

# Policy Brief



## CIRCULAR ECONOMY IN GHANA'S AGRI-FOOD VALUE CHAIN; A TRIPLE BOTTOM LINE SUSTAINABILITY ANALYSIS

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### Introduction

The University of Sheffield, UK in partnership with two Ghana-based research institutes namely the Council for Scientific and Industrial Research Food Research Institute (CSIR-FRI) and Gold Coast Sustainability and Governance Institute (GCSGI) undertook a 12-month research on exploring circular economy in Ghana's agri-food sector. The aim of the research was to assess the triple bottom line (economic, environmental and social) sustainability impacts of the country's agri-food value chain.

The fundamental principle of Circular Economy (CE) is to ensure that the value chains of production systems are self-sustaining and support the reuse of resources to avoid making the environment a sink for waste. Circular Economy in agri-food chains, which links production and consumption supply chain activities, is about reducing food waste and consequently promoting global food security. We believe evaluating agri-food circular economy from the triple bottom line perspective presents a more comprehensive view of potential impacts. Over the duration of the project, the activities undertaken sought to capture the three pillars of sustainability with regards to agri-food circular economy in Ghana. Adopting a triple bottom line analysis of circular economy system highlights the potential impacts on people (social), planet (environment) and profits (economy) in what is commonly referred to as the 3 Ps.

### Environmental impacts

**Reduction in food loss waste:** The CSIR Food Research Institute plays a key role in reducing food surplus waste at the farm level. The institute through the use of scientific research is able to develop new and innovative agri-food products from several food crops. By estimating some of the embodied resources (water, fertiliser, manure, packaging) associated with food crop production, the report showed how operations at CSIR-FRI if non-existent, would consequently imply these resources are wasted alongside.

**Agri-food circular economy practices:** The circular economy business model at CSIR-FRI is a 'near closed loop system' in that, some of the waste generated are recycled and used to produce new products, while there are still some waste generated during the production that ends up at the landfill. Waste streams such as crop peels and sawdust are recycled and used to produce edible mushrooms. Some of the waste is also used to produce biodegradable compost bags. However, some of the landfill bulk waste ends up at incinerators which has negative impacts on the environment.

**Environmental impacts of linear production model:** Through the use of lifecycle assessment method, we were able to estimate the lifecycle impacts associated with the annual production of CSIR-FRI agri-food products based on a linear production model. The impacts measured (greenhouse emissions, water depletion, cumulative energy demand and landfill bulk waste) enabled us to see the 'environmental cost' associated with operating a linear processing model.

# Social impacts

**Stakeholder Awareness and perception:** The findings showed that there is some appreciable level of awareness of circular economy among the stakeholders (farmers, agri-food processors, distributors, government, financial institutions) in Ghana's agri-food value chain. Stakeholders believed that lack of government legislation and enforcement, inadequate investment funds for innovative products and limited market research on circularized products are among some of the barriers to agri-food circular economy in Ghana.

**Consumer preferences and perception:** Ghanaian consumers play a vital role towards achieving an agri-food circular economy. Out of the 1000 respondents that took part in our consumer survey, it was revealed that the preferences for circularized agri-food products depended largely on consumers' perception on the three factors namely hygiene, taste and price of the product. The overall level of circular economy awareness among consumers was however low although they were familiar with some of its principles such as recycling. In terms of openness to innovation, we found that the average Ghanaian consumer is mostly influenced by their family and friends in their willingness to try new foods.

# Economic impacts

**Profit creation:** The economic impact of CSIR-FRI's operations is seen in the key role the Institution plays in terms of profit creation for actors within the value chain. First, the farmers that supply the crops, profit from selling to CSIR-FRI. Secondly, CSIR-FRI in turn also makes profit margins from processing these crops into various food products. Although the analysis is done at the micro-level analysis, it is still indicative of the massive role that agri-food processing on the whole plays in the Ghanaian economy.

**Cost of waste management practices:** Some of the waste generated during the agri-food crop processing is converted into products of economic value. However we noticed a significant portion of waste still ends up at landfill site or incinerators which also comes at an economic cost. This associated cost of waste management practices is a reflection of the unsustainable economic cost in the absence of a truly circularized system of agri-food production.

# Policy Recommendations



Some of the recommendations made to support Ghana's efforts in achieving an agri-food circular economy is highlighted below

**Food waste valorization plants set up:** The next phase of Agri-Food CE research should be focused on expanding food waste valorisation opportunities identified. Waste valorisation is a process where waste is converted into useful resource. This represents real steps towards 'closing the loop' at the end of the value chain. Since CSIR-FRI has the technical resources and expertise, the Ghana government can support the institution in creating pilot case studies to demonstrate the technical feasibility of different valorisation technologies. Upon a successful pilot scheme, then efforts can be scaled up and food valorisation plants can be set up leading to the creation of new and sustainable value chains.

**Technological innovations:** A necessary shift towards circularity requires advances in technological innovations. Technological innovations can potentially increase efficiency in resource use. For instance, some technology innovation could enhance information and data sharing among actors within the agri-food value chain. Farmers knowing exactly the quantity of food to produce to meet demand could prevent some post-harvest food losses. This can be facilitated by smart agriculture such as the use of drone technology to estimate and spread the exact quantity of fertilisers and pesticides on farms.

**Government regulations and incentives:** From the stakeholder workshop and consumer survey, we see that the principles of circular economy is not entirely new to the Ghanaian populace. However, the current practices of waste separation at both commercial and household level is not widely practiced because there is no specific regulation to enforce such behaviors. Regulation can drive the move towards circular economy once government makes certain practices a requirement. Sometimes, regulations on its own can be counter-productive if some incentives are not put alongside the regulations. For instance, if consumers are to receive some economic benefit/compensation from household waste separation then, perhaps they can be motivated to participate.