

# Analysis of the Circular Economic System Using the Causal Loop Diagram Method Based on the Green Economy an Islamic Economic Perspective in West Sumatera

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## Abstract:

Circular economy is an economic concept that implements sustainable development goals related to sustainable and sustainable levels of consumption and production as well as a solution to environmental problems caused by consumption and production programs from the application of a linear economy with the concept of "take-use-dispose". The aim of this research is to find out how Islamic economics views the development of a circular economy based on a green economy. This research was conducted in West Sumatra. The stages in this research were carried out by determining the main variables in the circular economy, using multiple linear regression analysis. Based on primary and secondary data, the A Causal Loop Diagram analysis was carried out and then integrated with an Islamic economic perspective. The results of this research found that circular economics is in line with the principles contained in the Islamic economic perspective, namely: (1) Principles of wise resource management; (2) The principle of minimal waste disposal; (3) Principles of social justice and growth; and (4) Principles of sustainable development.

**Keywords:** Circular Economy, Causal Loop Diagrams, Sustainable Development, Islamic Economic Perspective.

## 1. Introduction

Over the last decade growing attention has been paid word wide to the new concept and development model of Circular Economy, Circular economy with the aim to provide a better alternative to the dominant economic development model, so called "take, make and dispose". The negative effects caused by the latter are threatening the stability of the economies and the integrity of natural ecosystems that are essential for humanity's survival. (Julian Kirchherr, Denise Reike, 2017), (Rizos et al., 2017). Currently, Indonesia is in the era of the fourth industrial revolution, characterized by rapid developments in human activities. Technology plays a significant role in human life, aiding in the facilitation of human activities. Various innovations have been created to keep up with technological advances so that sales of goods increase and lead to accumulation of waste. Waste is an urgent unresolved problem in Indonesia. Garbage is something that is no longer used, something that needs to be thrown away, usually comes from human activities.

Additional waste continues to increase along with the growth of the human population. In general, this waste comes from the general public, UMKM food and beverage products; fisheries and agriculture. (Darmastuti, S, Cahyani, I.P., Afrimadona, A. & Syarif, 2021), (Nakamura & Kondo, 2018) the Circular Economy approach is integrated with the waste input-output processing process. Both natural and artificial waste piling up in various landfills across so that a major problem. Improper waste management can pollution and environmental damage and can even pose a threat to human health. (Swarr et al., 2011), (Ghisellini, P., Cialani, C., Ulgiati, 2016), (Li, 2012), (Ghisellini, P., Cialani, C., Ulgiati, 2016). stated that through a circular

economy it is able to create a balance between the environment and the economy and will directly have an impact on sustainable development.

This can pollute the environment and pose health risks to humans by damaging human tissue and potentially causing various diseases. As a result, this will have an impact on achieving sustainable development goals. (Torado, M.P., & Stephen, 2016) states that the Sustainable Development Goals (SDGs) are to increase people's income and welfare in order to reduce levels of poverty and inequality by always paying attention to the environment. In line with the development of science and technology (IPTEKS) an analysis of the application of the circular economy concept is needed so that it can help overcome various problems arising from the application of a linear economy which tends to use the 'take-use-dispose' concept so that it worsens environmental conditions. The circular economy is currently concept promoted by the European Union, as well as several countries including France, Canada, the Netherland, Swaden, China, Japan the United Kingdom and Finland along with various business sectors worldwide.

(Torado, M.P., & Stephen, 2016), (Korhonen, 2004), explain the concept of a circular economy creates management by reducing the production and consumption of a product. (Ferrão, 2023) have stated that circular economy practices, waste management, accountability and management accounting practices contribute to achieving the goals of ecosystem protection and sustainable development. West sumatera is one of the provinces in Indonesia that finds it difficult to implement a Circular Economy system. Judging from its geographic location and natural resources, west sumatera has good natural resources to be developed for economic development. Based on existing phenomena and the Covid-19 pandemic, the existing linear economic system is increasingly weaking, namely unproduktiv land and increasing household waste.

Based on this, it can be seen that the circular economy is an economic model that aims to produce economic growth by paying attention to environmental aspects generated by the linear economic approach. Through a circular economy, an economic system will be managed to optimize the use of resources by paying attention to environmental aspects by reducing waste produced by economic activities. The concept of a circular economy aims to encourage that a product can be processed again with the of reduce, reuse, recycle, refurbish and renew. (Ramadani, 2023) The implementation of a circular economy can increase environmental resilience, social welfare of society, reduce environmental damage, increase the formation of added value of new products as well as increase green economic growth in line with sustainable development goals. Therefore, circular economy can enhance the economy and the quality of the environment, as well as benefit future generations, based on the business model and consumption patterns of society.

When viewed from an Islamic economic perspective, the principles of a circular economy are in line with the values and teachings of the Islamic religion which encourage environmental awareness, social justice and wise management of resources. This can be seen in a circular economy where resource management is wise by promoting resource management which is in line with the concept of spending wealth in a good way in Islam. Through efficient use of resources and recovery of recycled materials that can help maintain environmental sustainability and protect the gifts God has given to humanity. This in islam, environmental awareness is recognized as the responsibility of the Ummah. Allowing waste can damage the environment, therefore, the concept of recycling and remanaging waste properly in islamic teachings is considered a wise action.

Reacycling practices not only preserve nature, but can also boost the economy by creating job opportunities and reducing wastage of natural resource (Listyadewi, 2023). Based on this, in this study the research team attempted to explain the compatibility between the circular economy concept based on green economy and the Islamic economic concept based on the Al-Qur'an and hadith. With the aim of achieving sustainable development that is environmentally friendly so that benefits for humans are realized. Based on this, the researcher is interested in conducting this research with the proposed title **“Analysis of the Circular Economic System Using the Causal Loop Diagram Method Based on the Green Economy an Islamic Economic Perspective in West Sumatera”**.

## 2. Literature Review

### 2.1 Understanding Circular Economy

A circular economy is often described as an economic system that combines the reduction, reuse and recycling of activities that require systemic change whose primary goal is to increase the economic and environmental value of future generations. According to (Julian Kirchherr, Denise Reike, 2017), (Chengkang Gao , Chengbo Gao , Kaihui Song, 2020), (Bassi et al., 2021) A circular economy is most frequently depicted as a combination of reduce, reuse and recycle activities. Furthermore (Belmonte-Ureña, L.J., Plaza-Úbeda, J.A., Vazquez-Brust, D., Yakovleva, 2021), (European Commission, 2018) argue that the use of renewable energy has a strong impact on economic growth. Therefore, with product innovation in business, this will have a positive impact on the economy and the environment. (Kasztelan, 2017), (Swarr et al., 2011), (European Commission, 2018), (Rizos et al., 2017) argued that the productivity of resources and the recycling rate have a direct and significant impact on economic growth.

(Julian Kirchherr, Denise Reike, 2017) proposed to organize the economy as a circular system to ensure a sustainable development. This is in line with (Walters et al., 2016), (Lewandowski, 2016), (D'Amato et al., 2017) the environmental conservation benefits both the economy and the society. This new economic model has been developed to defeat the traditional model based on the principle "take, make and dispose". (Lewandowski, 2016), (EEA, 2017) in particular of circular economy business and consumption models implying the selling of a service (instead of a product) or its leasing, refurbishment and remanufacturing. (D'Amato et al., 2017), (Nakamura & Kondo, 2018), (Rizos et al., 2017) explains that circular economy also requires producers and consumers to become more active participants in the recycling or reuse of products, forgetting about the passive "throwaway" culture of the linear economy. Based on the opinions and theories of these experts Circular Economy could help the transition to a degrowth path, that is less resource use with increasing wellbeing.

## **2.2 Circular Economy, Green Economy and Sustainable Development**

One of the expected outcomes of a circular economy is essentially the existence of means to realize new aspirations and hopes for economic management, and in particular to overcome the failures of liberal economies. According to (Sinha, 2022) that the existence of a circular economy is a step forward in the journey of sustainable development, because it seeks to create an economic model that separates the use of resources from natural resources by reusing waste products of consumption and production as new input variables in the economy. Therefore a circular economy can provide solutions, especially to overcome the environmental impact of production systems. With a circular economy then not only to transform and increase productivity, but also to make the production system truly environmentally friendly and sustainable (Korhonen et al., 2018).

(Thuy Ngoc & Tu Anh, 2016), (D'Amato et al., 2017) Green economy is an economic concept that aims to improve the welfare and social equality of society, while reducing the risk of environmental damage. This is in line with the circular economy which strives for a circular economy is an economic system designed to dispose of waste, use everything effectively and efficiently by paying attention to environmental aspects. (Rizos et al., 2017). Based on this, by carrying out a circular economy analysis based on green economy, it can have a positive influence on sustainable development, especially in dealing with problems related to socio-economic and environmental issues (Thuy Ngoc & Tu Anh, 2016) stated that there are three global issues that pose a threat to achieving sustainable development goals, including poverty, air pollution and biodiversity which are the three main pillars of sustainable development that have become a problem (Kasztelan, 2017)(Belmonte-Ureña, L.J., Plaza-Úbeda, J.A., Vazquez-Brust, D., Yakovleva, 2021).

## **2.3 Circular Economy from an Islamic Perspective**

Islam teaches that cleanliness is part of faith. Based on this, circular economic principles integrated with religious values can encourage society towards environmental awareness, social justice and wise resource management. Furthermore, with a linear economic approach that is able to maximize profits but ignores the long term with the concept of "take-use-dispose" which results in waste and environmental damage. As Allah says Subhanahu Wara'ala in the Qur'an Surah Ar-Rum Verse 41, which mean "it has been seen that corruption on land and in the sea is caused by the works of human hands, so that they may return (to the right path)" (RI, 2016). The above verse confirms that human activity is the cause of various damages that may

occur on land as well as at sea.

Humans were not only created to worship God, but they were also appointed caliphs of the earth. Harnessing and safeguarding nature is the role of humans. However, it is human green and bad habits that cause environmental damage and its impact us (Fona et al., 2024) and (Nasution, 2022). Based on this, the circular economy is an economic approach that is appropriate from an Islamic perspective to always protect the environment. Therefore, for the sake of human survival, must protect the environment, one of them is the implementation of a circular economy based on a green economy (Joko Hadi Purnomo, 2022) and (Hidayatullah & Purwanto, 2024). Based on theory, opinions and previous research, by analyzing a circular economic system based on a green economy, sustainable development goals can be achieved in the province of West Sumatra. Through a circular economy, products and materials can be recycled, renewed or changed into new products.

Furthermore, with the compatibility between the concept of a circular economy based on green economy and the concept of Islamic economics based on the Al-Qur'an and hadith, human benefit which is reflected in the achievement of environmentally friendly sustainable development goals can be achieved. Therefore, by studying the analysis of a green economy based circular economic perspective and its principles, it can increase human awareness in developing a green economy based circular economy which has an impact on achieving sustainable development goals. Furthermore, it can bring prosperity to society as a whole.

### 3. Research Methodology

This research is a type of Research and Development (R&D) research which is development research in order to produce and test a theory so that a new theory is obtained that supports the achievement of a circular economic system based on a green economy. This research uses a qualitative method with the tool used in the form of a Causal Loop Diagram. Furthermore, data collection techniques were carried out using observation techniques, distributing questionnaires and documentation. The data analysis technique uses descriptive qualitative by reducing the data, presenting the data in the form of pictures, tables and descriptions and ending with a conclusion. This carried out in several stages, starting with defining and discussing a topic, establishing about the problem, collecting and analyzing literature, collecting data, analyzing data and drawing conclusions.

This research is structured as follows: (1) analysis of variable key circular economic ; (2) conduction multiple linear regression analysis (3) Analysis was carried out using Causal Loop Diagrams with qualitative descriptive methods using data collection techniques in the form of secondary data, namely by means of library research from books, journals, websites and newspapers (4) the influence of the circular economy on achieving development goal and it is relation to the Islamic economic perspective.

### 4. Results and Discussions

#### Multiple Linear Regression Analysis

Multiple linear regression was carried out on the application of the 5R (Renew, Recycle, Refurbish, Reuse, Reduce) has principle. The results of research using the ANOVA test taking into account the F value are as follows:

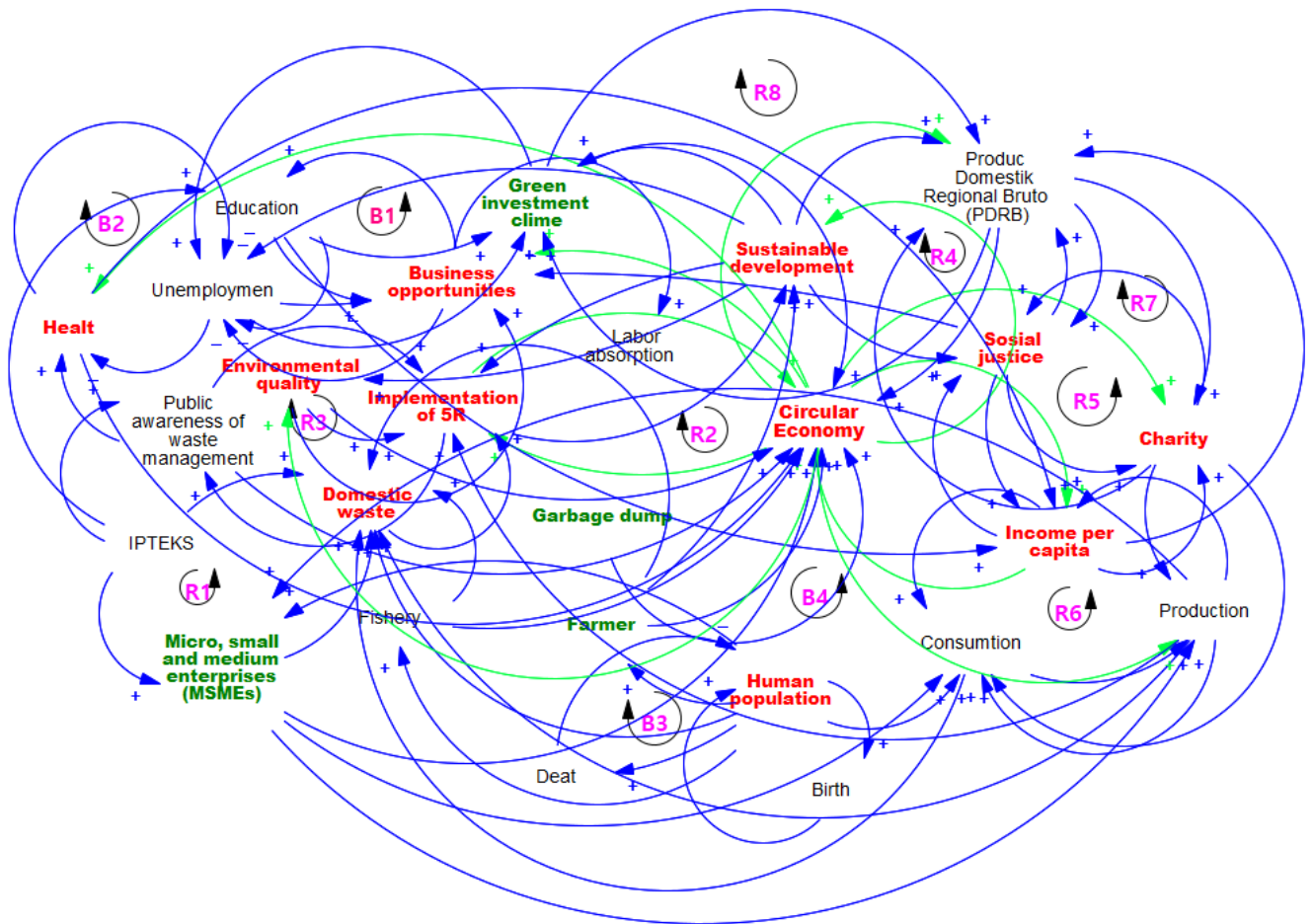
Table 1. ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig
1 Regression	1949.752	5	389.950	3033.484	.000 <sup>b</sup>
Residual	89.213	694	.129		
Total	2038.964	699			

Based on the results of the multiple linear regression analysis in the table above, it can be seen that the application of the 5R principle (Renew, Recycle, Refurbish, Reuse, Reduce) has a significant effect on Circular Economy Based on Green Economy in West Sumatra.

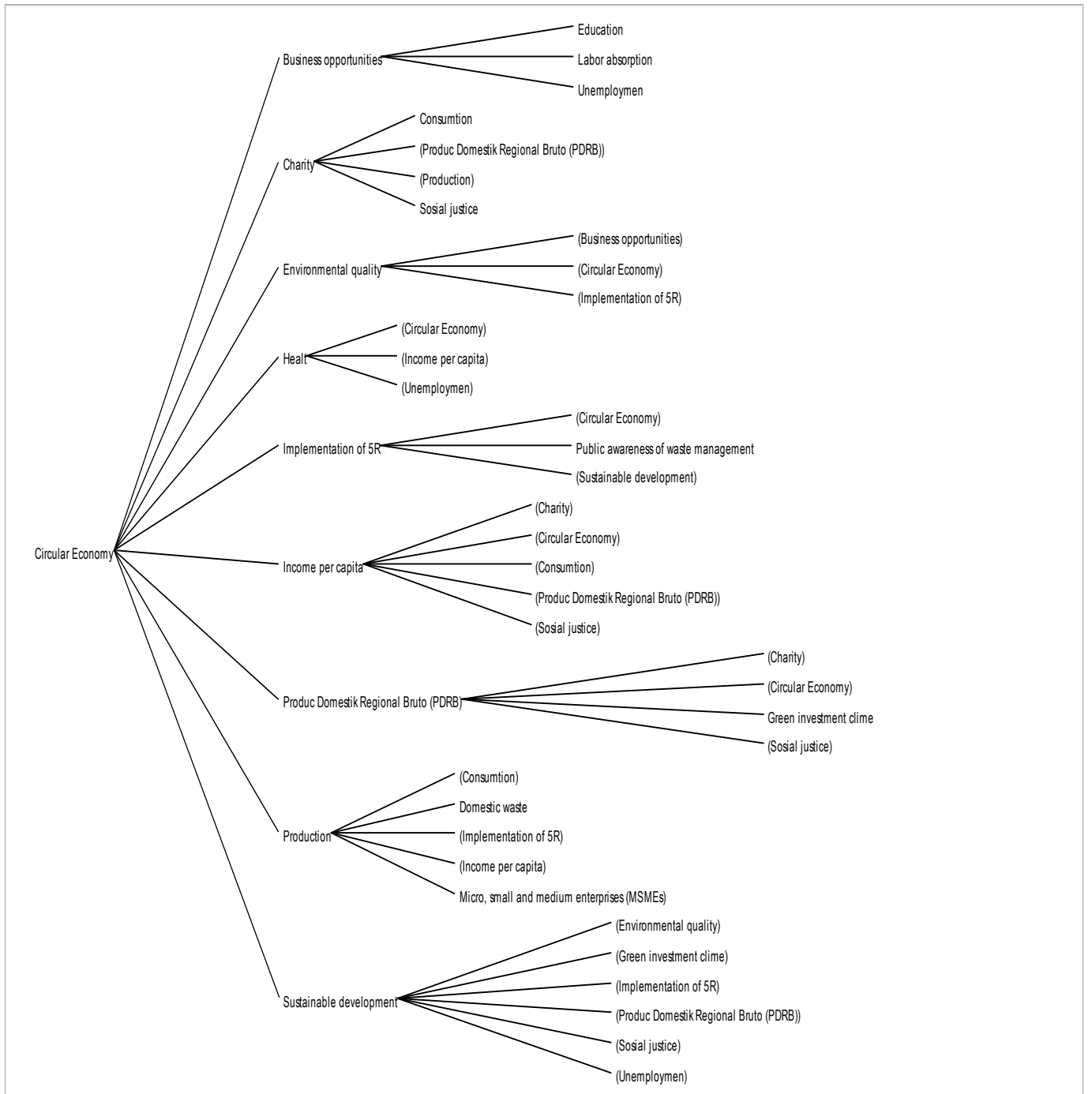
#### Circular Economic and Various Sector

A circular economy is an economic system designed to optimize the use of resources, reduce waste and maximize efficiency in order to achieve sustainable development goals so that it has an influence on various sectors. This can be seen from the analysis results in the image below:



**Figure 1:** Analysis of Circular Economic System Using the Causal Loop Diagram

Based on the picture above, it can be seen that a circular economy using the principles of an Islamic economic perspective can be an effective approach in achieving sustainable development goals.. Furthermore, from the output produced in processing the data and information obtained from the literature review, the following results were obtained, namely:



**Figure 2:** The Influence of The Circular Economy on Various Sector

Based on the results of the analysis using the Causal Loop Diagram in figure 1 and figure 2, the results of the circular economic analysis based on the green economy are as shown in the table below:

**Table 2:** Circular Economic Relationship Various Sector

Number	Sector	Causal influence
1.	Business Opportunities	Education, Labor absorption, Unemployment
2.	Charity	Consumption, PDRB, Production, social justice
3.	Environmental Quality	Business opportunities, circular economy, implementation of 5R
4.	Health	Circular economy, income per capita, unemployment
5.	Implementation of 5R	Circular economy, public awareness of waste management, sustainable development
6.	Income Perkapita	Charity, circular economy, consumption, PDRB, social justice
7.	Product domestic Regional Bruto	Charity, circular economy, green investment climate, social justice
8.	Production	Consumption, domestic waste, implementation of 5R, income per capita, MSMEs
9.	Sustainable Development	Environmental quality, green investment climate, Implementation of 5 R, PDRB, social Justice, unemployment

Based on the results of the analysis of the circular economic system using a causal loop diagram based on green economy that has been carried out, it can be seen that the circular economy is in line with the Islamic economic perspective which is based on the Koran and Hadith which encourages environmental awareness, social justice and wise resource management. Furthermore, aligning circular economics with an Islamic economic perspective is as follows:

#### **Principles of Wise Resource Management.**

This is in line with the concept of spending wealth in a good way in Islam. Through efficient use of resources such as the application of the 5R concept (reduce, reuse, recycle, refurbish, renew) this can help in maintaining nature conservation, environmental sustainability and protecting the gifts that Allah SWT has given to mankind. This can be seen in the circular economy analysis R1 and R3. This is supported by research conducted by (Ghisellini, Cialani, and Ulgiati 2016); (Fernandes and Ferrão 2023); (Fona, Hasibuan, and ... 2024); (Muh. Fathoni Hasyim, Liliek Channa AW, Basuki, and Ahid 2020).

#### **Principle of Minimal Waste Disposal**

This is in line with Islamic economic principles regarding environmental maintenance as an obligation for all mankind. Therefore, by turning waste into a valuable resource, humans in running a business must integrate with Islamic principles or business ethics in Islam. This can be seen in the circular economy analysis of R2, R3 and B1. This is supported by research conducted by (Purwanti 2021); (Li 2012); (Hidayatullah and Purwanto 2024); (Nasution 2022); (European Commission 2018); (Listyadewi 2023); (Nakamura and Kondo 2018).

#### **Principles of Social Justice and Growth**

This means that a circular economy can strengthen the principles of social justice from an Islamic economic perspective. Circular economy emphasizes the importance of ensuring human equality such as access to economic opportunities, zakat, health, education, decent income. So that through a circular economy we will be able to reduce poverty and unemployment levels. This can be seen in the circular economic analysis R4, R5, R6, R7, R8, and B1, B2, B3. This is supported by research conducted by (Belmonte-Ureña, L.J., Plaza-Úbeda, J.A., Vazquez-Brust, D., Yakovleva 2021); (Nasution 2022); (Thuy Ngoc and Tu Anh 2016); (Hasoloan 2013); (Ghisellini et al. 2016).

## Principles of Sustainable Development

This means that in an Islamic economic perspective, humans are considered as caliphs who have the responsibility to take care of nature. So that through circular economy principles, business people in running their business should always care for the environment, reduce waste, implement the 5R concept (reduce, reuse, recycle, refurbish, renew) so as to minimize environmental damage. This can be seen in the circular economic analysis R2, R3, R4, R8, B1, B4. This is supported by research conducted by (Belmonte-Ureña, L.J., Plaza-Úbeda, J.A., Vazquez-Brust, D., Yakovleva 2021); (Kasztelan 2017); (Bassi et al. 2021); (Leach et al. 2018); (Piscicelli 2023).

## 5. Conclusion

Circular economy is an economic concept that is environmentally friendly. Viewed from an Islamic economic perspective using the green economy-based Causal Loop Diagram method, the results show that circular economics is integrated with Islamic economic principles, namely integrated with the principles of wise resource management; the principle of minimal waste disposal, the principle of social justice and economic growth and the principle of sustainable development. This proves how important it is to implement a Circular Economy System in West Sumatra Province to achieve sustainable development goals. Furthermore, for future research, it is recommended to carry out further research with more comprehensive and in-depth topics and with sustainable control, the Circular Economy can provide long-term benefits for Indonesia, especially West Sumatra.

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