CIRCULAR ECONOMY PRACTICES IN AGRICULTURE: REVITALIZING ENVIRONMENTAL HEALTH AND CULTURAL HERITAGE IN WEST JAVA

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Abstract Transformation going to economy circular in sector agriculture become a key strategy for reach development sustainable environment. In West Java, an area rich in diversity life and culture agrarian, implementation principal economy circular No only contribute to efficiency source power and reduction waste, but also plays a role important in preservation environment and revitalization values wisdom local. This article review literature latest about practice economy circular in the field agriculture, with focus on the approaches that have been implemented in West Java, including utilization waste organic, agriculture integrated, and use technology appropriate use based on community. In addition, articles it also discusses challenge implementation, potential improvement quality environment, as well as his contribution to preservation culture local. Results of the study show that integration between innovation technology, policy area, and participation public become key in push system agriculture adaptive and sustainable circular.
Keywords: Circular Economy, Agriculture, Environment, Health, Culture

1. Introduction

Agriculture as sector strategic no only play a role in fulfillment need food, but also has implications big to condition environment and balance ecosystem. In the middle global challenges such as change climate, degradation land, and pressure to source Power nature, approach economy circular appears as solution transformative capable push development environment sustainable (Geiss Doerfer et al., 2020; Kirchherr et al., 2022). Different with system linear economy oriented towards extraction, production, consumption, and disposal, economics circular emphasizes on the principal subtraction waste, recycling repeat source power, and extension cycle life products (Ellen MacArthur Foundation, 2021).West Java as an agricultural region main in Indonesia has potential big for implement principles economy circular in sector agriculture. This area known No only Because productivity the land, but also because riches culture and wisdom local still life in practice agriculture traditional (Setiawan et al., 2023). However, in a number of decades. Lastly, intensification agriculture and the use of chemical inputs excessive has cause various problem environment, such as water pollution, degradation fertility land, and improvement greenhouse gas emissions glass (Central Statistics Agency, 2022; Nuraini & Kurniawan, 2024).

Seeing this urgency, the implementation of a circular economy in the agricultural sector of West Java is a strategic step to integrate environmental conservation and local cultural conservation in one development framework. Through utilization return waste organic, integration system agriculture, as well as adoption technology friendly local environment, concept economy circular No only offer solution ecological, but also strengthens values social and cultural issues that have long been foundation life farmers (Rahman & Lestari, 2021; Prabowo et al., 2023). This article aiming for to study various practice economy circular that has been or potential applied in the sector West Java agriculture, review the impact to development environment, as well as highlight How approach This can strengthen identity culture and capacity adaptive public local. With approach literature review, articles This expected can give runway conceptual and practical for development policy and innovation agriculture sustainable based on economy circular.

2. Circular Economy Concept in Agriculture

Circular economy is paradigm development economy that focuses on optimization use source Power through the principles of reduce, reuse, recycle, and recover, as well as put forward design capable system extend cycle life products and materials (Ellen MacArthur Foundation, 2021). In the context of agriculture, approach This aiming for create system production more food efficient, closed, and low emissions, with utilize waste organic, source Power local, and diversification system production (Jurgilevich et al., 2020).

Economy circular in the field agriculture emphasizes on integration between production and conservation processes environment, with avoid dependence to external input like fertilizer chemicals and pesticides synthetic (Kibler et al., 2021). Practice like recycle repeat waste agriculture become compost, integration plants and livestock, utilization bioenergy from waste organic, and utilization technology low emission is example implementation real from principles circular in system agriculture

(Sanyé-Mengual et al., 2022). Further, approach circular also adopts principal agroecology, namely utilization interaction ecological for support productivity agriculture in a way sustainable without damage balance nature (Wezel et al., 2021). In many developing countries, including Indonesia, the water supply system agriculture traditional like intercropping, rotation plants, and integration farming-farming has long reflected principles circular in a way inherent (Prabowo et al., 2023).As the number increases global awareness of impact environment from system food conventional, organization international as FAO and UNEP encourage transition towards circular food systems as part from strategy to achieving the Sustainable Development Goals (SDGs), in particular in context management source Power nature, mitigation change climate, and resilience food (FAO, 2021; UNEP, 2023).

In its application, the economy circular in sector agriculture No just repair technical, but rather change systemic that requires integration cross sectors and support strong policy. Transition going to agriculture circular also demands involvement active from community, perpetrators business, and government area in to design system production adaptive food to change environmental and social. Thus, the economy circular offer approach holistic for build system empowered agriculture flexible, friendly environment, and integrated with values culture local.

3. Dynamics Agriculture in West Java

West Java is one of the provinces with contribution agriculture the largest in Indonesia, both from aspect production plant food, horticulture, and commodity plantations and livestock. Diversity its agroecosystem, starting from plains low until mountains, support various type cultivation, such as rice, vegetables plains height, coffee, tea, and livestock ruminants small (BPS West Java, 2023). In addition to the potential ecological, province This is also rich in wisdom local still sustainable in practice agriculture traditional, such as system *intercropping, huma,* and *leuweung ban* in the community customs. However, the dynamics agriculture in West Java is not off from various challenge environment. Massive urbanization, conversion land agriculture, as well as degradation quality land and water become problem the main threat sustainability system production food (Saputra et al., 2022). Data shows that rate transfer function land agriculture productive in West Java reaches 6,000–8,000 hectares per year, especially in the Greater Bandung and Bogor-Depok-Bekasi areas (Pusdatan , 2022).

Practice agriculture intensive that relies on external input like fertilizer chemicals, pesticides, and irrigation artificial also participate to worsen condition environment. Some area of agriculture, in particular horticulture intensive in Lembang and Pangalengan, recorded experience decline quality land, increasing level residue pesticide in groundwater, as well as damage structure land consequence processing excessive land (Nuraini & Kurniawan, 2024). On the other hand, there is still there is practice agriculture local in nature *semi- circular,* such as utilization waste cattle for fertilizer cage, system irrigation based on gravity, and agriculture integrated based on family. However, this adoption practice has not been standardized and has not received systematic policy support (Setiawan et al., 2023). Other challenges include limited access for farmers to environmentally friendly technology, lack of economic incentives, and weaknesses in farmer institutions in collective resource management.

Potential big for implementation economy circular in West Java lies in the strength community local, network extension worker agriculture, and increasing awareness generation young farmer to issue environment. Programs such as *Farmer West Java Millennials, Sunda Farming,* and *Independent Food Villages* start push diversification practice more agriculture adaptive and ecological, although Still nature partial and requires integration cross sector. With understand condition ecological, social, and institutional aspects that shape dynamics agriculture in West Java, implementation economy circular can design in a way contextual and based need local. This is important for ensure effectiveness intervention environment at a time guard sustainability social culture public farmers in the area.

4. Relevant Circular Economy Practices in Agriculture in West Java

Implementation economy circular in sector West Java agriculture can take through a number of purposeful approach for reduce waste, improve efficiency use source power, and extend cycle life products and materials in system agriculture. Some relevant and established practices applied or

potential applied in this area covering utilization waste agriculture, integration system agriculture, as well as technology innovative based on community.

A. Utilization Waste Organic for Compost and Biogas

One of practice economy the most direct circular applied in sector agriculture is utilization waste organic, such as remainder plants and waste livestock, for produce compost and biogas. In some areas in West Java, such as Cianjur and Garut, farmers have developed system processing waste agriculture become fertilizer environmentally friendly organic environment. Utilization compost can increase fertility land, reduce dependence on fertilizers chemistry, as well as reduce impact negative to ecosystem (Purnomo et al., 2023). In addition, biogas technology uses waste cattle for produce energy also starts introduced in several area agriculture. The use of biogas is not only can replace material burn fossils, but also reduces emission methane from waste livestock, which contributes to global warming (Anggraeni et al., 2022). Practices This support creation cycles more energy efficient and friendly environment.

B. Agriculture Integrated

Practice agriculture integrated, which combines various commodity crops and livestock in One system, is implementation economy circular based on the principal diversity and utilization source Power optimally. One of the example implementation systems this is in West Java an *agroforestry system* that integrates plant horticulture with plant trees, such as coffee and tea, as well as maintenance livestock. The systems not only increase diversity life, but also helps guard stability ecosystem, reducing erosion, and increase power stand to change climate (Syahbana et al., 2023). Beside this, *Integrated Farming Systems* (IFS) which combines agriculture plant food with livestock, fish and utilization waste cattle for fertilizer, also started growing in various areas in West Java. Practice This reduce dependence on external inputs, such as fertilizer chemicals and pesticides, as well as increase resilience food and income farmers (Prasetyo & Santosa, 2023).

C. Technology Innovative Based on Community

Implementation technology appropriate wisdom - based use local and participation community be one of element important in economy circular in the sector agriculture. In West Java, various technology friendly environment like system drip-based irrigation technology simple, utilization energy renewable for processing results agriculture and technology agriculture precision has introduced. In rural areas, such as Ciamis and Sukabumi, farmers start adopt technology for increase water and energy efficiency, which is in line with principal circular (Rahman & Lestari, 2021).

Development technology based on community this also supports empowerment public local. The *Independent Food Village Development Program* is based on the management of source power in a way independent and efficient has applied in several village in West Java, with objective for increase resilience food and reduce dependence on supply external (Setiawan et al., 2023). Community-based technologies enable farmers to innovate locally, reduce waste, and produce products with higher added value.

D. Agriculture Sustainable with Principal Ecology

In addition. to the implementation technology and systems agriculture integrated, economy circular in agriculture also focuses on the principal agroecology. Agroecology emphasizes importance management source Power natural in a way sustainable through a priority- oriented approach conservation diversity life, management friendly land environment, as well as subtraction use of chemical inputs (Wezel et al., 2021). In West Java, the concept agroecology start applied to the system paddy farming, with integrate technique water management in efficient, rotation plants, and use fertilizer organic. Base on agroecology, no only contribute to sustainability environment, but also improve welfare social farmers. Farmers who implement principal agroecology generally get more results stable and more stand to change climate, with increase power absorb land against water and lowers risk loss consequence attack pests and diseases (BPS West Java, 2023).

5. Impact to Environment and Heritage Culture

Implementation economy circular in sector agriculture in West Java has significant impact to preservation environment and culture local. With adopt principal management source efficient and sustainable power, as well as restore practice friendly traditional environment, economy circular can

create synergy between sustainability ecological and social culture. In this context, there are two aspects main the necessary impact analyzed, namely impact to environment and impact to inheritance culture local.

6. Impact to Environment

Implementation economy circular in agriculture potential big for reduce pressure to ecosystem and restore quality degraded environment. Some impact positive that can produce among others: a. Reducing Soil Pollution and Water

Use compost organic produced from waste agriculture and livestock can reduce dependence on fertilizers chemicals that are often pollute land and water sources. Additionally, use biogas technology for process waste cattle become energy Renewable also helps reduce pollution air caused by greenhouse gas emissions glass (GHG) from waste organic (Anggraeni et al., 2022). This is in line with effort for mitigation change climate and improvement quality ecosystem local. Next, Recovery Biodiversity Practices agriculture integrated farming, such as agroforestry and Integrated Farming Systems (IFS), supports improvement diversity biological with integrate plant food, trees and livestock in One interconnected system support. The agroforestry system in West Java, for example, does not only increase productivity land, but also provides habitat for various species of flora and fauna, which play a role important in maintenance balance ecosystem (Syahbana et al., 2023) and then management Sustainable Natural Resources Approach agroecology, which prioritizes technique management land and water in efficient, can prevent erosion land and guard stability ecosystem agriculture. Conservation programs land, such as terracing and system water management based natural, start applied in the area plains West Java height for reduce impact negative from agriculture intensive that can cause damage land and subsidence fertility (Setiawan et al., 2023).

7. Impact to Inheritance Culture

Circular economic practices also have a positive impact on the preservation of local cultural heritage that has existed for a long time in the West Java agricultural community, including (a) Revitalization of Local Wisdom in Agriculture, many agricultural practices in West Java have adopted the principles of a circular economy even though they have not been formally labeled, such as the intercropping system, which combines various types of plants in one area, and shifting cultivation, dry land farming that relies on crop rotation and natural land cultivation, is an example of the diversity of environmentally friendly farming techniques and is very much in line with the concept of a circular economy (Setiawan et al., 2023). Through implementation economy circular, farmer can empower for to preserve knowledge local, this increases resilience food in a way sustainable. Wisdom local related with management source Power wise nature can too become cultural capital in effort more conservation wide at level communities and villages ; (b) Community Empowerment through Creative Economy and Local Innovation Apart from the sector agriculture , application economy circular also opens opportunity For develop economy creative based on product local made from results agriculture , such as processed food local , crafts hand from material natural , and products processed results agriculture organic . Engagement generation young in develop products innovative This can become method for guard identity culture at a time support economy sustainable local (Rahman & Lestari, 2021); (c) Education and Development Culture Sustainable Agriculture through development of educational programs agriculture sustainable which involves training about principal economy circular, generation young can more understand importance to preserve tradition and culture agriculture local. No only increase knowledge technical farmers, but also strengthen bond social in community agriculture, which in turn strengthen self-identity culture local.

8. Discussion

Implementation principal economy circular in sector agriculture in West Java has shown significant potential for overcome various challenge environmental and social issues faced by society agriculture. Practices like utilization waste organic for compost and biogas, agriculture integrated based on agroforestry and Integrated Farming Systems (IFS), as well as implementation technology friendly environment can increase efficiency use source power, reduce waste, and repair quality environment. Impact positive to very real environment, including among others subtraction pollution land and water, restoration diversity life, and management source Power more nature sustainable. While from side inheritance culture, economy circular also strengthens preservation wisdom local in practice friendly farming environment and support empowerment public through products local based on agriculture sustainable.

However, even though Lots potential that can developed, implementation economy circular in agriculture in West Java is still face a number of challenges, especially related with gap knowledge, access to technology, and support policies that are not optimal. Required effort collaborative between government, institution research, sector private, and community local for ensure sustainability and success implementation principal economy circular in the sector agriculture.

9. Recommendation Policy

For support implementation economy more circular wide in sector agriculture in West Java, some recommendation policy can consider: (a) Strengthening Government's Green Infrastructure and Technology regions and centers need strengthen provision infrastructure and technology friendly environment for farmers. This is covering provision tools and machines for processing waste agriculture become compost and biogas, technology irrigation efficient, and device for agriculture precision that can increase productivity and reduce use of external inputs (fertilizers) chemicals and pesticides). Strengthening access to technology. This will make it easier adoption principal economy circular by farmers; (b) Empowerment Farmer through Education and Training

Education for farmer become key in push implementation practice economy circular. Government and institutions education can Work The same for to organize training related agriculture sustainable, technology friendly environment, as well as benefit economy circular for farmers. With improvement knowledge and skills, farmers in West Java will more Ready For implement supportive changes sustainability term long; (c) Compilation Policies that Support a Circular

Economy Policies that support a circular economy circular in sector agriculture must designed in a way integrated and needs - based local. This covers supportive policies utilization waste agriculture for production compost and energy renewable, incentive for farmers who adopt practice friendly environment, as well as funding for research and development technology sustainable agriculture. Government area can give incentive for farmers who implement technology circular, such as subtraction tax or access to a bigger market wide for product organic; (d)Cross-Sector Collaboration for Sustainable

Development Collaboration between sector agriculture, environment and culture are very important for ensure integration economy holistic circular. Programs that involve various parties, including public local, institution education, non- governmental organizations, and sector private, must implemented for create system more agriculture inclusive and sustainable. Formation network partnership between various stakeholders will accelerate knowledge transfer and adoption practice economy circular at level farmer; and (e)Strengthening Protection to Inheritance Culture Local

Government must also ensure that adoption economy circular No ignore preservation wisdom local in practice agriculture. Sensitive approach to inheritance culture and social public farmers in West Java need applied with notice values local that can support sustainability agriculture, such as system *intercropping, dryland* and agriculture based on community. This effort will create balance between conservation culture and development sustainable economy.

In general, overall, implementation economy circular in sector agriculture in West Java has potential big for increase sustainability environment and economy. With support appropriate policies and close collaboration between government, sector private, as well as public local, sector agriculture in West Java can develop become a model for agriculture sustainable that is not only profitable in a way economy, but also preserve diversity life and heritage culture that becomes strength social for the area.

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