves, while your plants will have healthy roots if they get a sufficient amount of phosphorus. Phosphorus is also required for good flowers and fruits. Potassium makes the plant healthy by facilitating the circulation of nutrients within the plant. In addition to N-P-K, plants also require other nutrients, such as calcium and magnesium. Since these are required in small quantities, you need not add them separately unless in exceptional cases, if your soil is totally devoid of these minerals or the crop you wish to grow requires them in large quantities.

4.2.3 Market

Organic fertilizer market in Tamil Nadu is a huge market as a result of the expansion of irrigated crops, as all crops use different amounts of organic fertilizers due to their different

characteristics that distinguish them from chemical fertilizers. Organic fertilization is the cornerstone that should be developed to raise the productive value of agricultural land and reduce the environmental pollution resulting Of the waste in the use of mineral-chemical fertilizers and therefore recycling organic waste is one of the important factors that lead to the provision of quantities of organic fertilizers that meet the needs of agricultural land. Organic food is still a niche concept in India. Current domestic organic food sales are estimated at around Rs.200 million annually and growing at a compounded rate of 30 percent to 40 per cent each year. Demand is growing as incidences of food adulteration are repeatedly reported on in global media and consumer consciousness of natural, healthy and safe foods rises. New food safety legislation is also working towards improving the safety standards of food and, at the same time, consumers are increasingly willing to pay for organic foods as their disposable incomes rise. Key factor behind the recent pickup in growth is e-commerce which provides organic companies with an appealing route to market. There are more than 25 e-commerce platforms selling organic foods online in India now, plus generalist grocery sites like big basket and Pepper tap are selling organic categories. In addition, there are specialized organic retailers like ISayOrganic, JoyBy Nature, ekgaon, and Organic Shop. It takes about three years to convert a field from conventional to organic. An organic food company, which obtains the organic certification, usually works with a group of farmers known as its Internal Control System (ICS). The company provides those farmers with support in terms of inputs and education in organic growing practices. It also assures the buyback of the crop throughout the conversion process. Companies also incentivize farmers by engaging them in growing more crops that can be sold as organic, instead of having single crop operations. A very important aspect of supply chain management is certification. Different importing countries have different sets of approved certifications so food companies need to set a standard of organic farming and choose an appropriate agency for certification. These agencies include the USDA, EU, Control Union and OU Kosher. To help increase parity between India and its export markets, the Government has implemented the National Programme for Organic Production (NPOP). It has also launched PGS-India (Participatory Guarantee System of India) which is a quality assurance initiative that is locally relevant, emphasizes the participation of stakeholders — including producers and consumers — and operates outside the frame of third-party organic certification.

The typical size of the deal has been Rs.3 million to Rs.10 million and typical turnover of the companies at the time of investment has been in the range of Rs.5 million to Rs.10 million.

We are also witnessing venture funding in start-ups and early stage organic companies increase. Why are these investors bullish on investing in Indian organic food? First and foremost, if we look at the entire food basket and plot each food category on a graph with the scale of opportunity and margin opportunity on two axes, organic foods is one of the few categories that will fall into the high scale, high margin opportunity bracket. The high scale is driven by the fact that organic food consumption is not even 0.1 per cent of India's Rs.300 billion annual food consumption. Likewise, India's share in the Rs.100 billion global organic food market is less than 0.2 per cent. The scale of the opportunity is also driven by the increasing variety of organic foods hitting the market and the emergence of e-commerce as a channel in which to sell the product. The high margin opportunity is driven by two things: typically there is a 15 per cent to 50 per cent premium on organic products, which in a stable organic business can translate to 10-25 per cent EBITDA margins. Margins are also driven by the immense branding opportunities in organic products. Indian commodities like pulses, staples, and vegetables are long overdue a re-brand so are an example of food products which could benefit from organic branding. Another reason for investor interest is that the typical organic supply chain is more efficient compared to conventional agribusiness as there are fewer intermediaries and there is better control on quality, cost and traceability of the product A unique opportunity to investors to invest and earn top-quartile internal rates of return over the next five to 10 years. It is an exciting time for the organic foods industry and I believe all stakeholders including consumers, retailers, companies, farmers, investors, certification agencies, importers and the government will benefit with the evolution of the industry.

The organic food market in India is growing at 25-30 per cent, but the awareness about organic farming is still low in India despite huge spending, the government. India is capable of growing all kinds of organic foods. Farmers should be educated to boost organic cultivation. Organic farming not only protects land and water resources, but also improves farm income, he added. According to the study, India's organic food market has potential to grow more than 25 per cent annually with more awareness about these products and the government incentivizes region-specific organic farming to ensure consistent growth in future.

The current growth in the organic food market is driven by rising health consciousness, changing lifestyles, mounting disposable spending and growing availability of organic food products in shopping malls and retail outlets. More growth is expected in future as the

government is increasingly supporting organic farming in the form of subsidies and is also planning to roll out a comprehensive policy in this regard. As per the government data, organic farming is practiced in 12 states in about 4.72 million hectares. In 2013-14, organic food production was 1.24 million tons.

4.2.4 Competition

Organic farming produces the same yields of corn and soybeans as does conventional farming, but uses 30 per cent less energy, less water and no pesticides, a review of a 22-year farming trial study concludes." Of course, the people who make fortunes selling fertilizer, herbicides, pesticides, GMO crops, etc., don't want people to know that. We must keep believing that the kind of agriculture we're seeing since the "Green Revolution" is the only viable way to do things and that organic methods are a throwback to less efficient times and more expensive. In fact, as far as we know organic farming would be cheaper than non-organic if it was as heavily subsidized. Organic farming approaches for these crops not only use an average of 30 per cent less fossil energy but also conserve more water in the soil, induce less erosion, maintain soil quality and conserve more biological resources than conventional farming does.

The study compared a conventional farm that used recommended fertilizer and pesticide applications with an organic animal-based farm (where manure was applied) and an organic legume-based farm (that used a three-year rotation of hairy vetch/corn and rye/soybeans and wheat). The two organic systems received no chemical fertilizers or pesticides.

The research compared soil fungi activity, crop yields, energy efficiency, costs, and organic matter changes over time, nitrogen accumulation and nitrate leaching across organic and conventional agricultural systems. The reason was that wind and water erosion degraded the soil on the conventional farm while the soil on the organic farms steadily improved in organic matter, moisture, microbial activity and other soil quality indicators. The fact that organic agriculture systems also absorb and retain significant amounts of carbon in the soil has implications for global warming, pointing out that soil carbon in the organic systems increased by 15 to 28 per cent, the equivalent of taking about 3,500 pounds of carbon dioxide per hectare out of the air. This is helpful, but a footnote compared to the importance of stopping soil erosion. The "Green Revolution" way of doing things has been destroying most of our most fertile land for decades now.

4.3 Vision

Our vision is to be an industry leader in creating sustainable and secure system that improve and transform the polluted environment into healthy environment

4.4 Mission

Our mission is to conduct and bring together credible, evidence-based science on the environmental and health effects of organic farming and communicate the findings to the people.

- Our mission is to provide quality Healthy Environment and maximize return with diligence and integrity.
- Advance understanding about the health and environmental benefits of organic farming through scientific research.
- Improve the efficacy and sustainability of organic farming methods through scientific research.

4.5 Objectives

- To engage and develop partnerships with institutions, agencies, organic farmers, and food systems that are working to improve and transform Green environment.
- To empower consumers to make choices that will improve their health, the health of the environment and the health of their communities through education and outreach.
- To strengthen and expand organic practices and commodities which reduce the use of toxic, synthetic chemicals and have clear benefits to human health and the environment.

4.6. PRODUCTS AND SERVICES

4.6.1 Problem worth Solving

Waste management in India is an area which has not been taken seriously. India is considered to be a country which doesn't give its importance to recycling of wastes. India is coming up with plans to make the country clean but doesn't give its equal importance to the area of usage of wastes. Cleaning of wastes is just the starting point. The real progress of the country will be determined by the effective management of wastes. India now features itself in the top ten countries that produce solid wastes due to the increasing standard of

urbanisation. India is generating such waste at 621,000 tonnes a day (approximately). There are only four developing nations among the list of top 10 waste-generating countries - Brazil, China, India and Mexico. This is primarily because of the large size of their urban populations and because their city-dwellers are adopting high-consumption lifestyles. The progress in waste management especially in semi urban areas have to be increased in order to make the most for both the rural and urban can be utilized. The semi urban areas can be made as a hub in order to take the increasing urban wastes and provide organic manure to the farmers in the rural and semi urban areas. These problems have to be solved in order to make the most out of the waste.

This problem has to be solved now because of the many progress taken by the government of India in cleaning the cities. The wastes can be collected to make the best output possible out of the collected. If the wastes are not collected, there could be a chance that India is dumped with wastes that could never be recycled. Many industries have now realised the importance of the waste management and are coming up with process of generating electricity but these recycled energy are not given to the people. People should be benefited for the contribution that they give. Domestic wastes are not utilised probably in the process of recycling. There is a lot of awareness which has to be given for people for the effective usage of domestic wastes. There are various process associated in the conversion of solid wastes. And also people were aware of the possible usage of solid wastes. The domestic wastes are often rotten and degraded by nature which can be used in the most effective ways possible to earn the highest optimum output. The domestic usage is high in urban areas and high quantity of wastes can be collected in the process and it is a problem which has to be solved in the near future. The extraction of the methane gas in various parts of Tamil Nadu has led to confusions among the people of the state. This process demands remedial measures which will bring a sign of relief to people who are concerned about the methane extraction. There are also quality concerns over the extraction of methane in various other ways. All those things should be addressed by justifiable methods and outcomes.

4.6.2 Our Solution

The possible solution for this problem is the by production of electricity and organic manure out of the domestic wastes collected. Electricity is something which can be obtained only from the solid wastes. In this case we feed the biodegradable wastes to the cows which are very old. The old cows after the consumption of the input, gives us the dung through

which effective methane gas can be obtained. The rest of the dung along with the other biodegradable wastes can be utilized in order to make the organic manures. The organic manures can then be utilized in making the culture of organic farming again into the rural areas of India. The country can bring back its own high quality vegetables in the farming.

Organic farming can bring outputs which has high demands in the foreign and also in the domestic market. This is due to the increase of awareness about natural product in the mind-set of people. There is also a possibility of selling the extracted bio gas itself into the market. The bio gas extraction from the cow dung can be used as a replacement for the gas used in cooking. The energy conservative society was in a situation to take whatever replacement options available in the country to change. This could be a possible solution for the people who don't get enough facilities for cooking in the rural areas. In the process of making this world a better eco-friendly energy conservative, these kind of steps should be taken in order to maintain the energy which can be conservative. The solutions could be either biogas or electricity and organic manure production. This ensures that the product is getting much more diversified output and doesn't depend on one part of market. The process is made in such a way that it can be aligned in any ways depending upon the circumstances. The organic manure has a very good market in abroad and hence it can be used to make the higher revenue margin. Also the methane gas extraction from the wastes and cow dung may reduce the extraction of methane gas from the ground on fertile land.

4.6.3 Validation of Problem and Solution

The problem of managing the waste needs a solution which has to be addressed. There were also many ways in converting the solid wastes but there are no awareness on the biodegradable waste management. The solution could be of any means for this problem but the solution given in this project makes it to be flexible in its own ways. There were many options available as remedial measures. All these measures were incorporated into a single context for the flexibility. The solution could be altered in many ways depending upon the spectrum of demand. This ensures that this could be the best solution possible out of all the solution available.

Bio gas which was extracted from the cow dung can either be directly sold to the rural market or they can be converted into electricity in the form of fuel cells which can be used for various possible purposes. The cow dung which is remaining after the extraction of the

methane gas can be used as the substitute for the extraction of methane directly from the ground.

4.6.4 Roadmap/Future Plans:

Implementation process in sub urban areas first because of the accessibility to both the rural areas and urban areas is the first stage of future plan. Later the process could be implemented in various possible locations nearby. The revenue stream could be increased by making the organic manures to be sold in abroad. The demand for organic manure is high and that could be explored in getting higher revenue stream. The project could be taken to the next stage by forming communities in collecting the domestic biodegradable wastes and also in possession of old cows and cultivating fields. The natural organic farming could be made in the land and the products can be sold at a higher price. The process has a very good scope of scalability if it is approached in the right method possible. The optimum utilization of the resources could take the company to the next level. The method can be utilized in various parts of the country depending upon the geographical conditions available. The process could take various dimensions in its shape when the right approach is taken at the right geographical areas. The scalability would bring higher margin of revenues when all the diverse options available with the management of wastes can be utilized in the optimal way. Available market in Abroad should be kept in watch for future expansion.

4.7 Market Analysis Summary

4.7.1 Market Segmentation

There are customers at both ends of our supply chain that will benefit from our services and products. Municipalities will benefit from our service by having an alternative means of waste disposal. Other potential customers who will benefit from our compost product include turf farms, fertilizer manufacturers, nurseries, landscapers, golf courses, homeowners, and even the federal government for use in highway construction reseeding. Therefore, we have two basic market segments; those waste treatment facilities which will benefit from our services and consumers who will benefit from our product.

There is a report stating that landfills are overflowing and the costs of disposing of sewage and garbage is rising. City leaders can relieve over extended municipal budgets, prevent the

contamination of drinking water, and help farmers build healthier soils by recycling garbage and human waste back to farms. At least 13 U.S. states have 6 years or less before all of their landfills are completely full. We offer a service by which municipalities can dispose of their waste without it having to be land filled anywhere. This is of great value to this customer.

At the other end of our process are the users of our compost. According to Cornell University composting is experiencing a resurgence of activity which is driven by increased understanding of the agronomic benefits of compost utilization, and rising disposal costs for municipal wastes. Also, according to Purdue University consumption of compost in the commercial market is growing due to people looking for a more organic or natural substitute for traditional chemical fertilizers. Recycling is at the forefront of responding to this growth trend in the Mid-Atlantic USA. We will initially focus on selling compost to fertilizer manufacturers, nurseries, and landscapers. We already have commitments from a fertilizer manufacturer and a landscaper to purchase 600 tons per year or more of our compost material.

Five major market segments for compost have been identified:

- Agriculture (for food and non-food crops and sod farms).
- Landscapers (for industrial and commercial properties; golf courses, cemeteries, and athletic fields; landfill covers; and damaged soils).
- Nurseries (for plant and forest seedling crops and reforestation projects).
- Public agencies (for highway median strips, parks, recreational areas, and other public property).
- Residents (for home landscaping and gardening).

4.7.2 Target Market Segment Strategy

To target our customers, we examined the market trends. This market has grown significantly in recent years and we expect to capture a quarter of this multibillion-dollar market. This market growth is fuelled by a more health conscious consumer. People are better informed about the potential side effects associated with chemical fertilizer products both to their health and to the environment. Sales of organic foods have risen sharply. Organic food sales at the retail level totalled $10.4 billion, according to Katherine DiMatteo, executive

director of the Organic Trade Association. This year, retail sales of organic foods are expected to exceed $15 billion with more than $32 billion projected by 2009 (CNBC, Dec. 3, 2004).

4.7.2.1 Market Needs

Several companies compete in the fertilizer market. Their major selling points are performance and price. However, health conscious consumers have created growing competition between chemical and organic products. Competition can be divided into two forms: direct and indirect.

Our direct competitors would include other compost producers capable of producing sufficient product to supply the growing compost demand.

Our indirect competitors are fertilizer manufacturers who also are a part of our target market. As noted elsewhere in this business plan, the trend is away from chemical fertilizers, toward natural organic soil enhancers. Thus the market for chemical fertilizer is decreasing while our market is increasing.

4.7.2.2 Market Trends

Current trends in the market greatly favour the start-up of our recycling business.

Laws have been passed in India placing greater restrictions of the types of landfills which can receive waste sludge. These laws take effect in 2008. Municipalities are already seeking alternative means of disposal as disposal prices are expected to skyrocket as landfill space decreases dramatically. Our recycling service solves this problem for municipalities.

The organic industry now boasts sales in excess of $9 billion at retail, with growth forecast to continue at 25% per year, the demand for compost to use in organic farming and other applications is growing rapidly.

4.7.2.3 Market Growth

The possibility of growth in this market is realistically huge. Consider the following simple facts:

i. Municipalities must have an alternative means for disposing of waste; we offer a great alternative to meet that need.

ii. Market trends are skewing more and more toward organic soil enhancements and away from chemical fertilizers; we meet this need as well.

iii. We have no huge direct competition in our target area and very little in the similar region.

All of this means that waste management is poised to see tremendous growth.

4.7.3 Key Customers

- Farmers
- Terrace Farming
- Grocery shops owners
- Nursery Shops
- Recycling Industries

4.7.4 Future Markets

The Future Target market of the business will be expanding to other regions (i.e) expanding the Target Market. The next will be taking the work of Government Municipalities collection of waste management may be as lease or making the waste management industry as Private

and tries to take over the clean and Green project of our Government and using India as pollution free, clean and Organic.

4.7.5 Competition

4.7.5.1 Competitors and Alternatives

When we look into our Target market, the main competitors are Government that is Urban local body Municipalities, Chemical fertilizer Manufacturers and other organic fertilizer manufacturers especially who are selling through online. When we look into the chemical fertilizers the products are more costly and do not address the market trend toward organic, natural soil enhancers.

Municipalities have composting operations in an attempt to deal with waste disposal issues. They typically use a method in which sludge is placed on the ground in windrows which are turned periodically for aeration. This is an inefficient method of composting primarily because it is slow, taking 90 or more days, which means that availability is uncertain for consumers. Also, in this composting method high enough temperatures are not achieved to kill harmful bacteria and seeds that may sprout into weeds. Additionally, municipalities are not businesses, which mean their marketing capabilities are limited. Their market primarily consists of local homeowners and businesses, which ignores the greater market. Also, this composting method requires a lot of ground space which restricts the operation. Finally, odour can be a problem for municipalities due to nearness of local residents or businesses. For these reasons, municipality composting efforts are not considered a competitive threat.

4.7.5.2 Our Advantages

The competitive advantages we have are summarized as follows.

1. Discounted Pricing

2. Free Shipping

3. Accessibility

4. Convenience – Easy to use

5. Eco – Friendly

6. Cost: The price of our compost product is much less than chemical fertilizers.

7. Organic product: We offer an organic product which is responsive to current market trends. This includes the entire advantages organics offer over chemicals.

8. Elimination of disposal issues: Municipalities now have a waste that takes up landfill space. Our service recycles the waste which saves valuable landfill space.

9. More effective between application times: Normal times between applications can range from two to four weeks. Our product lasts for many months, thereby saving the customer time and money (no additional expenditure for more products).

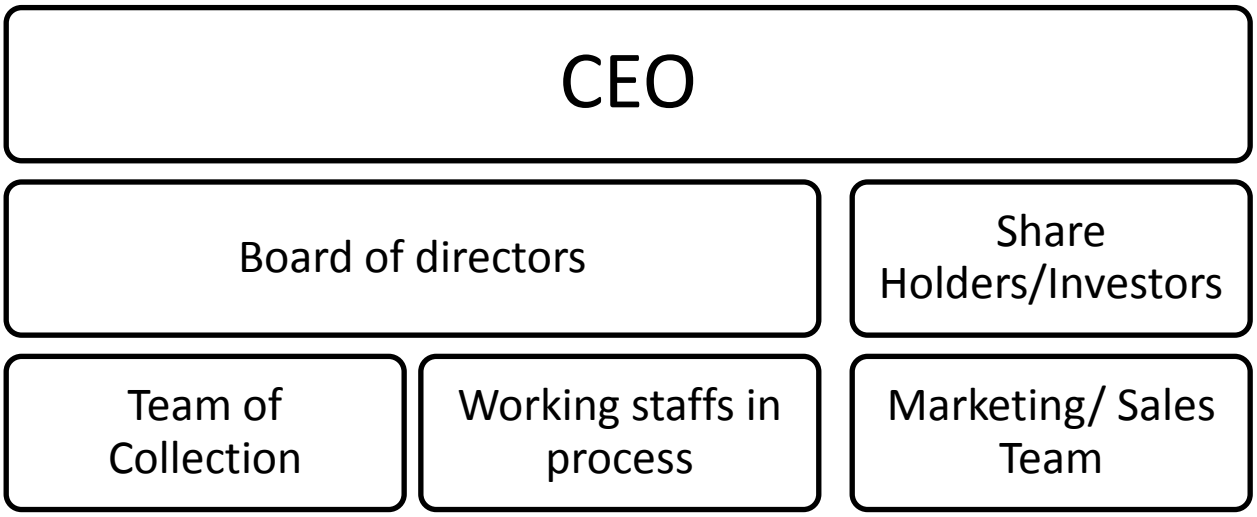
Value proposition for end users of compost material: Compost is a valuable soil amendment that improves many soil properties, such as porosity, structural & thermal stability, water retention, resistance to wind and water erosion, and tillage. Compost also decreases soil crusting, regulates storage and release of nutrients, enhances the development of beneficial microorganisms, builds up plant resistance to parasites and disease, and promotes faster root development. Plants and crops treated properly with compost may produce higher yields and have less weed growth. Chemical fertilizers do not offer this value.

4.8 Legal Compliance

A Company involving waste management and organic manure should have proper clearance from various departments for a proper setup of the business. That includes the following departments namely, Agmark , Ecomark, Indian Organic Certification, ISI-BIS , ISO-65, USDA. These accreditation will give worth to the product in Local as well as Abroad even when the product is exported in future as a part of scalability.

4.9 COMPANY AND MANAGEMENT SUMMARY

4.9.1 Organizational Structure



4.9.2 Management Team

The management teams could be distinguished into three sections based on the works that they do. The whole process is of three categories and the teams are divided based on the task that they have to be done. The first team is the collection team who collects all the biodegradable wastes from the domestic areas. The wastes deposited in the factories are first separated by the staffs who work on operations. They fall under the second category who works in factory where they feed these into cows and also collect the cow dung. They also involve in the extraction of methane from the dung. There is a separate in house team which converts the bio gas into electricity in form of fuel cells or they fill they biogas in containers which will make them ready to be taken to the market. The third process done by this team is making the organic manure from the cow dung. The manure is packaged and given to the marketing team. This team forms the third section who sells all the three products in the nearby market.

4.9.3 Management Team Gaps

All the teams are given a set of target which has to be attained in the given period of time. The management teams should acquire the gaps with performance that they have done with the respect to their target. The gaps should be minimal because they have to achieve the gaps which they made in the next recovery period.

4.9.4 Personnel Plan

The plan is to provide the customer and the employee with utmost satisfaction. The employee should get their welfare and benefits according to their services to the company. The incentives could be based on the performance that the employee puts in. The shift is based on the willingness of the employee to work and the incentives are made according to the shift allowance. Employee engagement should be at the highest level and they are given equal importance.

4.10 Marketing Strategies

Product Strategy:

The following is the clear explanation of the method what type of the waste should be used to produce the manure and biogas. The idea is to first produce a first quality manure which is of the mixture in the ratio of 1:1(dunk and soil), then second quality is in the mixture in the ratio of 1:2 (dunk and soil). Mostly Indian cultivators use the chemical fertiliser to produce the food product. Now as per the demand they were made to concentrate on the health. This helps the natural manure in producing the food at the house hold also. The variation in the quality helps them to be cultivated and produced in abroad and in domestic market. The Product differentiation could help the products to stand against the competitor's products.

Pricing Strategy:

Price penetration strategy and odd even price strategy can be used in the fixation of prices. The products are to be sold in three different types of products. Biogas price is fixed based on marker rate of biogas only. The biogas can be sold to the retailer or to the customer. The two type of manures are fixed the two different price, here use the Price penetration strategy, odd even price strategy. The price for the first quality is Rs. 99 and second quality is Rs. 77.

Promotion Strategy

Our promotional strategy will be two-fold: first phase promotion will focus on before, during, and six months following our opening; the second phase of promotion will deal with the long term. The purpose of the first phase is to assist with rapid market entry to ensure

early and sustained profitability. The second phase is to ensure long-term growth which helps us to propel toward achieving our goal of expanding state wide and across the country.

First Phase Promotions

- **Publicity**: We will send news releases to all of the major newspapers in Tamil Nadu. Publication of news articles about Tamil Nadu Recycling will lend great credibility and be an excellent way to let all target markets know about this new, innovative business and the solutions it provides for municipalities and users of compost or fertilizers. We will similarly seek publicity in the form of news stories from local radio and television stations.
- **Advertising**: We will utilize direct mail and face-to-face promotional strategies to raise awareness about our products and services in the target markets. Newspaper advertising may also be used. Radio and television ads are not certain; we will evaluate their effectiveness before further implementation.
- **Internet**: We will have a content heavy website geared toward educating potential customers about the benefits of our products and services. All literature, business cards, etc. will include our website and e-mail address information.
- **Alliances**: We intend to form alliances with fertilizer manufacturers to use our product in their fertilizer and/or distribute our product for us.

Second Phase Promotions

- **Publicity**: As the business grows and expands we will continue to seek publicity through news media to tout our successes.
- **Advertising**: We will continue to make face-to-face contact with customers and potential customers. Mail-outs will be done again within a few months of start-up. The second round of mail outs will be updated to reflect the benefits provided to customers thus far. Such mail-outs will be sent periodically.
- **Internet**: We will continue to have a comprehensive website. The website will be updated to provide responses to frequently asked questions. After the first six months, and certainly after the first year, we will evaluate the viability of having target clients

advertise on our site, and conversely, we will evaluate viability of advertising on our target client's websites (if applicable).

- **Alliances**: We will continue to seek mutually beneficial and complementary alliances with manufacturers where applicable.

Positioning Statement

For municipalities seeking an answer to their waste disposal problems, Tamil Nadu Recycling is the service of choice and trusted strategic ally who gives them a cost effective solution. For users of fertilizer and soil amendment products, Tamil Nadu Recycling is a dependable provider of low cost and consistent high quality compost products.

Place Strategy:

The manure buyers are those who have space to cultivate the vegetables in their land or garden. They can improvise by our product to cultivate the vegetables which turn out to be organic in nature. Mostly people who stay in apartment and in rental houses have no able land to cultivate so it is definitely in need for space in the housing premises. There is always requirement for the provision of sunlight. So we are concentrating only tier two cities and town people where they will be having enough spacing for in-house gardening. By selling the manure for every household, the improvement in the market size can be attained. It makes it easy for customers to utilize this service. Concentrating on semi urban areas will improve the sales.

Timing strategy:

The collection of biodegradable wastes has to be done within a day so that it can be in a state which can be consumed by the cows. The distribution of biogas and other products has to also be delivered in time. Effective logistics can be used to deliver the products on time to the customers. The logistics can be categorized as Inbound and outbound logistics where the collection of source and delivery of products comes into consideration.

Selling strategy:

Discounted Pricing: who are all buying more than 20kg for manure we are giving the each kg 5rupee discount. Free shipping Accessibility: customer buying excess of 25kgs of manure are given free shipping cost.

4.11 FINANCIAL PLAN

Sales project for First Year

SALES			
Particular	**Quantity**	**Amount per unit**	**Total**
BIO GAS	26,568.00	70.00	1,859,760.00
FIRST QUALITY MANURE	53,136.00	130.00	6,907,680.00
SECOND QUALITY MANURE	79,704.00	100.00	7,970,400.00
		SALES REVENUE	**16,737,840.00**

Sales project for Second Year

SALES			
Particular	**Quantity**	**Amount per unit**	**Total**
BIO GAS	66,420.00	70.00	4,649,400.00
FIRST QUALITY MANURE	66,420.00	130.00	8,634,600.00
SECOND QUALITY MANURE	99,630.00	100.00	9,963,000.00
		SALES REVENUE	**23,247,000.00**

Sales project for Third year

SALES			
Particular	**Quantity**	**Amount per unit**	**Total**
BIO GAS	106,272.00	70.00	7,439,040.00
FIRST QUALITY MANURE	132,840.00	130.00	17,269,200.00
SECOND QUALITY MANURE	199,260.00	100.00	19,926,000.00
		SALES REVENUE	**44,634,240.00**

Sales project for Fourth Year

SALES			
Particular	**Quantity**	**Amount per unit**	**Total**
BIO GAS	159,408.00	70.00	11,158,560.00
FIRST QUALITY MANURE	212,544.00	130.00	27,630,720.00
SECOND QUALITY MANURE	318,816.00	100.00	31,881,600.00
		SALES REVENUE	**70,670,880.00**

Sales project for Fifth Year

SALES			
Particular	**Quantity**	**Amount per unit**	**Total**
BIO GAS	318,816.00	70.00	22,317,120.00
FIRST QUALITY MANURE	318,816.00	130.00	41,446,080.00
SECOND QUALITY MANURE	478,224.00	100.00	47,822,400.00
		SALES REVENUE	**111,585,600.00**

Expenses:

First year expenses statement:

VARIABLE COST			
Particular	**Quantity**	**Unit per Cost**	**Total**
By Direct Raw Material	265,680.00	1.00	265,680.00
By Direct Raw Material (Black Soil)	180.00	1,200.00	216,000.00
By Direct Material Cost	2,400.00	30.00	72,000.00
By Wages	720.00	7,500.00	5,400,000.00
By Travelling Expenses	32,400.00	65.00	2,106,000.00
By Electricity Bill			360,000.00
By Maintenance Cost			360,000.00
		Total	**8,779,680.00**

Fixed Cost			
Particulars	**Quantity**	**Fixed Price**	**Total**
By Salary	20.00	180,000.00	3,600,000.00
By Lease Transport	6.00	108,000.00	648,000.00
By Lease The Small Three Vehicles	20.00	1,200.00	24,000.00
By Rent			600,000.00
By Deprecation			62,500.00
By Interest On Loan			9,000.00
		Total	4,943,500.00

Second year expenses statement:

Variable Cost			
Particular	**Quantity**	**Unit Per Cost**	**Total**
By Direct Raw Material	398,520.00	1.00	398,520.00
By Direct Raw Material (Black Soil)	270.00	1,200.00	324,000.00
By Direct Material Cost	3,600.00	30.00	108,000.00
By Wages	1,020.00	7,500.00	7,650,000.00
By Travelling Expenses	41,350.00	65.00	2,687,750.00
By Electricity Bill			540,000.00
By Maintenance Cost			240,000.00
		Total	**11,948,270.00**

Fixed Cost			
Particulars	**Quantity**	**Fixed Price**	**Total**
By Salary	30.00	180,000.00	5,400,000.00
By Lease Transport	9.00	108,000.00	972,000.00
By Lease The Small Three Vehicles	30.00	1,200.00	36,000.00
By Rent			900,000.00
By Deprecation			67,500.00
By Interest On Loan			13,500.00
		Total	7,389,000.00

Third year Expenses projection:

Variable Cost			
Particular	**Quantity**	**Unit Per Cost**	**Total**
By Direct Raw Material	797,040.00	1.00	797,040.00
By Direct Raw Material (Black Soil)	540.00	1,200.00	648,000.00
By Direct Material Cost	7,200.00	30.00	216,000.00
By Wages	1,440.00	7,500.00	10,800,000.00
By Travelling Expenses	83,100.00	65.00	5,401,500.00
By Electricity Bill			960,000.00
By Maintenance Cost			720,000.00
		Total	19,542,540.00

Fixed Cost			
Particulars	**Quantity**	**Fixed Price**	**Total**
By Salary	60.00	180,000.00	10,800,000.00
By Lease Transport	18.00	108,000.00	1,944,000.00
By Lease The Small Three Vehicles	60.00	1,200.00	72,000.00
By Rent			1,200,000.00
By Deprecation			172,500.00
By Interest On Loan			27,000.00
Total			14,215,500.00

Fourth year Expenses projection:

Variable Cost			
Particular	**Quantity**	**Unit Per Cost**	**Total**
By Direct Raw Material	1,594,080.00	1.00	1,594,080.00
By Direct Raw Material (Black Soil)	1,080.00	1,200.00	1,296,000.00
By Direct Material Cost	10,800.00	30.00	324,000.00
By Wages	2,160.00	7,500.00	16,200,000.00
By Travelling Expenses	69,240.00	65.00	4,500,600.00
By Electricity Bill			1,620,000.00
By Maintenance Cost			840,000.00
		Total	26,374,680.00

Fixed Cost			
Particulars	**Quantity**	**Fixed Price**	**Total**
By Salary	90.00	180,000.00	16,200,000.00
By Lease Transport	27.00	108,000.00	2,916,000.00
By Lease The Small Three Vehicles	90.00	1,200.00	108,000.00
By Rent			1,800,000.00
By Deprecation			276,000.00
By Interest On Loan			40,500.00
		Total	21,340,500.00

Fifth year Expenses projection:

Variable Cost			
Particular	**Quantity**	**Unit Per Cost**	**Total**
By Direct Raw Material	2,391,120.00	1.00	2,391,120.00
By Direct Raw Material (Black Soil)	2,160.00	1,200.00	2,592,000.00
By Direct Material Cost	21,600.00	30.00	648,000.00
By Wages	4,320.00	7,500.00	32,400,000.00
By Travelling Expenses	11,538.46	65.00	749,999.90
By Electricity Bill			3,240,000.00
By Maintenance Cost			2,160,000.00
		Total	44,181,119.90

Fixed Cost			
Particulars	**Quantity**	**Fixed Price**	**Total**
By Salary	135.00	180,000.00	24,300,000.00
By Lease Transport	40.50	108,000.00	4,374,000.00
By Lease The Small Three Vehicles	135.00	1,200.00	162,000.00
By Rent			2,700,000.00
By Deprecation			450,000.00
By Interest On Loan			72,840.00
Total			32,058,840.00

Marginal Costing:

Particular	First year	Second year	Third year	fourth year	fifth year
Sales	16,737,840	23,247,000.00	44,634,240.00	70,670,880.00	111,585,600
Variable cost	8,779,680.00	11,948,270.00	19,542,540.00	26,374,680.00	44,181,119.90
Contribution	**7,958,160.00**	11,298,730.00	25,091,700.00	44,296,200.00	67,404,480.10
Fixed cost	4,943,500.00	7,389,000.00	14,215,500.00	21,340,500.00	32,058,840.00
Profit	**3,014,660.00**	3,909,730.00	10,876,200.00	22,955,700.00	35,345,640.10

TRADING ACCOUNT & PROFIT AND LOSS ACCOUNT:

TRADING ACCOUNT & Profit and loss account					
PARTICULAR	Amount	Amount	Amount	Amount	Amount
TO PURCHASE	265,680	398,520	797,040	1,594,080	2,391,120
TO PURCHASE BLACK SOIL	216,000	324,000	648,000	1,296,000	2,592,000
TO PURCHASES OF RAW MATERIAL	72,000	108,000	216,000	324,000	648,000
To Cash purchases	353,680	330,520	1,561,040	2,864,080	5,101,120
To Credit Purchases	200,000	500,000	100,000	350,000	530,000
TO WAGES(60*7500)	5,400,000	7,650,000	10,800,000	16,200,000	32,400,000
TO ELETRICITY BILL	360,000	540,000	960,000	1,620,000	3,240,000
BY GROSS PROFIT C/D	**10,424,160**	**14,226,480**	**31,213,200**	**49,636,800**	**70,314,480**
	16,737,840	**23,247,000**	**44,634,240**	**70,670,880**	**111,585,600**
BY SALES OF BIO GAS	1,859,760	4,649,400	7,439,040	11,158,560	22,317,120
BY SALES OF FIRST QUALITY MANURE	6,907,680	8,634,600	17,269,200	27,630,720	41,446,080
BY SALES OF SECOND QUALITY MANURE	7,970,400	9,963,000	19,926,000	31,881,600	47,822,400
By Cash sales	16,682,840	23,144,000	44,569,240	70,570,795	110,435,600
BY Credit sales	55,000	103,000	65,000	100,085	1,150,000
	16,737,840	**23,247,000**	**44,634,240**	**70,670,880**	**111,585,600**
SELLING AND DISTRIBUTION COST					
TO SALARY	3,600,000	5,400,000	10,800,000	16,200,000	24,300,000
TO TRAVELLING EXPENSES	2,106,000	2,687,750	5,401,500	4,500,600	750,000
TO RENT	600,000	900,000	1,200,000	1,800,000	2,700,000
OFFICE AND ADMINSTATIVE EXPENSES					
TO MAINTAINANCE CHARGES	360,000	240,000	720,000	840,000	2,160,000
TO Lease rent for transport	648,000	972,000	1,944,000	2,916,000	4,374,000
TO Lease rent for three vehicles	24,000	36,000	72,000	108,000	162,000
To deprecation	62,500	67,500	172,500	276,000	450,000
TO INTEREST ON LOAN	9,000	13,500	27,000	40,500	72,840
	7,409,500	10,316,750	20,337,000	26,681,100	34,968,840
BY NET LOSS/PROFIT C/D	**3,014,660**	**3,909,730**	**10,876,200**	**22,955,700**	**35,345,640**
BY GROSS PROFIT B/D	10,424,160	14,226,480	31,213,200	49,636,800	70,314,480
	10,424,160	**14,226,480**	**31,213,200**	**49,636,800**	**70,314,480**

Balance Sheet:

LIABLITIES	**Amount**	**Amount**	**Amount**	**Amount**	**Amount**
CAPITAL	7,000,000	7,000,000	7,000,000	7,000,000	7,000,000
(+) NET PROFIT	3,014,660	3,909,730	10,876,200	22,955,700	35,345,640
BANK OVER DRAFT	127,500	62,250	97,500	816,600	450,000
SUNDRY CREDITORS	200,000	500,000	100,000	350,000	530,000
SHORT TERM LOAN	225,000	337,500	675,000	1,012,500	1,821,000
BY LONG TERM LOANS	900,000	1,350,000	2,700,000	4,050,000	7,284,000
TOTAL LIABLITITES	**11,467,160**	**13,159,480**	**21,448,700**	**36,184,800**	**52,430,640**
ASSET	**Amount**	Amount	Amount	Amount	Amount
BY BORING THE GROUND	1,250,000	1,350,000	2,050,000	3,500,000	5,300,000
By Depreciation	62,500	67,500	172,500	276,000	450,000
BY CASH IN Bank	85,000	41,500	65,000	544,400	300,000
BY CASH AT hand	115,000	14,500	25,000	400,000	350,000
BY SUNDRY DEBTORS	55,000	103,000	65,000	100,085	1,150,000
PLANT	400,000	550,000	620,000	1,500,000	2,300,000
LAND			1,400,000	2,020,000	3,700,000
Life storm	1,000,000	1,470,000	2,100,000	2,500,000	5,600,000
BIO CYLINDER	7,300,000	7,000,000	10,000,000	16,250,000	21,250,000
BILL RECEVIABLE	3,699,660	5,262,980	9,051,200	16,094,315	22,630,640
TOTAL ASSETS	**11,467,160**	**13,159,480**	**21,448,700**	**36,184,800**	**52,430,640**
Particular	First year	Second Year	Third Year	Four year	Fifth Year
Gross Profit	1	1	1	1	1
Net Profit Ratio	0	0	0	0	0
Current Ratio	1	2	2	3	3
PROFIT VALUE RATIO	0	0	0	1	1
Margin of Safety	-1,463,378	-1,387,807	4,551,756	16,621,312	27,669,720
BREAK EVEN POINT OF SALES	14,694,242	20,217,877	31,275,192	39,968,528	62,714,616

4.12 Operational Plan

The operational plan involves all the process and their subsequent plans are to be described in the following

4.12.1 Marketing Plan

We have clearly defined our target markets and have differentiated ourselves by offering a unique solution to our customers' needs. The primary focus of our marketing strategy must be to increase sales and profitability business quickly. This can be achieved by face-to-face contact, and an effective publicity and promotion campaign.

Value Proposition.

Value proposition for end users of compost material: Compost is a valuable soil amendment that improves many soil properties, such as porosity, structural and thermal stability, and water retention, resistance to wind and water erosion, and tillage. Compost also decreases soil crusting, regulates storage and release of nutrients, enhances the development of beneficial microorganisms, builds up plant resistance to parasites and disease, and promotes faster root development. Plants and crops treated properly with compost may produce higher yields and have less weed growth. Chemical fertilizers do not offer this value.

4.12.2 Sales Plan
Pricing Strategy

The going rate per ton for compost is Rs.50 and up. This price is low enough to ensure rapid growth in the market yet still provide a very healthy profit, given that we have no direct competition and chemical fertilizer is much more expensive. This is possible because we are on the front end of the industry growth in this region. We may be able to analyse and register our material as a fertilizer. In that case the price per kg will be in the Rs.100 range still well below the rate of Rs.250 per kg charged for manufactured chemical fertilizers; given this scenario, the sales figures below are very conservative.

Additionally, we will be priced at market rates for the waste disposal service we offer to municipalities. Tipping fees are generally Rs.15 and up per ton. Additionally, we will charge competitive skid box rental fees and transportation costs.

Sales Forecast

The forecast is based on reasonable sales projections within this very large market. An additional revenue stream will be the collection and removal of sawdust, wood chip, and bark from the wastes on a full time basis. The sawdust materials collected will be used in the composting process. The high growth is based on our plans to expand by increasing operations in towns and placing similar facilities in other areas of the Tamil Nadu. We anticipate that by 2020 we will have two such facilities and by 2022 we anticipate having four. Thus our sales forecast doubles in each of those years.

4.12.3 Location and Facilities

Suburbs of cities and villages around urban centres can be ideal locations for practice of Vermicomposting. Despite the superior ability of earthworms to control odours, such operations must be sensitive to neighbouring land users. Like low-technology thermophile composting, Vermicomposting in boxes or windows tends to be very space is limited and costly. Projects in urban locations, characterized by lack of space and proximity to neighbours will usually accept small-scale waste diversion in low-technology earthworm boxes or invest in high-technology methods like the Canadian Vermitech system or continuous-flow reactor systems. However, many large-scale vermicomposting projects, processing hundreds or thousands of tons of material per year, have located on large sites of many acres in rural areas.

4.12.4 Technology

Epigeic earthworms such as Eisenia, Eudrilus and Perionyx have been successfully cultured in organic wastes kept in cemented tanks under suitable temperature (26°C-30°C) and moisture (50%-60%) conditions for production of vermicomposting. Different doses (@2.5 tons/ha – 20 tons/ha) of harvested vermicomposting were applied (RBD technique) in the soils of paddy, pineapple and tea plantations in Tripura. Findings: Vermicomposting, rich in plant-available nutrients (avN, avP, avK etc.) and plant growth factors, when applied to soil: improved soil aggregation, water use efficiency, nutrient uptake etc. Dramatic yields of paddy, pineapple and tea were recorded following application of 10-20 tons of vermicomposting. A significant ($p<0.05$) and gradual increase in density and biomass of earthworms were also noticed with increase in amount of vermicomposting applied. Conclusion & Significance: Crop yield was very much related to the concentration of

vermicomposting, beyond the level of which production declined. Vermicomposting and its application to soil has several advantages: i) reduce organic pollution, ii) produces organic manure for application in agro-ecosystems, iii) increases biodiversity, iv) production of high quality earthworm proteins from wastes and its utilization as feed for poultry birds and fishes

4.12.5 Equipment and tools

The materials needed to start a vermicomposting system are simple and inexpensive. The following are the requirements of Vermicomposting process:

A suitable bin can be constructed of untreated, non-aromatic wood, or plastic container to be purchased. A wooden box is better if we wish to keep the worms outdoors, because it will keep the worms cooler in the summer and warmer in the winter.

An outdoor wooden bin can even serve double-duty as a bench. If a plastic container is used, it should be thoroughly washed and rinsed before the worms and bedding are added. The bin size depends on the amount of food produced by the household.

For two people (producing approximately 31/2 pounds of food scraps per week), a box 2 feet wide, 2 feet long, and 8 inches deep should be adequate. A 2-foot-by-3- foot box is suitable for four to six people (about 6 pounds of waste per week). Red worms (the type used for vermicomposting) thrive in moist bedding in a bin with air holes on all sides. For aeration and drainage, drill nine l/2-inch holes in the bottom of the 2-foot-by-2- foot bin or 12 holes in the 2-foot-by-3-foot bin.

Place a plastic tray under the worm bin to collect any moisture that may seep out. Drilling holes on the upper sides of your bin will also help your worms get needed oxygen and prevent odours in your worm bin. Keep a lid on the bin, as worms like to work in the dark.

Ideally Vermicomposting should consist of seven layers of:

i) Pebbles

ii) Coarse Sand

iii) Processed Soil mixed with cow dung

iv) Bagasse (Sugarcane Bagasse)

v) Processed cow dung + processed vermicastings +Earthworms

vi) Sugarcane Bagasse

vii) Vermiculture soil with many productive earthworms

These seven layers keep the earthworms cool and extremely productive.

4.12.6 Milestones

The benchmarks that are being expected during the course of Start-up are mainly focusing on the safe and clear disposal of waste that will profit the company in a larger scope. To be a well renowned organization in 2 years knowing the place well and making all possible revenue from the place. In next 2 years develop into a much big organization making the city clean with the clear cut support from the government and other functional NGO's.

4.12.7 Key Metrics

Key Metrics that have to be considered for the improvement of the company in the prevailing circumstances of the environment. Performance of the company, Workers efficiency, Conversion ratio, infrastructure, logistics are the most important indicators that literally show the growth of the company visually overcoming the obstacles in the society that is pulled to a healthier community.

CHAPTER 5 – SCALABILITY OF THE START-UP

Addressing the waste management is considered to be one of the most immediate and serious environmental problem particularly in developing countries. The waste management has been adopted by industrialized nations for developing strategies largely depending on a number of factors, such as topography, population density, transportation and infrastructure, socio-economic and environmental regulations. But the importance of biodegradable wastes and their scalability in usage is still unnoticed. The following chapter describes about the scope and the scalability associated with the biodegradable waste management.

5.1 SCOPE OF BIODEGRADABLE WASTE MANAGEMENT:

A systematic approach of waste management encompassing the waste of all kinds of resources at all stages should be adopted. However the material constitutes the major fraction of the total production cost, material wasted are of critical importance. Waste Management is not only a project this is one of the best plans for our nation but a profit yielding business. Waste management involves engineering principles, economic, urban and regional planning, management techniques and social sciences to minimize the overall was activity of the system under consideration. Biodegradable waste can be commonly found in municipal waste such as green waste, food waste, paper waste and biodegradable plastics which can utilized in major areas and help in production of methane gases.

The scalability can be projected in a way that the scope for further improvement is possible in both side of non-biodegradable and biodegradable waste management. House hold wastes can be used in soil that can be used to nourish house garden. There are many ways to compost; some compost mixtures allow for items like meat and dairy to be included, while others are strictly for fruit and vegetable scraps.

5.2 SCALABILITY OF WASTE MANAGEMANT:

Scalability is expanding of business with increase in the production of organic manure and biogas production and exporting to foreign countries. Extending to own farming especially in organic with production and marketing in the organic food section. Modulated design can accommodate city scheduling and operational needs with geographical expansion towards other parts of the state. The scalability can be used in making the product with good

packaging sectors. Green items, which break down quickly, like raw vegetable peelings, coffee grounds, tea bags, grass cuttings, leaves are collected initially and the scalability can also be in moving to other range of sectors such as e-waste recycling. Here are two main types of waste that are to be known about so there are opportunities available for scaling up in waste management.

- Food and garden waste
- Mixed dry recycling

Food and garden waste is the waste which is described in the project. The scalability can be done by entering into the mixed dry recycling where the concentration is on recycling of the products such as Cans, Cardboards, Paper, Plastic, Glasses. Expanding the areas around Tenkasi in a steady pattern so that the business doesn't get any drawbacks

By entering into these markets there are very good chance of scaling up the business in waste management. Waste management is an area where there is a need for exploration and through which the utilization of various kinds of wastes can be converted into profitable resources.

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APPENDIX

Questionnaire for the collection of data relating to Waste Management Business

1) Name :

2) Number of people in each category
   (a) 0 – 10 yrs _____
   (b) 10-20 yrs _____
   (c) 20-30 _____
   (d) 30-40 _____
   (e) Above 40 _____

3) Sex
   (a) Male (b) Female (c) others

4) Place : _____

5) What is your Occupation?
   (a) Farmer (b) Business (c) Government Servants (d) others

6) How many members are there in your House?
   (a) 1 (b) 2 (c) 3 (d) 4 (e) More than 4

7) How many bags of garbage do you generate per week?
   (a) 1 bag (b) 2 bags (c) 3 bags (d) none

8) How do you dispose Garbage?
   (a) Corporation/Municipality (b) Private (c) Self disposal (d) others

9) If self-disposal, where do you usually put away the collected waste?
   (a) Public Bins (b) By the valley/lake side/river (c) By the roadside (d) On an open space

   (e) Others specify

10) Is there any Public Bins near your House?
   (a) Yes (b) No

11) How many times once Public Bins are cleared?
   ----

12) Are you satisfied with the service provider?
   (a) Yes (b) No

13) Reason : _____

14) Do you burn Garbage?
    (a) Yes (b) No
15) Would you like to change the current Service Provider?
    (a) Yes (b) No

16) Have you ever been educated on Proper waste disposal?
    (a) Yes (b) No

17) In what type of container do you collect waste?
    (a) Waste Basket (b) Old Basket (c) Plastic bags (d) Tin/can

18) How often is the waste container emptied in your house?
    (a) Once a day (b) Once in two days (c) Once in three days (d) Once in a week

19) Would you like to give your garbage for recycling?
    (a) Yes (b) No

20) Which Food do you prefer irrespective of price? Foods from
    (a) Organic Fertilisers (b) Chemical Fertilisers

21) Do you have garden at your house?
    (a)Yes (b) No

22) How much quantity do you dispose per week?
    (a) 0-5 kg (b)5-10kg (c)10-15kg