



**CENTURION
UNIVERSITY**
*Shaping Lives...
Empowering Communities!*

A Crusade to Zero Food Waste and Wealth Creation



An Action-Learning Research Project of
Centurion University of Technology & Management, India

OCTOBER 2021

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ABOUT

Centurion University, established with the credo, 'Shaping Lives and Empowering Communities', is a unique institution designed to apply education as a tool for making a real-time difference for the common man towards living a productive life and earning livelihoods with dignity and self-respect.

Every aspect of Centurion converges on this point. While the world at large identifies Centurion University best for its unique skill-integrated-into-higher education model that produces job-ready, employable, and entrepreneurial graduates, it is increasingly gaining recognition for its ambitious and futuristic circular-economy action-learning-research projects that promote sustainable environment and generate wealth from waste.

The goal of these action-learning-research interventions is to minimise the pressure on existing (natural) resources by recycling and reusing them, thereby minimising if not eliminating waste, and generating wealth from waste.



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THE CONTEXT:

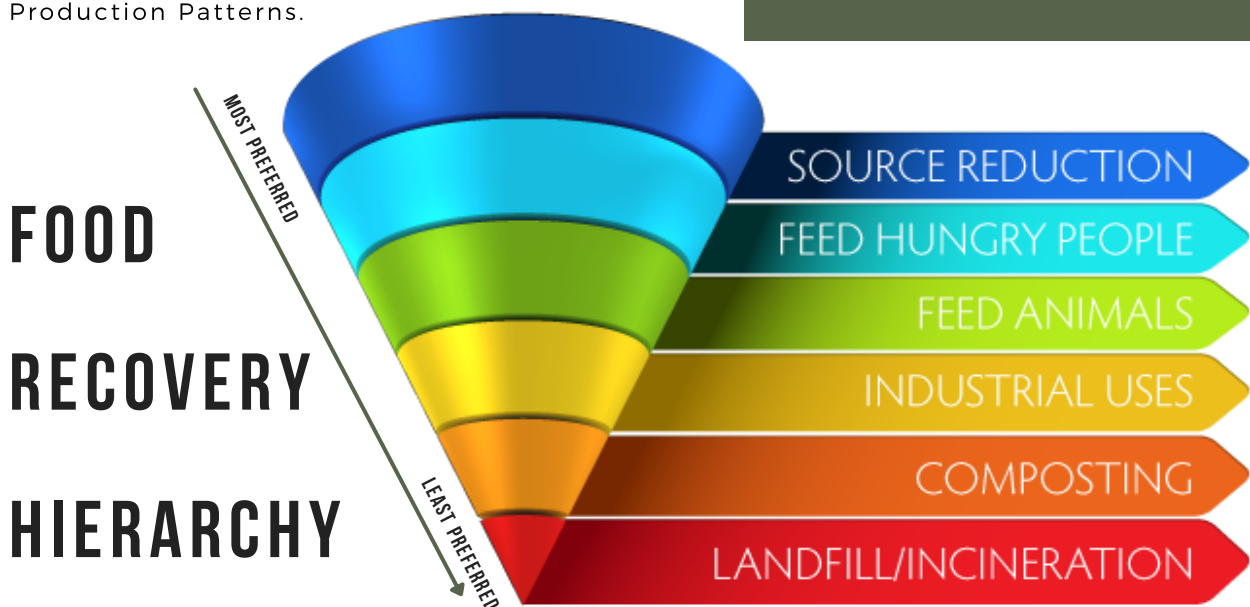
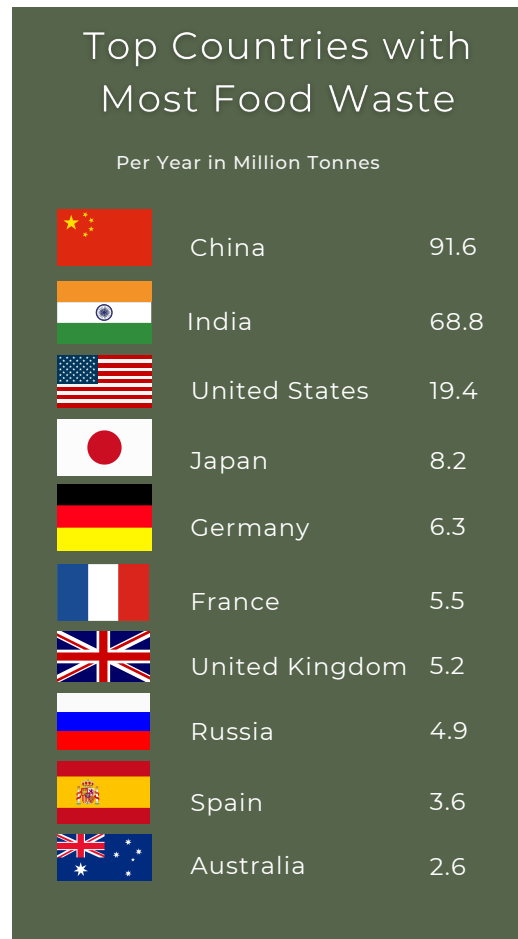
FOOD WASTE, AN EVIL THAT NEEDS TO BE CONTAINED AND ELIMINATED

SUSTAINABLE DEVELOPMENT GOAL 12: ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS, CONTAINS A WIDE RANGE OF TARGETS, ONE OF WHICH IS CLOSELY RELATED TO THINK. EAT. SAVE.

According to FAO1 the amount of food wasted globally is close to a mind-numbing 1.3 billion tonnes every year. In India, as much as 40% of the food is wasted every year, valued at INR 92,000 crores, while 14% of the population, i.e., 189.2 million people, fight undernourishment and hunger related problems.

The Food Waste Index Report 20212 states that a shocking 50 kg of food per person per year is thrown away by Indian homes, ending up in landfills where it contributes to the generation of greenhouse gases with catastrophic environmental repercussions. Since food waste is recyclable, it is critical that every effort is applied to achieve zero-waste to reduce the greenhouse emissions that come from landfills.

With the global interest growing in achieving the SDGs, efforts towards food waste prevention have intensified, highlighting a hierarchy for alternative options. It is vital to reduce food loss and waste to achieve 'Zero Hunger World' as per the Sustainable Development Goals (SDGs), with special reference to SDG2 - End Hunger and SDG12 - Ensure Sustainable Consumption and Production Patterns.



THE ACTION:

TAKING THE CONCEPT ONE STEP AHEAD



THE PRINCIPAL OF ZERO WASTE

The 'Zero-Waste' principle consists of a set of clear-cut measures focused on prevention of waste through redesigning the life cycle of the resource to ensure reuse until the optimum level of consumption is achieved. The aim here to reach the point where no food waste reaches the landfills, incinerators or oceans.

THE PROCESS

Centurion University offers courses that vary from 3 months to 4 years duration, consisting of certificate, diploma, undergraduate, graduate, post-graduate and doctoral students. The students come from all socio-economic walks of life, from BPL (below the poverty line) youth, to tribal to urban converging into an inclusive education ecosystem where classrooms, learning-training-production labs and recreational facilities, as well as the dining areas are shared and enjoyed by all equitably.



Centurion University worked diligently through each of the steps of the Prevention of Food Waste Hierarchy Pyramid:

(1) Reduction of food waste at source: The students were consistently made aware and counseled to reduce food wastage by serving only as much as they would eat.

(2) Donate food to hungry people - at any given time, there are 500 daily-wage workers on the Campus engaged in construction and other works.

(3) Feed the animals - Centurion University has an enthusiastic Animal Club run by the students, who use the food waste to feed the stray animals (dogs, cats, cows) inside the Campus and in close surroundings on daily basis.



Most of the waste cooked food is collected and mixed in large drums to form a mass of homogenous slurry, which is fed to the pigs bred in piggeries close to the Campus.



(4) Industrial uses - the food waste in the Campus is not suitable for anaerobic digestion for energy recovery, hence, this step for recycling and reusing food waste has not been used.

(5) Composting through bio-intervention - using a bio-composting machine has been installed with a capacity of producing approx. 130 kg of ready-to-use soil nutrient compost per day. The process is simple: the liquid food waste and anything that is not edible by animals is mixed in a 12.5:1 ratio (food waste to sawdust) to produce the highest level of natural compost, ready to be used for cultivation.

The production process using the **BIO COMPOSTING MACHINE** is continuous where the food waste is mixed with sawdust and a typical bio-culture (catalyst). This mix is then fed into the composter through the following steps:

- **Segregation:** plastics and other non-biodegradable are separated from the food waste.
- **Cutting to size:** The approximate size of food that can be loaded should be no larger than 1.5 inches.
- **Draining:** The organic waste is placed in a perforated vessel for about four hours to remove excess moisture before it is fed into the Composter.
- **Adding Sawdust:** Sawdust is added to the organic waste in 10% to 30% proportion depending on moisture level at the outlet. The percentage of sawdust is adjusted to the moisture content of organic waste. For example, if the food waste contains more curry gravy, sambhar, dal, etc. more sawdust would be required to eliminate the moisture.
- **Adding Compost Bio Culture:** A catalyst bio-culture is added to the mix in a proportion of 0.1% (of feeding capacity).
- **Going to the checklist** - Once everything is added to the composter, the following checklist is run-through:
 - The door to the inlet is shut tightly, ensuring that nothing obstructs it.
 - The composter is put on "AUTO" mode.
 - The collection bin is placed at the outlet end of the composter machine, where the compost is automatically collected.
 - The collection bin is again checked, and any un-composed organic material are segregated from the compost, which is then reloaded.
- **Collecting the compost:** The quality of the compost is checked. It should be moist, not wet. If the output is wet, it is again mixed with sawdust and reloaded into the composting machine for a rerun.

(6) Zero Food Waste goes to landfill/ incineration - The above process absorbs all the food waste produced in the Campus, all **622 kg** of it, and nothing ends up thrown.



THE PROCESS EXPLAINED:

THE CHEMICAL PROCESS OF COMPOSTING

The process that composts organic waste is either aerobic or anaerobic. While the aerobic process uses oxygen, the anaerobic one occurs in the absence of oxygen.

The composter machine used at Centurion University is an incubator for composting bacteria aerobically. To accelerate the composting process, the bacteria are encouraged to grow rapidly in this aerobic process using food, water, air, and a mixture of organic waste.

The composting bacteria consume carbon and water giving out carbon dioxide (CO₂) and water vapor, which gradually reduces the quantity of carbon in composting mass to have the C:N ratio rise to 20:1. Carbon and nitrogen in gas form can be used as building blocks for bacteria.

The generation of CO₂ from carbon is an exothermic process, the heat of which is preserved in Composter with the help of insulation. The temperature of the composting mass, which would increase up to 45 degrees Celsius, kills most of the harmful bacteria from the organic waste, and accelerates the composting process.

COMPOSTABLE MATERIAL



Vegetable Waste



Food Waste



Spoilt Vegetables



Fruit Skin and Spoilt Fruits



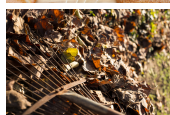
Raw and Cooked Meat



Eggshells



Bread and Bakery Products



Dry Garden Waste

NON-COMPOSTABLE MATERIAL



Coconut Shells



Plastic Bags and Bottles



Glass



Metal



Dog and Cat Waste / Droppings



Napkins / Sanitary Waste



Pharmaceuticals



Cosmetics

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COMPOSTING PROCESS

DETAILS

Kwik Compost Available		<ul style="list-style-type: none"> KC-200 (200 kg capacity) KC-500 (500 kg capacity)
Installation Date		<ul style="list-style-type: none"> KC-200 on 30/12/2014 KC-500 on 31/10/2015
Number of students who eat in the mess every day	Boys Girls Total	3,050 1,490 4,540
Average food waste per day	Boys Girls Total	418 kg 204 kg 622 kg
Conversion process of waste food to compost:		<ul style="list-style-type: none"> Training started on 03/12/2014 Work with the KC-200 started on 01/01/2015 Work with the KC-500 started on 01/11/2015
Compost produced per day		<ul style="list-style-type: none"> KC-200 produces 0.5 kg compost per day KC-500 produces 1 kg compost per day
Compost produced till date		170 tons (approx)
Proportion (food waste to saw dust)		12.5:1
Culture used per day	0.35 kg	1777:1 (Food waste : Culture)
Compost produced per day		130 kg per day



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THE COMPOSTING PROCESS



Cooked Food Waste



Vegetable Peels,
Kitchen waste



Spoiled, Expired
Food Waste



Composted Fertilizer



THE PURPOSE: ENERGIZE AND REJUVENATE MOTHER EARTH

The Campus at Bhubaneswar was built in 2010, on 40 acres of Government of Odisha leased land, which was formerly used, for illegal sandstone quarrying. The whole of 40 acres lay barren and desolate without even a blade of grass on it. It was an arduous, uphill and painstaking task to create the green-covered Campus that stands today proud and vibrant with the widest variety of flora and fauna.



Centurion University celebrated the achievement of its 'zero food waste' goal for the first time in 2015. With the production of the natural fertilizer through composting, the next step had almost directed itself - cultivation of food.

THE INNOVATION:

UPCYCLING FOOD WASTE TO CREATE WEALTH

BIT BY BIT THE 40 ACRES OF BARREN LAND WERE NURTURED WITH THIS NUTRIENT-RICH SOIL AND LANDSCAPED TO CREATE A MOST VERDANT AND VIBRANT GREEN COVER.

While the endeavour started with the basic goal of achieving 'zero food waste', achieving that milestone brought into focus a new horizon. The rich compost generated through bio-intervention begged to be put to further use, thus extending the circular economy kickstarted by the initial 'zero food waste' efforts. This is how the "Green Cover" project started in 2015.

The organic fertiliser helped to create the much-needed soil for the Campus, for growing its green cover. Bit by bit the 40 acres of barren land were nurtured with this nutrient-rich soil and landscaped to create a most verdant and vibrant green cover that consists among others of:

- Mango orchard consisting of more than 1,500+ mango trees
- Perennial and seasonal flowering plants
- Fruit trees, including coconut, jackfruit, lemon, orange, banana, papaya, java plum, water apples, custard apple, guava, tamarind, pomegranate, date, star fruit,
- Exotic fruit trees/ shrubs/ creepers such as, dragon fruit, apple, passion fruit, coffee, olive, strawberries, watermelon,
- Vegetables, including brinjal, broccoli, pumpkin, watercress, beans, okra, zucchini, parsley, leeks, yellow capsicum, red capsicum, red cabbage, beet, cucumber, onion, turmeric, carrot, garlic.
- Medicinal plants, including tulsi, Ghusuripana, Vana Jasthimadhu, Madhumalati, Guluchi lata, Bisalya Karani etc.
- Herbs and spices including fenugreek, bay leaf, cinnamon, pepper, thyme, rosemary, basil, coriander, dill, and so on.



THE ECONOMICS

What started with food waste has come now in full cycle, creating wealth for the University in terms of organically grown fruits, vegetables, trees and flowering plants.

(1) Nursery - A cottage nursery has been established on the Campus that generates approximately INR 40,000/- from sale of saplings. Sale of fruits and vegetables a steady trickle of income, which is cycled back into making the Campus green and environmentally sustainable.

(2) Greenhouse - A greenhouse is set up for the study and cultivation of specific exotic plants - fruits, spices, and vegetables - with very encouraging results. The Campus boasts of an exclusively organic kitchen, where the food is cooked solely with the vegetables, spices, and herbs grown on the Campus.

(3) Butterfly garden - One other feather-in-the-cap is the creation of a 'Butterfly Garden' on the Campus with bright flowers and host plants (that feed caterpillars, to encourage breeding of butterflies). Today this beautiful experimental garden stands proud housing a wide variety of plants, insects, and small animals.



THE CONCLUSION:

THIS IS ONLY THE BEGINNING

Centurion University has been successful in bring food waste to zero on its Campus, and then moved the milestone a notch higher, to creating wealth from this process. The result is that today, in the course of less than 10 years, there are 40 acres covered with soul-satisfying greenery as far as the eye can see in any direction. In addition to the remarkable green cover, the University is growing organic food for its inmates and gradually expanding to commercial capacity.

The whole process has proved successful beyond measure. While we have been able to completely put an end to food waste, the transformation of the waste product to wealth has opened the gates to a world of opportunities for income generation and entrepreneurship. Indeed, this is only the beginning.





**A CRUSADE TO ZERO WASTE
AND WEALTH CREATION**

**GOT ANY
QUESTIONS?**

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**ALL IMAGES IN THIS REPORT HAVE BEEN CAPTURED ON THE CAMPUS OF
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