Social-Circular Economy as a Sustainable Supply Chain Model in Developing Country: The Empirical Evidence from Indonesia

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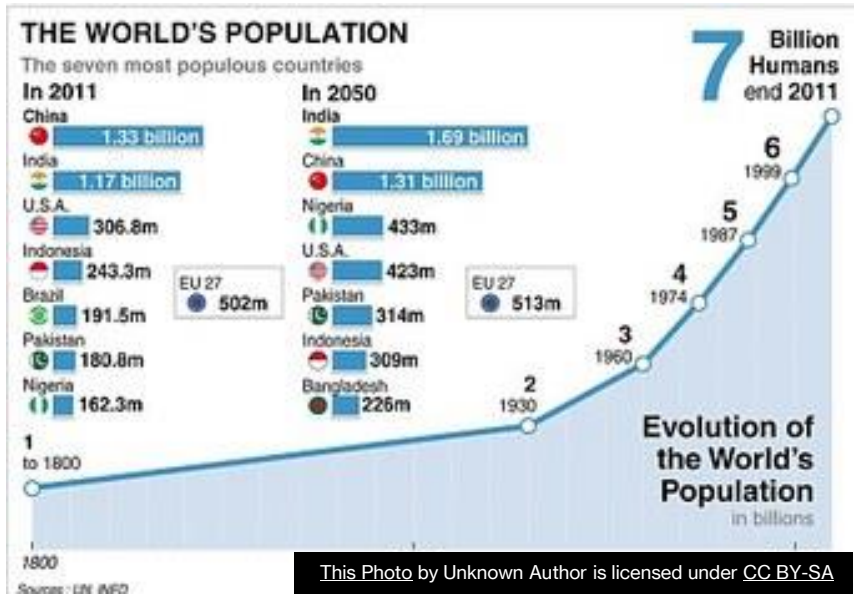
Keynote Speech

The 1st International Conference on Engineering Optimization and Management in Industrial Applications (ICEOMIA)

Yogyakarta 29th October 2022



Growing population and globalized world (Worldometer, 2022)

7.98 billion (Oct. 2022)	9 billion (2037)	10 billion (2057)

Increased demands of customers

Increased industrial activities

Industrial activities

Source of job creation

Livelihoods

Improved social wellbeing

Implementing and supporting sustainable production practices

Industry is a critical actor

Meeting customer demand

Generate economic growth

Preserving the natural resources

Producing waste

Issues

- Natural resources depletion
- Environmental degradation
- Social problems

Sustainable Development

- “Meeting the needs of the present generation while considering the needs of future generations” (Brundtland Report, WCED, 1987)
- Triple Bottom Line (TBL): economic, environmental, and social

SUSTAINABLE DEVELOPMENT GOALS (SDGs)

Eeconomic Development	Social Welfare	Environmental Protection
• Goal 8: Decent Work and Economic Growth • Goal 9: Industry, Innovation, and Infrastructure • Goal 10: Reduced Inequality • Goal 11: Sustainable Cities and Communities • Goal 12: Responsible Consumption and Production	• Goal 1: No Poverty • Goal 2: Zero Hunger • Goal 3: Good Health and Well-being • Goal 4: Quality Education • Goal 5: Gender Equality • Goal 16: Peace and Justice Strong Institutions	• Goal 6: Clean Water and Sanitation • Goal 7: Affordable and Clean Energy • Goal 13: Climate Action • Goal 14: Life Below Water • Goal 15: Life on Land

Goal 17: SDGs can only be realized through inclusive solid partnerships and cooperation at the global, regional, national, and local levels.

SUSTAINABLE AND MORE EFFICIENT INDUSTRY

Circular Economy (CE)

Internet of Things (IoT)

Circular Economy (CE)

DEFINITION

- An economic system that replaces the “end-of-life” concept with reduce, reuse, recycle, and recover materials from the production/distribution and consumption processes. It replaces the consumers with users and the products with product-service systems.
- Emphasizes the philosophy of manufacturing, usage, and recycling of products promoting better consumption and product recovery at the micro, meso, and macro levels to achieve sustainable development for future generations.
- Follows a cyclic or closed-loop material flow which emphasizes on no-waste principle leading to better consumption of material; energy; adequate utilization of scarce resources.

OBJECTIVE

- To achieve “zero-waste,” modular designs, design for the upgrade, disassembly, repair, remanufacture, and closing the loop on materials while reducing the usage of energy and materials.

The Implementation of Circular Economy

Economic Sectors

- Reduce the cost of raw materials, energy, waste management, emission control, and statutory/taxation (environmental) risks
- Enhance the public image as well as new product design innovations and market opportunities for businesses

Social contexts

- Increasing employment
- Participatory democratic decision-making
- More efficient use of products through cooperatives and user communities, not consuming individually

How CE Achieves SDGs?

CE achieves SDGs

- Creating a loop of 3Rs (recycling, reducing, and reusing), repairing, refurbishing, remanufacturing, and repurposing
- More valuable products
- Longer material life

CE in the EU by 2030

- Increase GDP an additional 0.5%
- Create 700,000 jobs
- Increase workforce by 4%
- A net benefit of 1.8 trillion Euros
- Decreasing CO2 emission by 48%
- Increasing household income by 3000 Euros

Sustainable Supply Chain Management (SSCM)

- SSCM is “the management of material, information, and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account, which are derived from customer and stakeholder requirements” (Seuring and Müller, 2008)

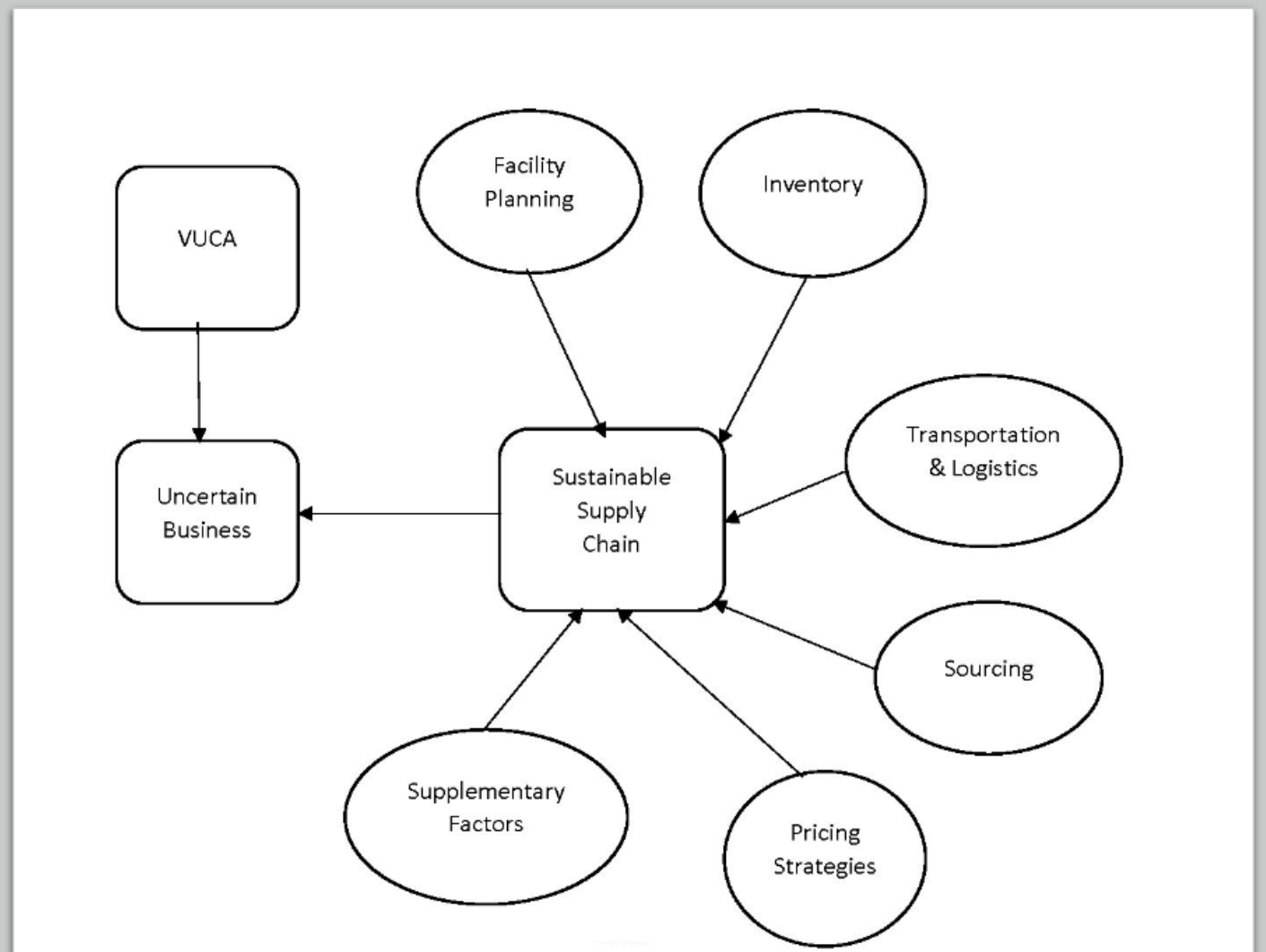
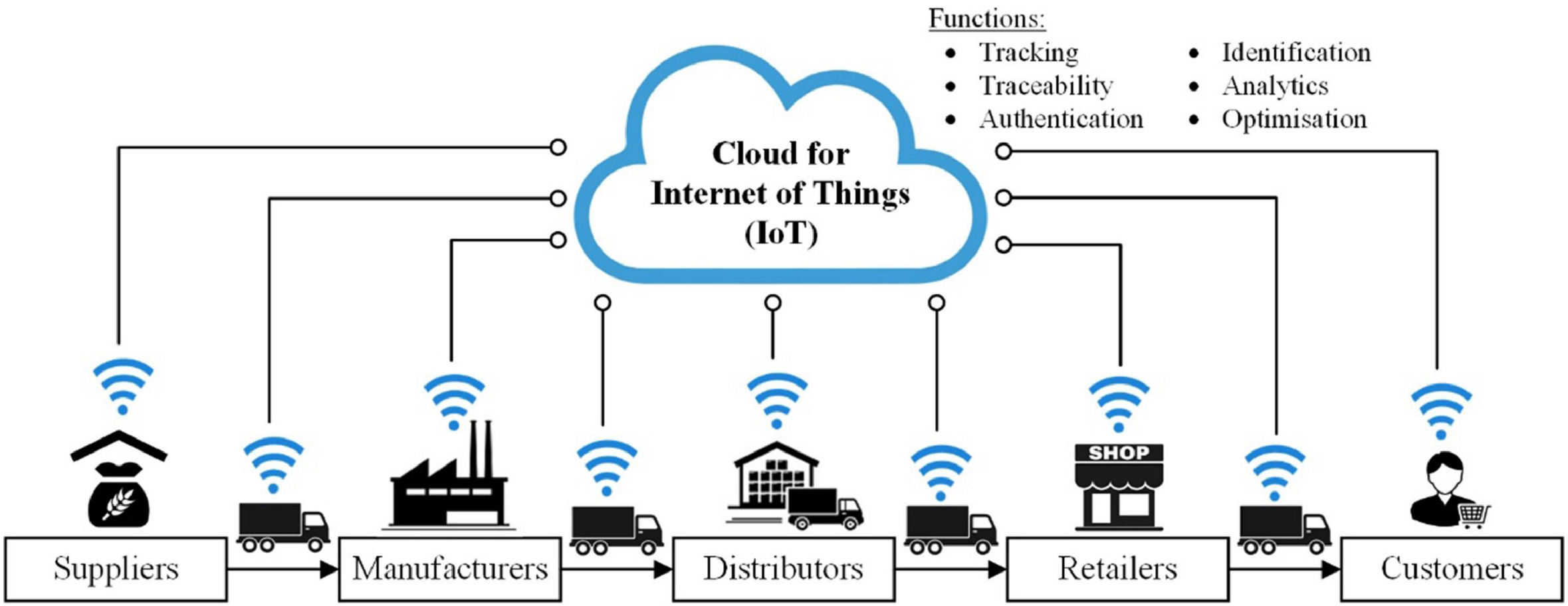


Figure 1. Sustainable Supply Chain Framework

(Chopra and Meindl’s, 2007)

The IoT-empowered logistics and supply chain management.



(Tsang et al., 2022)

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CE in Developed and Developing Countries

Developed countries

Technologically advanced industrial ecosystems and global value chains

Developing countries

- Unsustainable economic growth
- High growing population
- Poverty become a major problem

The three most critical barriers in implementing CE: technological barriers, policy barriers, and public participation barriers

Criticism for SSCM and Industry 4.0

CRITICISMS

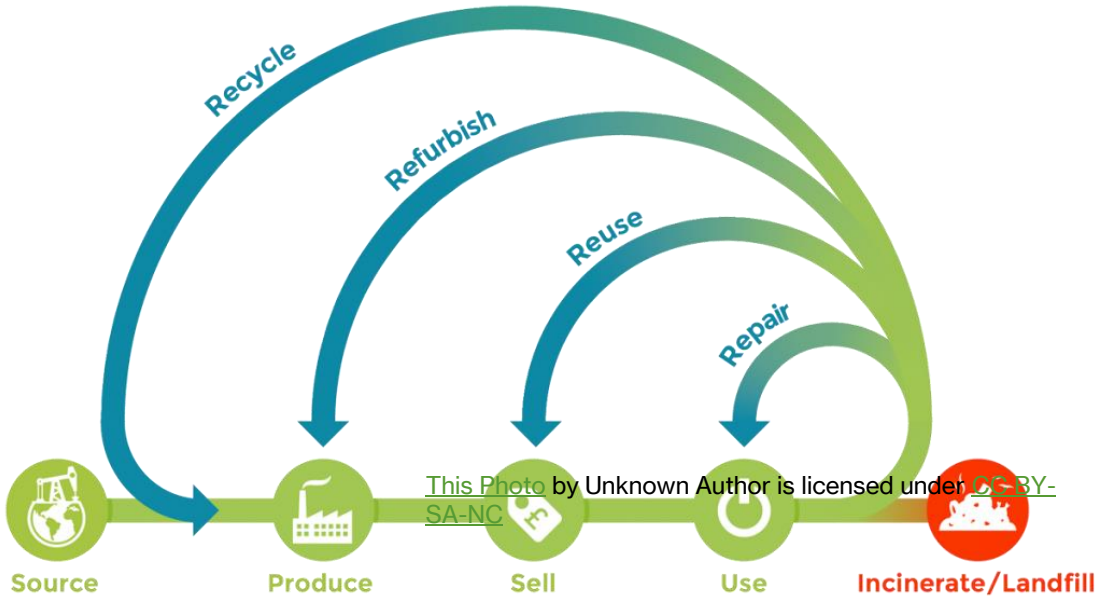
- SSCM still focuses on industrial interests, is not yet human welfare and planet protection (Menon, 2021)
- The literature pays more attention to issues related to the environment than social aspects such as diversity, equality, human well-being, quality of life, working conditions and community relations (Mani et al., 2016)
- Companies are more motivated to implement Industry 4.0 to increase competitiveness in terms of performance and productivity, but not sustainability and social responsibility (Satyro, 2022)
- Sustainability is considered as a secondary goal in Industry 4.0 (Ghobakhloo et al., 2021)

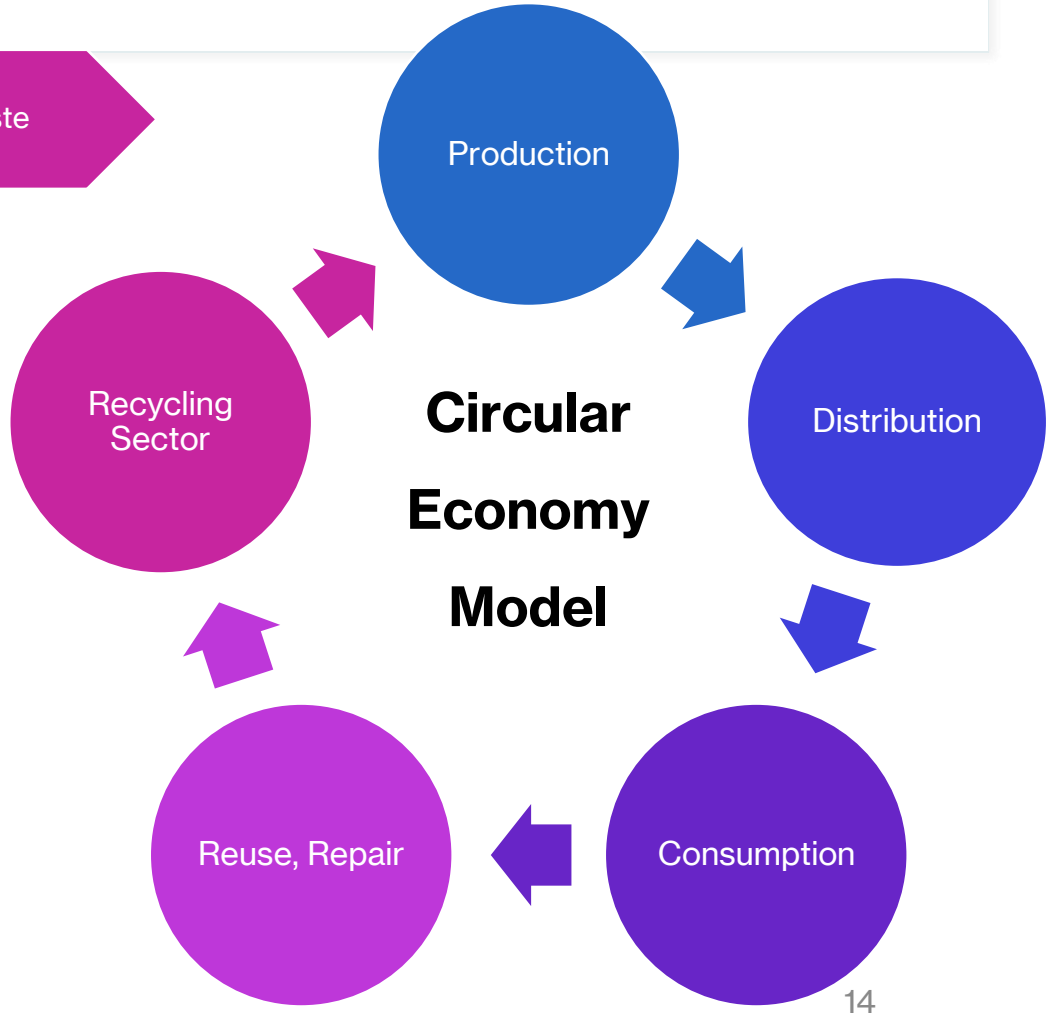
How to implement CE that prioritizes social aspects, especially for developing countries?

Empirical evidence in Indonesia

Enonomy Model: Linear vs Circular

Linear Economy Model





CE Practices

CE mainly focuses on the reuse of post-consumption products.

Waste

- Liquid waste and solid waste with very many variations
- Organic and inorganic waste

Indonesia

- 67.8 million tons of waste in 2020
- 37.3% of waste comes from household activities

(Ministry of Environment and Forestry, KLHK)

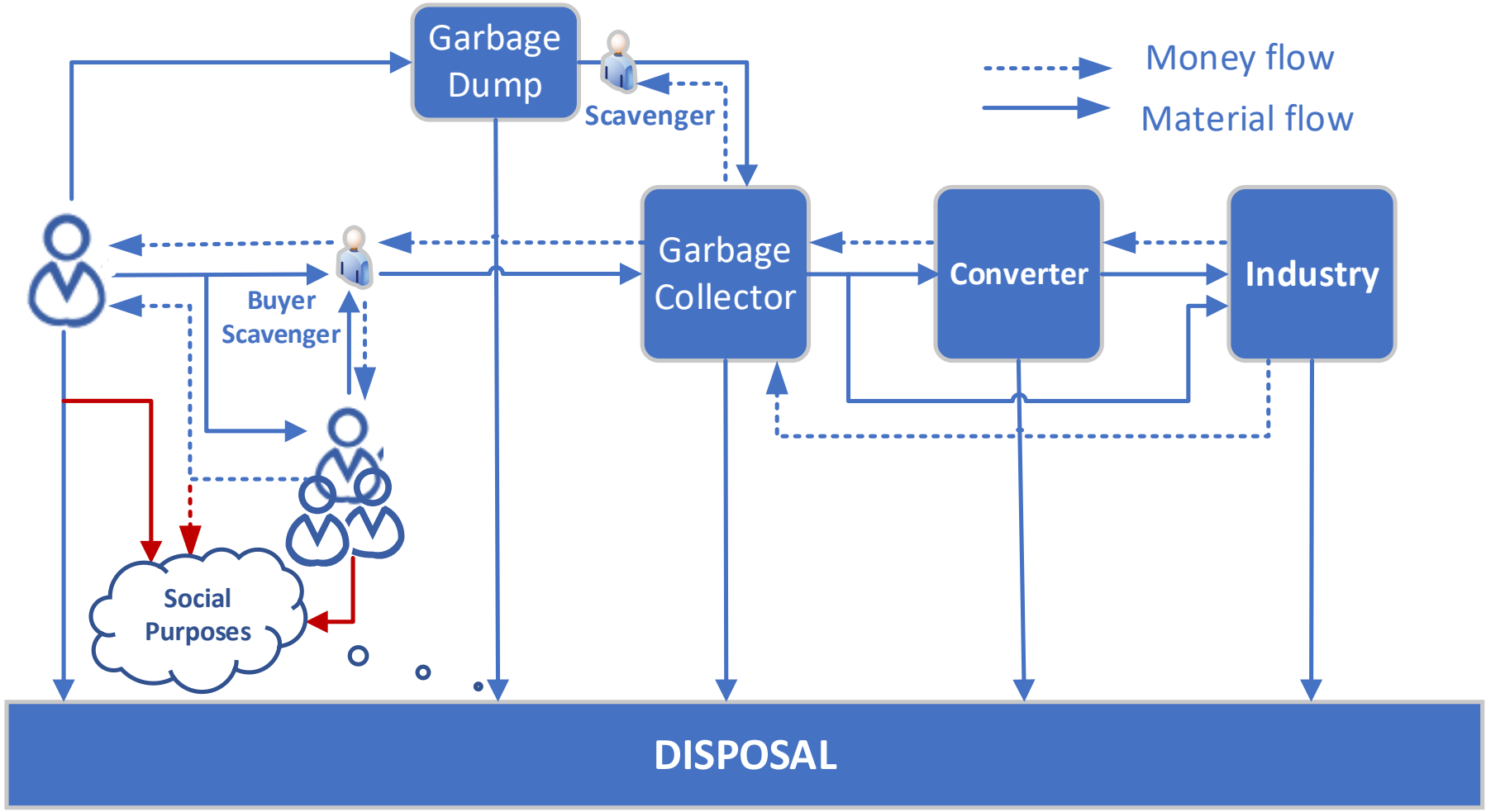
CE Activities on Post-Use Products in Developing Countries

- CE activities on post-use products include waste collection, sorting, and conversion.
- CE practice in developing countries requires multi-sector collaboration, which is most important in waste collection and management (Khan and Ali, 2021; Serrano et al., 2021; Winterstetter et al., 2021)
- Waste collection process
  - By the manufacturer (through sales agents): beverage bottles made of glass, printer cartridges, used batteries, used tires and others
  - By other parties (by waste pickers or scavengers)
- By involving the informal sector such as waste pickers (Morais et al., 2022), CE can provide prospects to eliminate poverty in developing countries (Andersen, 2007) (Constant et al., 2013).

INDONESIA REGULATIONS FOR HOUSEHOLD WASTE MANAGEMENT (SIPSN, 2020)

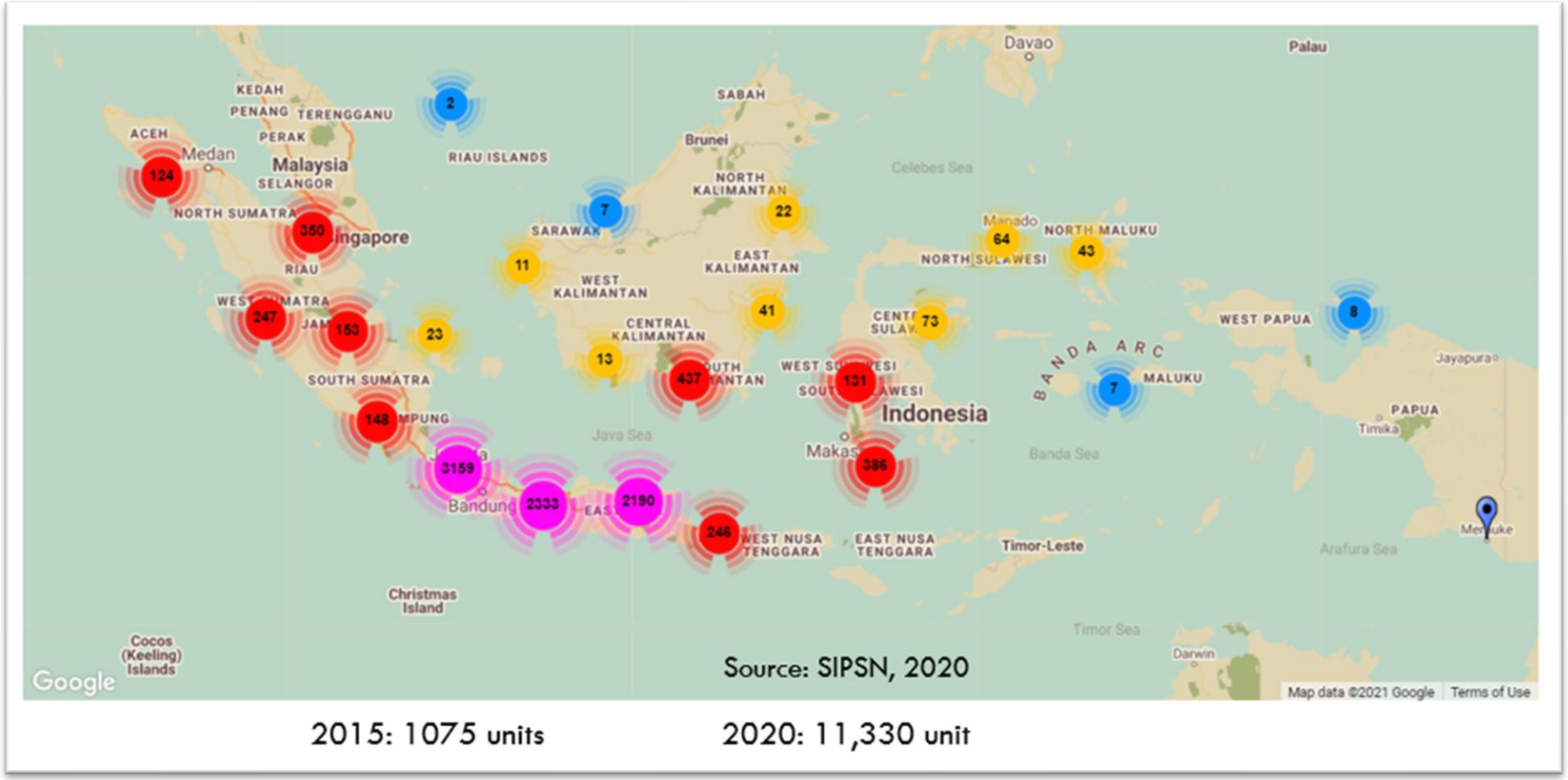
UU No.18 Tahun 2008	• Management of Household Waste and Household-Type Waste
PP 27 Tahun 2020	• Specific Waste Management
Perpres No. 97 Tahun 2017	• National Policies and Strategies for the Management of Household Waste and Household-Type Waste
Permen LH No. 13 Tahun 2012	• Guidelines for the Implementation of Reduce, Reuse and Recycle Through Waste Banks
P.10/MENLHK/SETJEN/PLB.0/4/2018	• Guidelines for Formulating Regional Policies and Strategies for the Management of Household Waste and Household-Type Waste

SOCIAL-CIRCULAR ECONOMY (SCE) MODEL



QUANTITY	CONTRIBUTION	ROLE	ORGANIZATION	BENEFIT
• More than 11 thousands	• 1.7% to the handling of national waste	• As a place to store waste that has been sorted by type of waste • Encourage public participation to participate in sorting waste. • Empowering community through waste management	• Community independently • Community in collaboration with local governments • Community in corporations with a corporate social responsibility (CSR) scheme	• Increase community income • Increase human social interactions

WASTE BANK AS A COMMUNITY-BASED WASTE MANAGEMENT

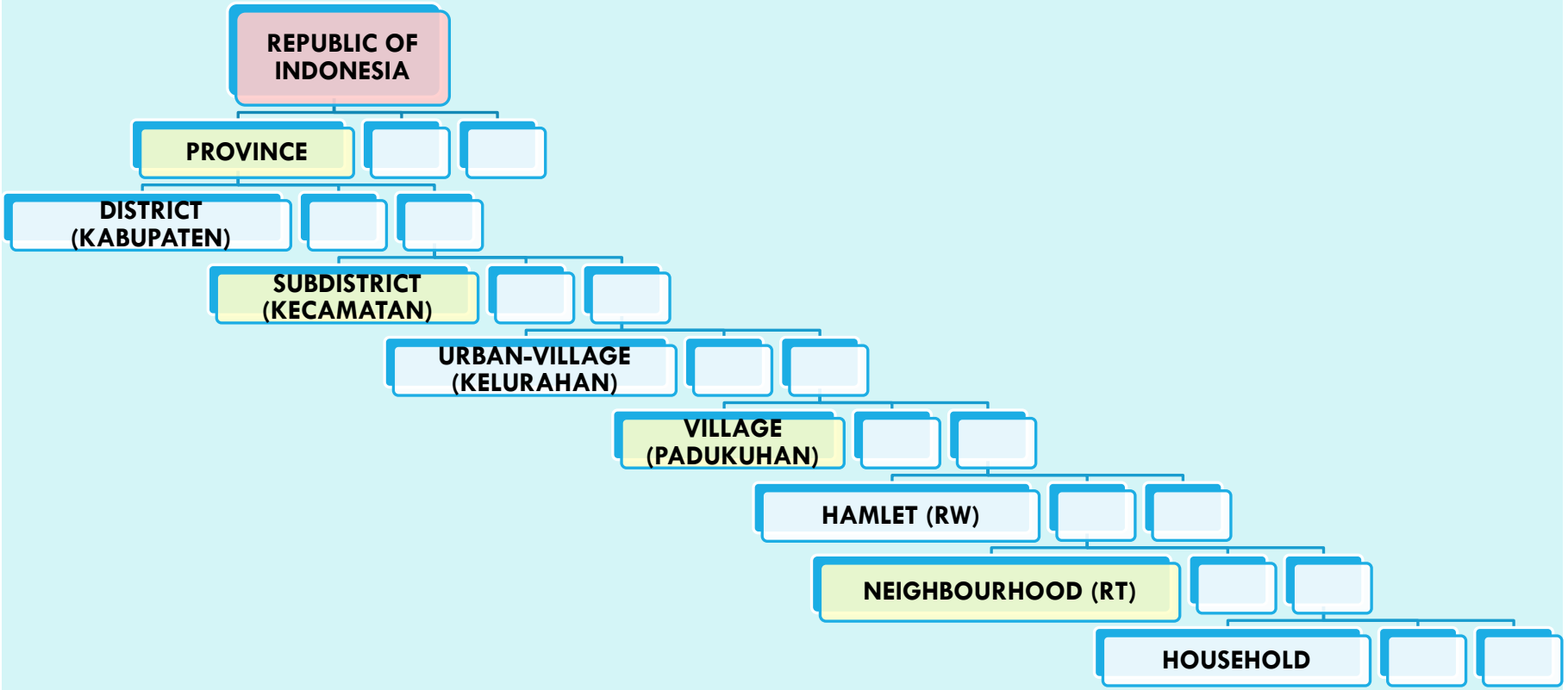


2015: 1075 units

2020: 11,330 unit

WASTE BANKS IN INDONESIA
(MEDCOM, 2021)

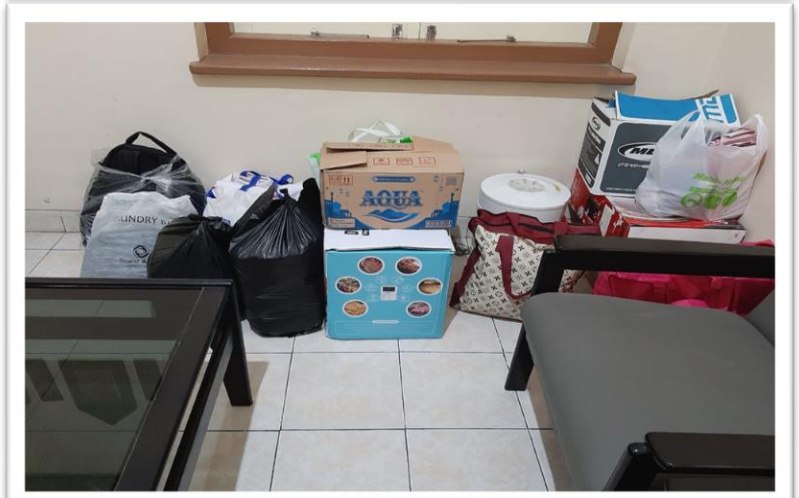
Indonesian Village Administration System




ACE
The helpful place


PENYALURAN BANTUAN
ANAK YATIM, DHUAFA DAN LANSIA
Kepada
Pengurus Aisyiyah Girikarto
Panggang, Gunung Kidul
BNI
Berbagi


Miyako


AQUA

FACTORS INFLUENCING THE SUCCESS OF CSE

Community commitment

- Support and assistance from the community leaders.

Gender issues

- The involvement of housewives and women's community organization are able to take responsibilities and to work for the system.

Professionalism of the management

Continuous learning

Community Cooperation

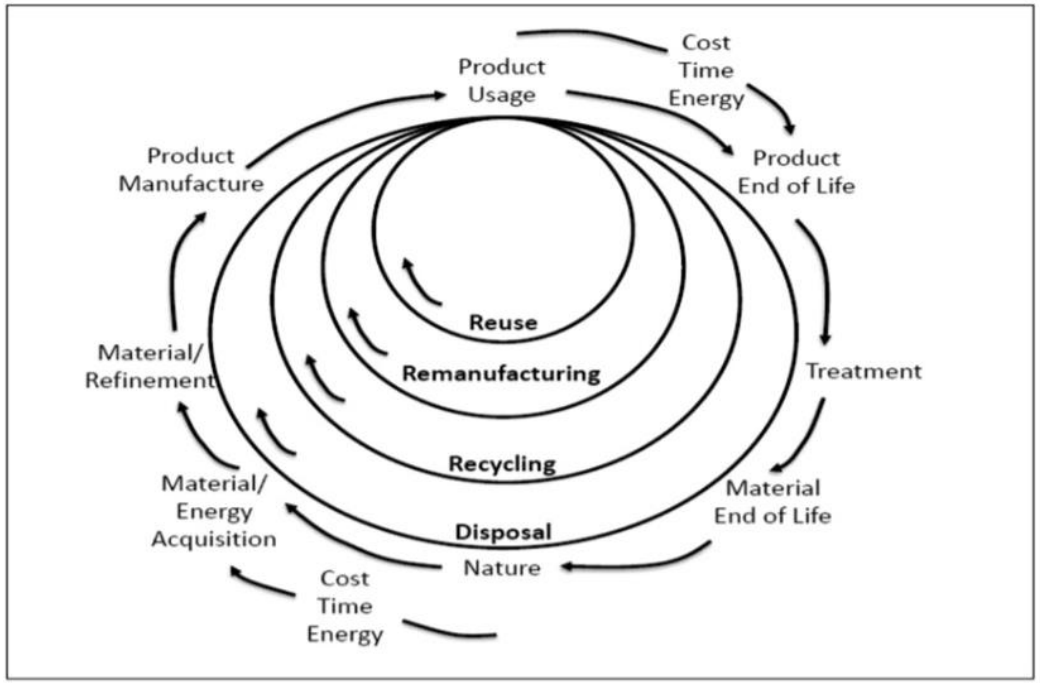
- The local community has high spirit of mutual cooperation.

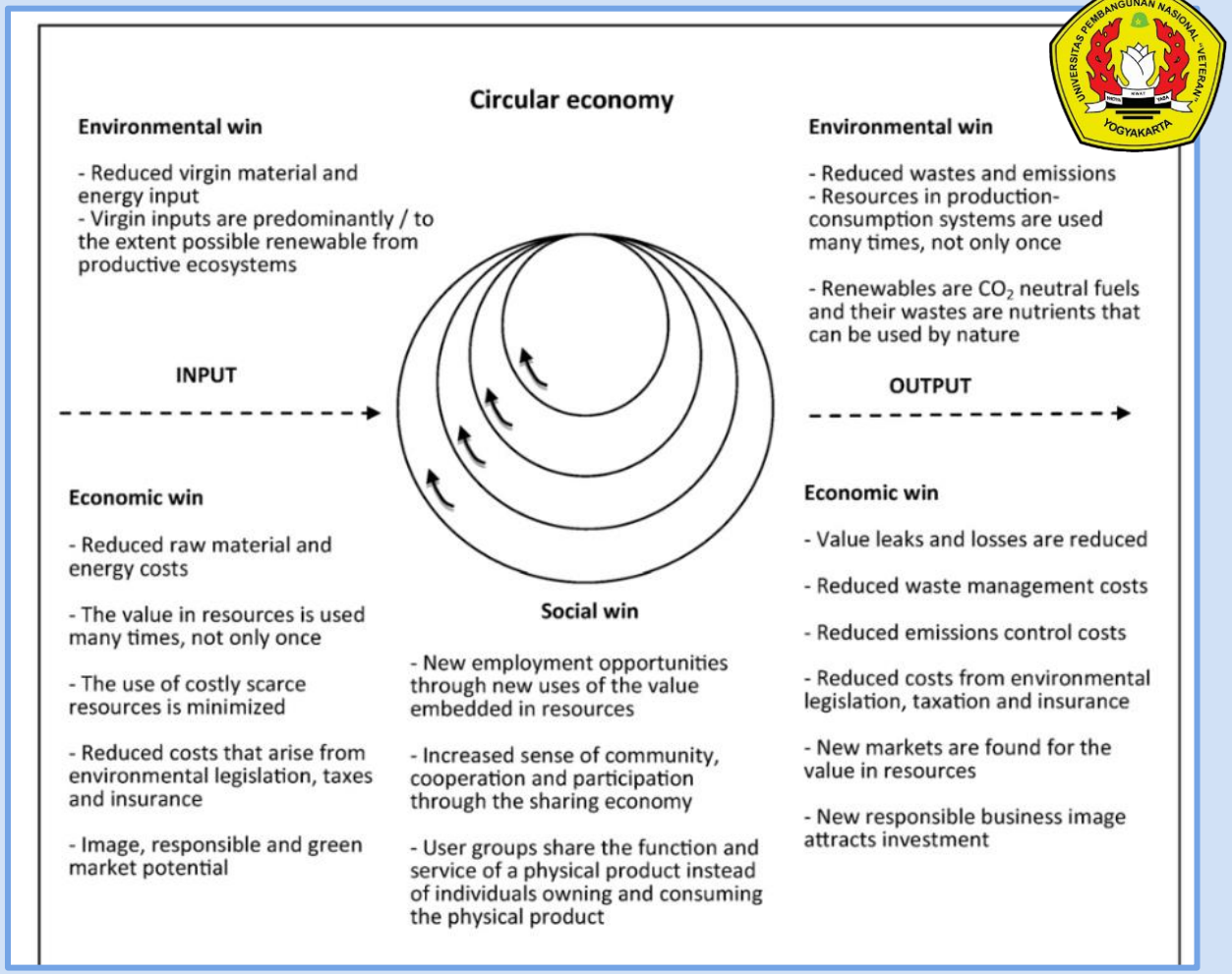
FACTORS INFLUENCING THE SUCCESS OF CSE

Socio-economic

- Initiated by the community without intervention from other parties.
- All community members voluntarily and wholeheartedly to participate in every stage of the system.
- High sense of community as a brotherhood results in good relationships among community members through respectful, collaborative, and sustainable interactions.
- Close relationship and good communication between the committee as service provider and the community as consumers.
- Members' sincerity in contributing most of the money earned from selling the waste will ensure the sustainable funding for social purposes.
- Sense of awareness and responsibility owned by the people of the village to improve the welfare of the supported by a harmonious relationship among them.

J. Korhonen et al. / Ecological Economics 143 (2018) 37–46





- **The social-circular economy (SCE)** is a method to manage resource circularity, efficiency, and optimization that advocates using waste as resources to generate **economic and social value.**

IMPLICATIONS

- SCE will be able to provide maximum outcomes if appropriately managed.
- Material flow in SCE will be more efficient and effective with the support of information systems.
- SSCM indicators need to accommodate social values.
- Product life cycle assessment should incorporate social impact instead of environmental impact only.
- It is necessary to develop a community-based SCM, a supply chain that is managed by the community voluntarily.

CONCLUSION

- The implementation of circular economy (CE) in developing countries differs from that in developed countries.
- CE should accommodate not only industrial goals but also societal goals.
- The CE concept can be improved into Social-CE, which can be defined as a method to manage resource circularity, efficiency, and optimization that advocates using waste as resources to generate.
- Sustainable Supply Chain Management indicators should be revised to include social value gain.

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