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Circular economy in India: Reconstructing growth for sustained economy-A case study of Indian Agri - Rural Industrial Parks 'Gothan' in Chhattisgarh, India

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Abstract: *In the twenty-first century, developing countries are contending with numerous challenges, like growing population, political unrest, health, food and water scarcity, pollution, and climate change. During this time the paradigm of Circular Economy is gaining popularity as a device for sustainable development across the world. The article discusses the roadmap of circular economy in agriculture sector, a qualitative study with a systematic literature review is been undertaken in order to gather in-depth knowledge about the topic. This paper discusses aspects of circular economy such as creation of new products, the introduction of new legislation, and adoption of CE around the world; in India it discusses government viewpoint and policies to adopt the emerging concept in various sectors. The case study of 'Gothan' from Chhattisgarh state, India, is been discussed, how these Rural industrial innovative parks are helpful in solving the issues of stubble burning, organic farming, rural unemployment and empowerment of rural communities through sustainable rural development, by adopting and implementing the basic fundamentals of Circular Economy.*

Key Words: : *Circular economy, sustainable local development, waste, Indian agriculture sector, Gothan (rural industrial parks).*

1. INTRODUCTION:

Living things have existed on our planet for billions of years without decaying in landfills, and it is certain that they will continue to do so for another billion years while producing no garbage. This is due to the biological cycle's circular character. Rain and sunlight nourish flora, which in turn supplies food for herbivorous animals, which in turn become a link in the complex food chain that exists in the biological world. Animals become fossils and nutrients after they die, improving soil quality and sustaining plant life. Sustainability is the result, which has existed for a very long time and will continue to exist. The cycle continues with no waste.

The take, make, and trash (or linear) philosophy has been at the forefront of human industrial activity since the beginning of product development. Natural resources remained the main source of material for manufacturing products for a very long time, but the industrial revolution brought the plastics into existence, which was more durable and has comparatively long life. Waste has emerged as a result, of once crucial linear production model. Large landfills are being created as a result, and air, water, and land pollution are increasing to the point where mankind encounters an existential threat. The industry is facing more difficult problems to create products that will limit the use of finite resources than just toxic waste and growing population. Long-term, this is a very serious issue, and in order to reduce

the consumption of valuable resources, we need to restructure our product life cycle. If we can incorporate the cyclical character of biological systems into economic operations, we can lay the groundwork for a new economic paradigm known as the circular economy.

1.1 Circular Economy

Due to the profoundly detrimental impacts of the present linear economic models on our ecology, Circular Economy (CE), although being a thirty-year-old idea, has only recently attracted major attention. Climate change and the loss of biodiversity are the two most significant effects of current industrial practices, which aim at supporting a population that is constantly growing worldwide without addressing the significant environmental imbalance and social disparities they result in. The circular economy includes not just recycling but also product design, consumption, and repurposing in order to maximize the value of recycled materials. The prime objective of the circular economy is to completely eradicate waste, not just to reduce it. An economic system where waste is converted into inputs during the extraction, production, and consumption stages. (Pearce and Turner, 1990)

A CE is developed to benefit business, society, and the environment. Due to its repetitive and regenerative nature, it attempts to separate growth from the exhaustion of scarce resources on the earth. The circular economy generally seeks to create a causally connected closed loop system to ensure the long-term and sustainable usage of resources that makes use of recycling, repairing, refurbishing, reuse, sharing, and remanufacturing. In a circular economy concept, all waste is anticipated to become a regenerative resource or an element for another activity, analogous to biological systems. The Concept is based on three key fundamentals, which are as follows

Minimization of Pollution and waste: In order to reduce the damage produced by economic activity, the theory suggests reducing waste and pollution.

Enhancing Product's Life cycle: The aim of a circular economy is to extend the useful life of the raw materials and goods by establishing loops in which resources and goods cycle through the economy. Reusing, mending, and remanufacturing the products and resources utilized in the economy actively help to achieve the goal.

Biological regeneration: The regeneration of natural systems is a fundamental principle of a (circular) economy. It creates the conditions for the regeneration of natural systems and raises the capital of nature.

The circular economy, a new manufacturing and consumption model, ensures long-term, sustainable growth. It enables resource optimization, lower raw material consumption and recovers waste by recycling it as a new product. "A model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible".(europa.eu,2020)

World Economic Forum defines CE as "A circular economy is an industrial system that is restorative or regenerative by intention and design. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse and return to the biosphere, and aims for the elimination of waste through the superior design of materials, products, systems, and business models".

2. Objective of the Study:

1. To study the economic, social and environmental impact at a regional level, the effects of the switch from a linear to a circular economy.
2. To study and assess how the agricultural industry may use the concepts and values of the circular economy to address environmental issues.
3. To determine the sustainability gaps based on the agricultural sector's linear procedures and processes for using farm leftovers to produce revenue and promote sustainability.

3. Literature review and Data sources:

According to the ***Ellen MacArthur Foundation (EMF, 2013)***, the linear economy model is based on the theory where unprocessed materials and natural resources are taken, and used to create products for use, and then discarded. On the contrary, Reconciling the cycles of natural ecosystems and production is the primary objective of the circular economy

paradigm. – On which the survival of the human beings depends. It is much more sustainable approach in contrast to linear economy.

In order to ensure this, waste must be removed by utilizing a variety of methods, including composting, repurposing, remanufacturing, and recycling of both biodegradable and non-biodegradable wastes, On the other hand, the use of chemicals should be minimized (a method to aid in the revival of natural systems) and focusing more on the use of renewable energy. Waste should become input for other processes through its valorization: either as natural resources that replenish themselves e.g. compost or as an element of another industrial operation. Hence a circular economy as restorative or regenerative by design and value. (EMF, 2013)

According to ***Geng, Y. et.al***. (2012), there are three layers of the circular economy: micro, meso, and macro. Organizations concentrate on sustainability-related tactics and strategies at the micro level, such as eco-design and cleaner manufacturing. To improve the economy and environment of the region on a mesoscale, parks and eco-industrial networks are to be built. Finally, systems for production and consumption that are concentrating on sustainability and favor Circular Economy are the outcome at the macro level.

As per the topic, if we particularly discuss Agriculture sector in CE, ***Kuisma and Kahiluoto, et.al.*** *(2017),* CE represents a promising strategy for preserving necessary resources and minimizing the harmful environmental effects of agricultural activities while enhancing economic performance through the reuse of agricultural waste on farmlands, providing sustainable livelihoods for the farmers and increased economic well-being with less investments.

According to ***S. Vanhamaki et.al***. *(2020*) in his article regarding application and adoption of CE at the regional level, regions play a crucial role in the systemic change that is necessary to get towards a circular economy. The primary study focus is on how a CE is implemented regionally through a road map process that functions as a strategic tool to bring regional stakeholders together (horizontal), with connecting regional goals with EU and national level CE targets (vertical).

J.Fiskel & Lal (2018) conducted a study in rural areas of India, Crop and animal wastes are among the agricultural wastes that are frequently burned in the fields or utilized as conventional home fuels. As a result of these methods, the air, soil, and water have been severely contaminated, posing health risks to both the workers and the neighboring homes. Programs for recycling and composting are struggling to keep up with the growth of waste, whereas small startup businesses and NGOs are introducing new solutions, from high-tech waste processing to enhance training and support for waste picker communities and working to make India a resilient economy.

Han J and He X (2011) have provided a summary of the fundamental design of a circular economy in agriculture. They underlined that a key component of China's agriculture sustainable growth is the creation of a circular economy. They contended that in order to advance an agricultural circular economy, the government should publicize more in order to boost people's knowledge of environmental protection, assist in the growth of ecological values and advance the concept of green consumerism.

Ruiz-Real et al. (2018) have offered numerous of research publications on CE, published worldwide between 2006 and 2017, obtaining the following conclusions about the contemporary paradigm:

a. Governments across the globe viewing CE as a approach to achieve sustainable and green growth amidst hard environmental targets.

b. The companies involved in waste management and recycling, of plastics, food, fashion, design, etc. are being impacted by CE. It is still has to be defined that what areas and sectors are under the realm of CE across the globe.

c. CE and Environment are very closely connected in the academics, business and in society as well. China is the global leader in the study of CE. The study discussed in this paper makes it abundantly evident that CE is a hot topic and is directly related to the environment. Research on CE applications is essential since pollution and waste management regulations are becoming stricter in nations like India.

Sadhan Ghosh (2020) has provided information, for researchers, planners, and implementers, on how resource consumption is reduced through rational use based on the 3R's (reduce, recycle, reuse), the legal framework and

government support for implementing CE initiatives, examples of best practices, and future plans and targets in various countries.

This paper uses the data from diverse secondary sources like government reports as primary source, apart from that current literature, research papers, articles from newspapers and magazines, blogs etc have been used. The data are presented using descriptive statistics methods including tabular analysis and charts.

4. Circular economy Globally - Adoption & Application :

The 2021 Circularity Gap Report, which focuses on industries with significant transformation potential, aims to achieve the ambitious target of 17% circularity by 2030, despite the fact that only 8.6% of the global economy is currently circular.

With the 2008 Circular Economy Promotion Law and the publication of CE-focused indicators, China was the first nation to incorporate CE principles into its national policy (Geng et al., 2012). The Netherlands, France, and Italy, the three front-runners in the race to develop a circular economy, and what they are doing in order to achieve it. One of the most ambitious governments in Europe is the Dutch government, which is working to create a circular economy. Due to the nature of its economy, the Netherlands has focused more on entrepreneurship, material innovation, and business model development. There is a lot of service, they are really nimble and agile, and they are quite receptive to new concepts. A first considering how compartmentalized the French government is, the circular economy roadmap in France is jointly held by the Ministries of the Ecological Transition and the Economy and Finance. According to new study from ING, US businesses are adopting circular economy strategies as the norm in their business models. According to ING's analysis, 62% of organizations have the strategic goal to adopt or have already implemented a framework for the CE. It is based on a poll of 300 US-based executives from the consumer electronics and telecommunications, food and agricultural, healthcare, and automobile industries. The report also demonstrates how the US company attention on sustainability has increased significantly since last year. 85% of respondents in 2019 claimed to be integrating sustainability into strategic decision-making, up from 48% in our 2018 report.

AEC's Framework for Circular Economy was approved by ASEAN during its 20th Council Meeting, which took place on October 18, 2021. With the help of the Framework, ASEAN hopes to achieve its long-term objectives of inclusive, sustainable, and resilient growth as well as resource efficiency. Their priorities are - Trade openness and trade facilitation in circular goods and services, standardization and mutual recognition of circular products and services, competitive sustainable finance and innovative ESG investments, enhanced role of innovation, digitalization, and emerging/green technologies, and efficient use of energy and other resources.

5. Circular Economy in India- Adoption Status :

Aatmanirbhar Bharat, the vision of new age India, is entirely depends on sustainable growth. A development strategy that promotes optimal use of resources is urgently needed. India must transition to a circular economy because to its expanding population, fast urbanization, climate change, and environmental pollution, with the rising population of the world, because, the stock of crucial and necessary organic materials is finite and exhausting.

Limited resources also imply that certain nations rely on other nations for their raw materials. The current triple planetary problems of pollution, biodiversity loss, and climate change can be addressed in large part by implementing a circular economy. The amount of greenhouse gases we release into the atmosphere can be reduced by expanding the life of resources through reuse. Also it can lower CO2 emissions, if energy consumption is reduced.

The Ellen MacArthur Foundation projects that by 2050, the adoption of the circular economy in India will save GHG emissions by 44% and result in an annual income of Rs 40 lakh crore ($624 billion), improving both the country's health and economy. India is headed in the right path with the Union Budget's recent emphasis on the circular economy. As of right now, the government has taken the initiative to create policy frameworks for eleven priority industries for the shift to a circular economy. Eleven committees have been established to hasten the nation's shift from a linear to a circular economy. These committees will be chaired by the relevant line ministries and will be made up of representatives from the industry, academia, and the Ministry of Environment, Forests, and Climate Change (MoEFCC) as well as NITI

Aayog. The key focus areas are Electronic waste, liquid & solid waste, agricultural waste, Lithium batteries, toxic industrial waste, scrap of metals, gypsum, solar panels, and depleted vehicles etc.

India's adoption of a circular economy strategy might result in huge annual benefits as well as a major decrease in traffic and pollution, all of which would have a snowball impact on the economy. Our transition to self-reliance will be accelerated by our capacity to increase resource efficiency, reduce the consumption of constrained resources, and provide the vigor for the formation of new business models and entrepreneurial enterprises. In order to promote the CE in all of the major areas of the Indian economy, the Ministry of Environment, Forests, and Climate Change (MoEFCC) is playing the major role.

6. Role of Circular economy in Indian Agriculture Sector - Case study of 'Gothans' supporting CE in Chhattisgarh :

Research indicates that global agricultural production has to rise by 70% by 2050 to meet the demand for food (Aznar-Sanchez et al., 2020a; FAO, 2009). There are two common commercial strategies to reach this objective: either increasing the area now devoted to agriculture, which accounted for over 37% of the land's surface area in 2017 (FAOSTAT, 2020), by raising productivity in agriculturally productive areas, which could result in a 38% rise in the quantity of land utilized for agriculture and a 53% increase in water usage worldwide (Alexander et al., 2015; Aznar-Sanchez et al. 2020b; Velasco-Munoz et al., 2018). This has resulted in significant challenges for managing natural resources sustainably for the long run, despite this fact, rising agricultural production has kept the balance between meeting human needs and protecting the environment, (Geissdoerfer et al., 2017; Ruf-Sals et al., 2020; Vanhamäki et al., 2020).

In this sense, the circular economy (CE) is an effective approach for safeguarding necessary resources, reducing the unfavorable environmental effects of agricultural operations, and boosting economic performance.

In order to create innovative, technical, and sustainable processes, products, and services, it is still necessary to overcome the obstacle of switching from a linear to a CE paradigm. Due to the excessive use of pesticides and irrigation, the fertility of the soil has been declining on almost 60% of our total agricultural land that is currently under cultivation. (Jermy et al, 2017) noticed that "Farmers, scientists, and conservationists are concerned about the seriousness of environmental degradation brought on by incorrect farming methods. Consequently, sustainable agriculture and economic viability have emerged as key concerns in Indian agriculture (Pandey and Singh, 2012: Cacek, et al, 2009). "One can see that our traditional farming systems were typified by small and marginal farmers using environmentally friendly farming inputs to produce food and basic animal products for their families. Farming was highly sustainable, and the practices were entirely organic and natural inputs," stated Kasturi (2007). According to Chhonkar (2005), in the past, agriculture was entirely dependent on cattle, and customs included ways to manage illnesses and pests. Moreover, since farming did not include the use of chemical inputs, agriculture was enhancing soil fertility and structure in their own indigenous methods. Additional methods used to maintain soil health and combat pests included conservation and shifting cultivation.

Organic farming entirely avoids chemical inputs and views farms as living organisms—a manner of giving back to the environment. "Only farm-based inputs, such as FYM, vermicompost, and other farm-based solid and liquid manures, are used in organic farming." Of all the current ways for disposing of organic waste, vermicomposting is regarded as the most harmless to the environment, where cattle dung plays the significant role. Poverty and unemployment are significant issues brought on by the growing population. As the world's population grows and more harmful pesticides and chemical fertilizers are used to increase food production, the ecological system is impacted by human food supply, making the land less fertile for both solving the problem and providing farmers with additional financial gain. The Chhattisgarh government introduced "Gothan" and "Godhan Nyay Yojna" on July 20, 2020, as part of the large-scale Suraji village program, which includes Narwa, Garwa, Ghurwa, and Badi. This program is first of its kind which is helpful in implementing the concept of CE in agriculture sector.

According to the circular economy theory, the agricultural sector can increase sustainability by simply holding onto more resources and making the best use of them over the longest period of time. Increased product durability, recycling, and reuse are just a few ways to do this.

'GOTHANS' - The Rural Agri- Industrial Parks of Chhattisgarh Region.

Gothan, the Agri- rural industrial parks are being created in the villages of the state of Chhattisgarh under the Narwa, Garwa, Ghurwa, and Badi subgroups as part of the Suraji Gaon Yojana government program. Canal means Narwa. Cow is referred to as Garwa. The term "Garwa" refers to both male and female cattle. Ghurwa refers to a location where cow manure is kept in order to be converted into Manure, which is made from the spoilage and decay of the cow dung. Vermicompost, which is made using earthworms, comes in second, and Badi, which means kitchen garden, comes in fourth. During the significant Chhattisgarh festival of "Hareli," the state government launched the Godhan nyaya Yojana.

Initially, as daycare facilities for the cattle Gothan were developed, activities carried out in Gothans have given people in rural areas numerous sources of income and employment. They are helpful to uplift the rural economy, other than treatment of stubble and cow dung collection, Gothan are remodeled as Agri- rural industrial parks where locals and self-help organizations can connect with small firms that are linked to small- scale businesses in rural areas. The Scheme has so far distributed 508 crore to its beneficiaries, of which 248 crore went to cattle owners who sold cow dung and the balance to Gothan committees and SHGs. Gothan are providing employment to the villagers especially, women by providing new opportunities. Women visit to this place after completing their household chores, and create various products for sale. Following are the sustainable-economic activities conducted at the Gothan:

(a)Treatment of Stubble (Parali):

By establishing Gothan, Chhattisgarh has launched an innovative experiment. The entire unusable Stubble (parali) (pairain Chhattisgarhi) is gathered through parali daan (people's donations) and turned into organic fertilizer by rural youth on a designated five-acre tract held in common by each community. In addition to giving them a means of subsistence, this protects the environment from pollution brought on by parali burning on farms.

The burning of parali, or crop residue, which causes pollution, is a well-known global problem, particularly in Delhi. Here is how the stubble could be used productively in this situation, using the Gothan model from Chhattisgarh as an example. Up to 35 million tonnes of parali are burned by farmers in Punjab and Haryana. This is a significant contributor to the air pollution in Delhi-NCR. Burning agricultural residue reportedly produced 1.28 million tonnes of particulate matter, 0.26 million tonnes of sulphur oxides, 9 million tonnes of carbon monoxide, and 149 million tonnes of carbon dioxide. Chronic obstructive pulmonary disease (COPD) and asthma cases have grown by 50% in Delhi. Capital city of India; Delhi is becoming immersed in pollution. In addition, the soil fertility in Punjab and Haryana is declining, and cancer cases are rising.

Now the question arises- What is the need to burn the stubble? After sowing the Rabi crop, farmers in Punjab and Haryana must transition quickly to the following winter crop. These days' short winters may cause them to be late, which could result in significant losses. Also due to rapid urbanization in these states the land is very scarce for farming as it is also used for several other commercial activities, hence no dedicated farm land can be provided to treat parali separately by the government in these states. Termites and other pests can damage a future crop if parali is left in the field. Farmers choose to burn their leftover stubble since it is the cheapest choice because they are already in a fragile economic situation.

Agriculture is a regenerative, or recycling, process. Therefore, it is necessary to use every product produced during the process and return it to the soil in some way. 21 million tonnes of high-grade organic fertilizer can be produced from 35 million tonnes of parali. In Northwest India, about 7 lakh tonnes of nitrogen, phosphorus, potassium, and sulfur are combined in the 23 million tonnes of parali that is burned each year. This is worth Rs 1,000 crores. In addition to this, burning stubble also destroys organic carbon. As a result, parali provides a crucial source for supplying nutrients to crops and enhancing soil health. By lowering the concentrations of carcinogens in soil, these minerals also lower the incidence of cancer in Punjab. Without government assistance, farmers cannot accomplish this, though. The job of providing farmers with an organic bio-decomposer spray and supervising the entire process of stubble decomposition into manure at the farm only has also been delegated by the government to some private agricultural groups.

Here, Chhattisgarh's Gothan is model as an example to solve the problem of stubble. By establishing Gothan, Chhattisgarh has already started the above-mentioned creative experiment. Each town maintains a dedicated five-acre plot known as a gauthan. Through parali daan (farmers donations), all the unused parali (paira in Chhattisgarhi) is gathered there. It is afterwards transformed into organic fertilizer by rural youth using a bio decomposer to create vermicompost, which in turn provides them a living. Only the transportation of parali from the farm to the closest gauthan is supported by the state government. Under this technique, the state has successfully produced 2,000 Gothan.

Other states need to step up and use already-existing mechanisms like the MGNREGA to accomplish the aforementioned by adopting the Chhattisgarh model. The Centre must permit states to add MGNREGA-eligible practices like harvesting and composting. Under MGNREGA, parali can be combined with a few natural enzymes and cow dung to create high-quality compost. The national issue of stubble burning and pollution can be resolved through a collaborative intervention utilizing conventional wisdom and local resources and supported by strong administrative assistance.

(b) Godhan Nyay Yojana:

Gothan is also the center of the country's pioneering Godhan Nyay Yojana (GNY) program, which purchases cow dung from the farmers, cow-dung collectors, and cattle ranchers for two rupees per kilogram. Dung obtained in this way is used to create vermicompost and super compost, which helps the Parali Yojana even more. Up to this point, 63.89 lakh quintals of cow-dung have been purchased through the Godhan Nyay Yojana. To the sellers of dung, 127 billion 79 lakh crore rupees have been paid. Through the program, around 97,000 landless villagers—who included farmers, dairy farm owners, livestock owners, members of self-help groups, and others—were able to receive money and meet their basic requirements while dealing with the challenging pandemic.

From the cow-dung purchased in the Gothan, more than 15.87 lakh quintals of compost have been produced. Vermi Compost and Super Compost, totaling 9.70 lakh quintals of compost, have been sold for Rs. 91.11 crore. The self-help organizations involved in the creation of vermi compost have received a dividend payment of Rs. 31.34 crore under the Godhan Nyay Yojana, while the Gauthan committees have received a payment of Rs 48.04 crore. Besides making profits, this plan has been instrumental in promoting the use of compost in agriculture and addressing the shortage of chemical fertilizers.

The 477 self-help groups, which include about 77 thousand women, participate in a variety of Gothan activities, including the production of vermi compost. They have earned 51.36 crores of rupees income so far.

These women's perseverance and labor have led to their financial independence. In Gothan, in order to increase the employment for the women ,152 oil crushing mills and 173 pulse mill units are being built respectively. An agreement has been made to create a business that will produce paint from cow dung.

(c) Other Allied Activities:

Apart from above mentioned activities, In addition, self-help groups in these Gothan engage in a variety of other activities, including community gardening, mushroom cultivation, fish farming, goat breeding, poultry farming, animal husbandry, and the production of dung lamps, vessels, vases, and incense sticks. The state government would transform the Gothan (cattle shed premises), where several goods are currently produced, into rural industrial parks in various districts.

Huge vermicompost manures have been diversified in a Gothan, producing a variety of beneficial goods from cow-dung. Prior to Deepawali (a major Indian festival), thousands of women's SHGs received orders to deliver eco-friendly clay lamps and other products made of cow dung to various cities across the nation. Markets are stocked with a variety of items, including colorful Diwali diyas (earthen lamps) of various sizes, idols of Lord Ganesha and Goddess Lakshmi, mobile & candle stands, name-plates, sleepers, key-chains, vases, incense sticks, and herbal Gulal for the Holi (festival of colours) celebration, among others. Cow- dung is already being used to manufacture paintings, pens, cement, and bricks.
Along with three different varieties of vermicompost, other cutting-edge products are created by adding value to cow manure. An initiative to create electricity from cow dung was recently launched in several Gothans. The state government stated in a press release that Gothan will generate electricity from cow dung in addition to producing organic

manure, tripling the benefits and incomes of women self-help groups and Gothan Samitis. According to a press release, electricity production from cow dung will also start soon.

7. Results & Discussions:

The key objective behind the formation of the Gothan by the Chhattisgarh government is to increase income of the farmers and livestock ranchers, promoting organic compost, reducing the need for synthetic fertilizers, and improving soil health and promote circular economy in agriculture sector.

All of the village's cattle are gathered in Gothan in the morning as part of the animals' routine daily posturing journey. A model Gothan consists of about five acres of land, a cow protection trench, a place to store water and feed, a shed for housing cattle, and a place to get water from tube wells or solar-powered pumps with good drainage. Cowherds assist Gram Gothan committees and SHGs in managing the Gothan. Vermicompost is created by the SHG's in Gothan from manure that has been preserved. Other products created from cow dung, such as earthen lamps (diyas), flower vases, vermiwash, compost, plant pots, etc., are prepared in response to demand. Vermicompost is sold to farmers, the agro sector, and the agricultural and horticultural departments, among others, for 10 rupees per kg (Sneha Pandey et al. 2022).

8. Advantages from the Scheme

- The program generates new job opportunities in rural communities.
- Protection of livestock, by providing them a dedicated space and controlling their movement on the roads.
- It has supported organic farming improving soil health, protecting the environment, and preserved food.
- Empowering women by providing them a regular income and employment by producing vermi-compost and other products.
- The program aids self-help organizations and livestock farmers in developing into successful businesses.

(A) Total numbers of *Gothans* in Chhattisgarh

According to NGGB program, the number of constructed Gothans so far is 9492 in 27 districts of Chhattisgarh, out of which 4251 Gothans are geo tagged by the government, and rest of the Gothans would be geo tagged soon as the work is in progress.

Table 1: Total Number of *Gothan* in State

***Gothan* Status**	**No.**	**(Percentage)**
Constructed	9492	100
Geo tagged	4251	44

****Source: agriportal.cg.nic.in* (Dec 2021)**

(B) Details about Cow Dung bought under the Program:

Over the last three years, the Chhattisgarh government has purchased cow dung from cattle herders for more than Rs 247 crore. Chhattisgarh is currently the only state in the nation to purchase cow-dung from livestock farmers under the Godhan Nyay Yojana program. Table presents the details of cow dung purchased in major 5 districts of Chhattisgarh under the scheme. It was noted that the greatest amount of cow dung (1666486 quintal) acquired under the program was in the Durg district. The data also shows that in 2021, the highest percentage (82.49%) of cow dung distributed to self-help groups was in the Raipur Division, whilst the highest percentage of Gothan was in the Bilaspur District. Nearly 77% of the entire amount of cow dung purchased and distributed across Chhattisgarh's big five districts.

Table 2: Details of Cow dung purchase under GNY

Districts	**Total No. of Gothan**	**Total Cow Dung Purchased (in quintals)**	**Total Cow Dung Distributed (in quintals)**	**Percentage of Cow Dung distributed**
Raipur	**322**	**1584331**	**1306914**	**82.4**
Durg	**231**	**1666486**	**1216701**	**72.9**

Bilaspur	**469**	**1394897**	**1052283**	**75.4**
Sarguja	**378**	**730849**	**588066**	**80.4**
Bastar	**255**	**480014**	**374651**	**78.0**
Total	**1655**	**5856577**	**4538612**	**77.4**

Source: agriportal.cg.nic.in, till 20/12/2021.

(C) Value-added products made from cow dung and their cost.

The state government proposed to buy cattle dung under the GNY Scheme at a cost of 2 Rs. per kilogram with the intention of using it to produce a variety of goods through the Gothan Samiti and self-help groups (SHG). The cattle owners have received their payments at intervals of 15 days. Vermin compost and other goods like Agarbattis or Dhupbatti (several types of incense sticks), Diya, Gamla, and Mushroom were prepared with the support of the various women self-help groups. These economic activities support farmers and cattle ranchers financially and create jobs. Information about the economic activities carried out by women's self-help groups is presented below in Table 3.

Table 3. Price of value added products sold at *Gothan*.

	Products prepared by cow dung	**Price (Rs)**
1.	Vermi-compost	10/kg
2.	Earthen lamp (Diya)	3/piece
3.	Earthen plant pot (Gamla)	10/piece
4.	Incense stick (Agarbattis)	180/kg
5.	Mushroom (Food item) (other items)	140/kg

(D) Percent share of profits in sale of vermicompost in *GNY at Gauthans:*

The benefits of vermicompost are clearly displayed in Table 4 under the *Godhan Nyay Yojana*. Currently, vermi-compost sold for 10 '/Kg, of which 5 '/Kg went to *Samiti* to purchase cow- dung for the subsequent vermi-composting. Self-help organizations receive Rs. 0.65 per kg for packaging and Rs. 0.50 per kg as a commission fee from cooperative banks, large area multipurpose societies, and primary agriculture credit societies. Revenues for self-help groups and the committee came from rupees 3.85, which are shared in the ratio of Rs. 3.24 and Rs. 0.58, respectively.

Table 4: Vermi-compost share of earnings under the Gothans

Particulars	**Profit Share**	
	(`Rs/Kg)	**(%)**
Selling Price	10	100
Committees for buying cow dung	5	50
SHGs for Packaging	0.65	6.5
Societies & Cooperative banks commission	0.50	5.0
Self Help Groups Commission	3.27	32.7
Committee's Commission	0.58	5.8

(E) Quantity of Vermicompost: Purchased by different agencies

Information about organizations that purchase cow dung is shown in Table 5. The table shows that the biggest percentage of cow dung was acquired by the Chhattisgarh Department of Agriculture (13.14percent), followed by the Directorate of Horticulture and Farm Forestry (6.14 percent) and the Forest Department (4.71percent).

Table 5: Dept.wise information of purchased Vermicompost under the Gauthan Scheme.

S.no	**Buyers**	**Quantity (quintal)**	**Value (Rs)**	**Percentage**
1.	Agro Societies/ Cooperative Societies	1785	1785000	28.95%

2.	Horticulture Department	830	830000	13.50%
3.	Forest Department	710	710000	11.51%
4.	Other Departments	504	504000	8.17%
5.	Local Government Bodies	640	604000	9.80%
6.	Nursery	915	915000	14.84%
7.	Sericulture Department	565	565000	9.20%
8.	Colleges & Universities	216	216000	3.50%
		6165	**6165000**	**100%**

Source: Chhattisgarh Government Press department, 2021

9. Conclusion:

Based on aforementioned study, the conclusion can be drawn, that these recently established programs significantly contribute to increasing the living standards of livestock farmers and women self-help organizations by giving them access to work opportunities at the regional level. It improves not just the economic situation but also the global social and environmental issues. The *Godhan Nyay Yojana* under Gothan is an innovative program. It greatly benefits agriculture, way of life, and the environment. The state government has built it as a successful circular economy in the rural sector. These small steps are required in all the sectors of different economies globally to improve the problem of global warming and sustainability which in turn is creating income and employment, that's too, without harming the environment.

The scheme has been designed according to the customs, traditions, culture and geographical location of the area, which has served beneficial for its successful implementation. The villagers especially women, feels connected with the objective; and contributing their best for the environmental up gradation and also educating and empowering others to be a part of such venture.

The above-mentioned conversations provide a meso-picture of the shift from a linear to a circular economy that India may use to benefit its enterprises, the environment, and its people. According to Ellenmacarthur foundation report 2016, the benefits of CE in India might include of:

- A yearly value created in 2050 of ₹40 lakh crore (US$ 624 billion), or 30% of India's present GDP.
- 2050 greenhouse gas emissions will be 44% lower than they are on the current trajectory of development.
- Opportunities for profit and material cost savings for enterprises.
- Lower levels of air pollution and traffic congestion.
- Expansion of India's stature as a center of technological innovation.
- Less usage of water, chemical fertilizers, and virgin materials.
- Drawing advantage from the upcoming digital revolution.
- Lower costs for goods and services result in more disposable income for households.

Developing a circular economy, where resource efficiency serves as the primary engine for both economic growth and environmental conservation requires strategies and a legal framework for waste management. A few nations that

adopted CE in place of the linear economy experienced positive results. Resource managers and planners need to carefully determine the components of CE implementation for the greater good of society.

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