

**REPORT OF WORKSHOP ON TRIPLE BOTTOM SUSTAINABILITY ANALYSIS IN
THE CIRCULAR ECONOMY OF THE AGRICULTURAL FOOD VALUE CHAIN IN
GHANA: LAUNCH OF REPORT AND POLICY BRIEF**



HELD AT CSIR-FOOD RESEARCH INSTITUTE, ACCRA

29TH APRIL, 2021

By: Wahaga, E., Nyako J. M., Bugyei, K. A., Arthur, A. B., Adusah, A., Mboom, F. P., Agyei, A. G. A., Sallah, D., V. Asunka, Somuah, F., and G. Ghansah

1.0 INTRODUCTION

The Council for Scientific and Industrial Research-Food Research Institute (CSIR-FRI), in collaboration with Sheffield University and Gold Coast Sustainability and Governance Institute organized a stakeholder's workshop at the CSIR-Food Research Institute on Thursday, 29th April, 2021. The theme for the workshop was “*The Triple Bottom Sustainability Analysis on the Circular Economy of the Agricultural Food Value Chain in Ghana: Launch of Report and Policy Brief.*”

A total of 41 people attended the workshop, representing diverse institutions and actors. Twenty four of the participants were physically present whilst 17 participated online. Participants were drawn from Research and Academia, Parliament of Ghana, Banking Sector, Government and Policy Agencies, Non-Governmental and Civil Society Organizations (CSOs), actors in the food value chain, climate change and agricultural waste businesses.

2.0 OPENING REMARKS



Professor Charles Tortoe, the Acting Director of CSIR-Food Research Institute in his opening remarks indicated that the circular economy model has social, economic and environmental benefits for the greener Ghana. He stated that an Agri-business circular economy will require efforts from all stakeholders within the supply value chain. Additionally, he indicated that there is the need to embrace and practice the circular economy model as the stakeholders have a vital role to play in its implementation in Ghana. He mentioned that CSIR-FRI is on course in engaging the circular economy model through its activities in order to help address and sustain the challenges of waste management in Ghana. Also, the CSIR- FRI will be an advocate for the circular economy model to promote greener Ghana.

3.0 Speech by the Director General of CSIR, Ghana, Prof Victor Agyemang



The Director-General for the CSIR, Prof Victor Agyemang gave an overview of the vision and mandate of the CSIR. He stated that Ghana's food security index has improved since 2012. In 2012, the food self-sufficiency in Ghana was about 70% but rose to 93% in 2020, showing a significant improvement. Additionally, the country's production far exceeded its consumption resulting in a surplus, but the country still has challenges with regards to food sufficiency. These challenges may be attributed to a loss or waste in-between production and consumption. Generally, the average post-harvest loss is 27% for rice, 18% for cassava and maize in Ghana. Post-harvest food losses have been estimated approximately to an amount of 400 million dollars per year. Preventing post-harvest food loss would help reduce food importation in the country. According to him, the core objective of the circular economy is to use waste as a resource for the next point of production, thereby reducing or eliminating waste and increasing efficiency in the food value chain system. Hence the country would have to move from a linear to a circular economy to

transform the function of resources. He concluded by listing the six principles of the circular economy which includes 'refuse', 'reduce', 'rethink', 'repair', 'recycle', and 'reuse' as excellent concepts that can guide the Ghana's Agricultural food sector to eliminate food losses. He outlined some of the benefits of the circular economy which included reducing water and energy consumption, using energy from renewable resources, reducing waste, among others.

4.0 Presentations by various speakers



4.1.0 Sustainability and circular Economy of the Agri-food Value Chain: Policy and Industry Impacts in Ghana and Global Perspectives (Key findings from Survey report).

The key findings from the survey was presented by **Prof Leni Ko** and **Dr Eunice Oppon** from the University of Sheffield, AREC, UK.

First to speak was **Prof. Leni Ko**. She acknowledged the presentations of previous speakers, Prof Tortoe, and Prof. Victor Agyemang and how their speeches were relevant for the gathering. She also acknowledged the funding bodies of the project which are the UKRI, Innovate UK and GCRF.

She mentioned that the project has been running for the past 12 months specifically looking at the potential role of a circular economy and the triple bottom line sustainability in the agri-food sector in Ghana and involves the University of Sheffield, UK, CSIR, CSIR-FRI Ghana and the Gold Coast Sustainability and Governance Institute in Ghana. She highlighted the key findings of the report and the key recommendations for policy intervention that has been proposed during the twelve months research which involved 1000 participants during the survey.

Her presentation summarized the key impacts the circular economy will have on Ghana's Agri-food sector as environmental, social and economic based on the research carried out over the twelve months.

4.1.1 Environmental impact

The circular economy will have a great influence in reducing food waste significantly which will impact the environment. According to Prof. Koh, Ghana is already heading in this particular direction and cited some examples like the recycling of coconut husk and many others already happening. It is indeed a great opportunity to be able to convert the existing linear economy module to a circular economy to reduce environmental impact. This direction is fulfilling the Sustainable Development Goals which focuses on driving down wastage and the use of resources unnecessarily to protect the environment in terms of Carbon dioxide, water consumption, scarcity and consumption. She mentioned that this is very important concerning Ghana's future development.

4.1.2 Social impact

The **social impact** is important in terms of getting stakeholder engagements, awareness and their willingness to join the circular economy module to gain all the benefits involved. Prof. Ko spoke

about the different stakeholders along the Agri-food value chain and the consumer being important because they drive demand, awareness, understanding and market value or potential for the new product developed or products developed from a current business module. Therefore, understanding consumer preferences and perception is very important in implementing the circular economy module.

4.1.3 Economic impact

The **economic impact** involves profit creation. She mentioned that businesses in the value chain will want to drive down cost, improve their process efficiency, cost, savings and profitability. This is very important to ensure sustainable future growth and development for the business and industry in the circular economy direction. She mentioned that there are lots of existing research ongoing in Ghana, United Kingdom, China and the United States in terms of the market value and potential of the circular economy in the industry and are interlinked to other sectors such as the energy sector where food waste can be used to generate biofuel. Thus, there are cross benefits and opportunities for industrial development and economic benefits in the circular economy module. The economic impact is the notion to drive down the cost of waste management by turning it into a resource by recycling, relooking and regenerating the value and resources from the waste to manage and minimize the negative environmental effects. Prof Koh stressed the need to ensure that the principles of the circular economy module (**Reduce, refuse, repair, recycle, reuse and rethink**) are applied as stated by Prof. Agyemang in his speech to drive down waste management in Ghana.



4.2.0 Policy recommendations based on the findings of the economic, social and environmental impacts from the circular economy module using the triple line sustainability module

From the research collaboration and findings, the policy recommendations had been categorized into three specific directions;

4.2.1 The first is the possibility to explore the establishment of food waste valorization plants in Ghana. She stated that the choice of position, location and specific technology could be looked further in the future however some examples have been cited in the survey report.

4.2.2 The second policy recommendation is concerning technological innovation and the CSIR has played a significant role in terms of advancing and expanding science and technology in Ghana. Prof. Koh stated that Research Institutions, Universities, Industries, and the Government play a very important role in contributing to scientific advances and technological development in

this direction. Innovation in the circular economy is needed to maximize and advance the value of all stakeholders involved.

4.2.3 The third policy recommendation is related to Government regulations and incentives which is important and cannot be ignored. She stated that the market could not be left to decide, thus there is the need for favorable government regulations and incentives to help encourage and stimulate the increased adoption of the circular economy business module in Ghana's Agri-food sector. This will ensure that better benefits in terms of environmental, economic and social will be experienced by all the key stakeholders involved.

In summary Prof koh stated the importance of adopting the triple bottom line principle in terms of people, plan, profit protection and all stakeholders involved in the Agri-food value chain from harvesting, food production, processing, packaging, retail and consumption. There are a lot of benefits and potential involved in adapting the circular economy module. The linear economy has so many limitations and these have been identified in the research findings. Thus, there are existing good work ongoing in Ghana, which means that Ghana is not starting from ground zero to transition from the linear economy module to the circular economy module.

Prof. Koh cited a couple of examples of the circular economy module existing in other countries especially in the UK where the British Standard 8001 has been established as the world's first circular economy standard to provide principles and guidelines for the implementation of the circular economy module. She also stated that the International Organization of Standards (ISO) is currently developing an international standard for the circular economy. She stressed the need for research and innovation and how the UKRI and other research funding bodies have invested in

gaining the acceleration of research and innovation towards the circular economy module. Some evidence of these includes the new production methods, new crop, plastic-free and smart packaging for the food sector in the food sector to reduce waste, waste to resources like bio fills and integration to health as people have become conscious of the fact that living a healthy life is linked to sustainable development and circular economy module. Also, she stated that in the UK, DEFRA and FSA and other bodies play role in the uptake of circular economy, thus the CSIR - FRI and the other sister institutions, universities, industries and the government can play a specific role in the uptake of the circular economy module in Ghana. She stated that many countries like Italy, Paris have made a commitment towards moving from the linear economy to the circular economy due to recent problems with climate change and hoped for the possibility of a future partnership between Ghana and the UK toward the transition.

4.3.0 Key findings from survey report (Presentation by Dr. Eunice Oppon Sheffield University, UK)



Dr. Oppon highlighted the fact that Ghana does not have a full system that manages food losses along the value chain and that most food losses are handled by the consumer. Ghana has about 400 million dollars of food loss which truly expose the system while unfortunately there are no systems in place that takes up these post-harvest losses and transform them into meaningful valuable products. Thus, Ghana always misses out on the embodied resources that comes with turning these losses into meaningful valuable products. For instance, Dr. Oppon stated that when the amount of water that goes into the irrigation of crop and the crop does not end up in the agro-industry or an institution like FRI and it becomes a major loss also considering the cost of fertilizer, packaging or manure involve in the production. Therefore, the uptake of the circular economy module will reduce or stop the waste along the agro-food value chain.

The recommendation that stood out according to Dr. Oppon was the investment into innovative products and CSIR doing well in this direction however more need to be done. Also, the need to involve other stakeholders especially the government to help with policymaking and incentives.

4.4.0 Agriculture in Ghana: Research and Innovations, Presentation by Miriam Oppon



Innovations in agriculture are evolving and have contributed to increased productivity in Ghana. These innovations are seen in the use of drones for spraying farms, the use of convenient apps like Troto tractor and Ignitia Ghana weather forecasting, however, innovations in agricultural waste management are still in their infant stages. Ms. Oppon stated that companies like DAS Biogas, fiber wealth, Humanure are currently innovators in the circular economy space in Ghana, which reuses organic kitchen waste into biogas. These innovations contribute to various sectors such as the energy and food sector amongst others, notwithstanding, more research and innovations should be promoted through policy changes that reflect circular economy at the core and knowledge sharing amongst institutions.

4.5.0 Sustainability and the contribution of circular economy and sustainable agribusiness sector to the Ghanaian economy; The Ministry of Food and Agriculture (MOFA) perspective (Presentation by Nana Sekyibea Addo (MOFA representative))



Nana Sakyibea Addo shared some relevant experiences with the uptake of circular economy in her line of work. She works with the MOFA extension technical directorate, one of the technical directorates responsible for the dissemination of agricultural technologies to farmers. Also, they are responsible for developing and executing policies, in charge of food security and emergency preparedness and the sustainable management of land and environment.

Through their activities of providing technical support and undertaking monitoring and evaluation for districts and regions, the directorate has observed pressure along the agri-food value chain due to climate change, biodiversity laws, greenhouse gas emission and others, affecting natural resources. Thus, it is very necessary to have or develop sustainable ways of production hence the circular economy module.

The main focus of the circular economy module is to make sure that the value chain of production systems is self-sustaining and support the reuse of resources to avoid wastage by reducing, reusing, recycling and recovering materials in production. It also permits optimal allocation of resources and efficient use of resources and waste to reduce environmental impact.

According to her, the circular economy is not commonly practiced by the farmers but shared few experiences where farmers were advised to apply the principle of the circular economy. **These include reminding farmers about the need to reduce losses and recycle possible materials from their agricultural activities and the importance to improve the performance in their agricultural activities. Encourage them to incorporate some activities that promote circular economy, for example, the use of organic manure, crop rotation, cover cropping and planting of leguminous crops. They also encourage farmers to find the best ways to transform their products into by-products.**

For instance, maize farmers are advised that the leaves, stalks, roots and pulps can be used for animal feed, fuel and plough the root based back into the soil. The maize cobs can be used to wrap Ga Kenkey. Also, Oil palm producers have been advised in this direction. She acknowledged that more needs to be done and suggested that more education, capacity building, transfer of technologies, policy remaking, adequate processing and storage equipment are needed to encourage the uptake and sustainability of the circular economy module. She stated the benefits that can be resulted from the implementation of a circular economy can reduce the cost of farming operations, improving the marketing of produce and the efficient use of natural resources whereby agricultural waste can be used by the industries to produce organic fertilizer to promote agriculture.

4.6 Sustainability and the contribution of circular economy and sustainable agribusiness sector to the Ghanaian economy; The agro-industry perspective, Presentation by Mr. Evans Amartey



Mr. Evans Amartey is a former banker now turned into a farmer and an agro-processor. He owns a 30-acre mango farm interspersed with maize in Abonsi in the Central region of Ghana. He has

experienced four harvests and the major challenge he has faced was how to manage the farm waste after harvesting. Thus, the circular economy module has helped him to reduce the cost of waste management by converting the waste into organic manure.

They have also been able to educate the 30 farmers he works with about how to essentially practice more hygienic methods on the farm. He also hopes to venture into vegetable farming by fallowing his land with the organic fertilizer produced with the farm waste.

Mr. Amartey stated that his main objective now is to review all their processes to ensure that they are in synergy with other stakeholders where there will be a clearinghouse for the storage of waste materials which will be fed into another industry's production process. This will be a start point to get value, revenue gain and reduction of cost for production activities. He suggested that from the industry's perspective, the circular economy must give clear benefits of cost-cutting and revenue generation through clear marketing drive and benefit-sharing.

4.7 Sustainability and the contribution of circular economy and sustainable agribusiness sector to the Ghanaian economy. The industry perspective – Accra Compost and recycling plant limited (Presentation by Barnabas A. Ampaw, Quality Control, Environment and Research Manager)



Mr. Ampaw spoke about the waste generated in Ghana amounting to about 5million tons of MSW per annum at a rate of 0.47kg/ person, however, on average, 12,710 tons of waste is generated per day. Also, Accra generates 3000 tons of MSW per day of which about 30% is managed sustainably and the remaining 70% lands up in unauthorized disposal points.

He mentioned that his company was established in June 2012 as a wholly Ghanaian limited liability Company to undertake the receipt, processing and recycling of solid waste management, provide MMDAs with a viable and cost-effective alternative to landfilling, produce compost to meet the growing demand for organic compost as soil enhancement medium or fertilizers, provide sustainable material and recovery solutions to the high or increasing levels of recyclables in solid waste management (MSW). They recycle 41% waste, 22% plastic waste, 11% paper, 9% textiles, 5% metals, 3% glass, 1% E-waste. They are considering recycling of medical waste in the future and are regulated by the Environmental protection agency (EPA) and the Ghana Standards Authority (GSA)

Their operations are aligned to the concept of Sustainable Development as adopted in Agenda 21 in 1992 at the Rio Earth Summit in Brazil, underpinned by Sustainable Development Goal (6)

which demands the provision of clean environmental sanitation management to protect ecosystems and promote healthy environments and focuses on a paradigm shift from conventional linear end-of-pipe solutions with an emphasis on integrated systems that holistically addresses challenges (recycling, composting, incineration etc.).

Their vision to be the leading waste processing and recycling organization in Africa and their mission to provide effective integrated processing, management and recycling of solid and liquid waste, for economic and social good and in an Environmentally Sustainable Manner, thereby producing compost and other products for Ghanaian and African markets.

He stated that the company has made some significant impacts in Ghana which includes the following; Employment creation whereby over 500 Direct and Indirect Jobs have been created, Improvement in Sanitation & Health, Business Development, Mitigating Cost in Public Health Management and contribution to National Economy.

4.8 The circular economy of the agriculture food value chain in Ghana; the role of CSIR

Presentation by Jeremiah Lartey-Brown – CSIR-FRI



CSIR is the engine of research in Ghana. The mandate of CSIR includes encouraging coordinated employment of scientific research for the management, utilization and conservation of the natural resources of Ghana in the interest of development. Mr. Brown explained that the CSIR is made up of thirteen institutions that come together to play a part in the uptake of the circular economy module. For instance, the Institute of Industrial Research uses the biodigester for waste management, the Forestry research institute uses waste wood to produce wood products and hybrid energy, the building and Road Research Institute incorporate plastic waste into the building of edifices and roads and the Food Research Institute is into value addition by working with the other sister institutions. For instance, they make use of waste like rice bran, snail shells and sawdust in the production of compost for mushroom production.

The circular economy module will be beneficial in the following ways when fully incorporated in our systems in Ghana; cleansing, and maintenance of the clean environment, increased return on

investments, job creation through new opportunities and collaboration between existing actors, improvement of social life, general improvement of the economy, the hope of survival for future generations. All these fit into the global sustainable development goals.

In conclusion, he stated that, for the circular economy module to be a success and sustained for the long term, the following indices must be considered; Success and sustainability indices, Buy-in of major stakeholders, Inclusiveness, Systems thinking, Discipline and sacrifice, Innovation, Continuous improvement, Conscious grooming of protégés, Stocktaking while noting available resources and coming to terms with what would be needed.

4 Question and Answers (Q&A) Section

This session was chaired by Prof. Mary Obodai and the speakers for the various presentations



A section of the participants

Question 1

Based on the current challenges associated with practicing or implementing the six principles (Reduce, Reuse, Recycle, Rethink, Refuse and Repair) of the circular economy module?

Response

Mr. Jeremiah Brown explained that none of the principles could be isolated, they work together. However, the most important quality needed to sustain the circular economy module is the discipline to refuse or refrain' to develop innovations and recommendations. Dr Eunice Oppon added that the principles were not new, however, more education/awareness needs to be done to observe the impact. Also, according to the survey report, Ghana lacks in the principle of **rethinking** and **refusing** due to the cost associated. This is mainly because Ghana has not consciously decided to transition fully in managing waste, however, some progress has been made in **reusing and recycling** some waste.

Question 2

From the findings in the survey report, what are the economic opportunities involved in the transitioning of Ghana's Agric Food sector from the linear economy model to the circular economy module?_

Response

Based on the survey report, CSIR has carried out works in this direction, for instance converting tubers and grains into powder which has generated a lot of profit for the council and the National basket of innovative products on the micro and macro levels from the Ghanaian and foreign markets respectively. CSIR has also created many employment opportunities through backward linkage with farmers and middlemen. Also, the waste generated from the linear module can be converted into good use by the circular economy module like converting farm waste into manure/ compost. This results in economic gains as well as environmental and social gains.

Question 3

What are the opportunities involved in transitioning from the linear model to the circular module?_

Response

The linear module does not consider any of the six principles of the circular economy module thus waste management is not considered. This can result in choked landfill and other negative impacts on the environment. On the other hand, the circular economy module considers profitable ways of managing waste through product development. For example, organic fertilizer can be produced by farmers which can eliminate the cost of buying fertilizer.

Question 4

Among the policy recommendations, what type of food waste valorization plants, the type of technology innovations, government regulations and incentives need to be set up or implemented to stimulate the uptake of the circular economy and the triple bottom line sustainability in Ghana

Response

The most important tool to ensure the uptake and sustainability of the circular economy module is the availability of funds and incentives especially from the government to Small Scale Enterprises to set up.

6.0 Closing Remarks

In the closing remarks of the Q and A panel, Dr. Eunice Oppon mentioned that Ghana is doing very well in the direction of circular economy, however, government support is needed in terms of funding and other incentives. She acknowledged the presence of the government representative at the workshop and employed him to communicate the findings of the survey to the government for a proactive response.

Mr. Jeremiah Brown encouraged stakeholders to continuously improve on activities towards the circular economy direction until the best is achieved.

Prof. Mary Obodai also mentioned that a lot of information has been given about the circular economy to help with the uptake, therefore more education and government support is needed to ensure continuous improvement in this direction.

Prof Leni Koh concluded by acknowledging the presence of the speakers, the stakeholders, the participants, the funding bodies and all members involved in the research (survey) and the organization of the workshop especially Prof Victor Agyemang, Prof. Charles Tortoe and Prof. Mary Obodai. She assured the possibility of Ghana partnering with the UK in the future to ensure the effectiveness and continuity of the circular economy. Finally, she encouraged everyone to support the country in this positive direction.

Rapporteurs

Signature

Akua Boatemaa Arthur (Principal Technologist)
Frank Peget Mboom (Senior Technologist)
Anita Adusah (Administrative Officer)

