Extended Producer Responsibility (EPR) As Corporate Social Responsibility: A Bibliometric Analysis

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ABSTRACT

Activity of production results in waste from plastic materials increasing every year. This condition requires the government to make a policy that can control the amount of unmanaged plastic waste. One of them is with extended producer responsibility (EPR). This article aims to analyze the publication trend of scientific research results related to EPR. The results in network visualization, the most commonly found keyword is extended producer responsibility. This can be seen that the keyword extended producer responsibility has a larger circle size than other keywords. The larger the size of the circle, the more widely used the keyword has been. In the visualization of the latest overlay regarding a research topic, it is shown in brighter colors. Bright yellow colors are review, cooperation, and plastic waste. Meanwhile, keywords with darker circles are problem, government, and corporate social responsibility. This illustrates that the topic has been discussed for quite some time. The results of the visualization showed that the keywords legal framework, problem, solution, cooperation, and corporate social responsibility looked dimmer than other keywords. This shows that these keywords are still few and not diverse in research and so there is opportunity to be used as research in the future.

Keywords: producer, social, responsibility, enveronmental

1. INTRODUCTION

One of the problems that is being faced by modern society today is waste. The increasing population, the accelerating level of industrialization and the shift in people's consumption patterns will result in the volume, type and variety of waste characteristics which are increasingly uncontrollable. Moreover, the problem of waste with a population of approximately 260 million people is a scary thing for countries, especially like Indonesia. Waste that is not handled properly will have an impact on polluting the environment and disrupting environmental sustainability (Kusuma et al., 2014). Waste is the remains of human daily activities and/or natural processes in solid form. Waste managed according to the law consists of household waste, household-like waste, and specific waste. Household waste is waste that comes from daily activities in a household, except for feces and specific waste. Household-like waste is waste that comes from commercial areas, industrial areas, special areas, social facilities, public facilities, and/or other facilities. Plastic waste is one of the problems experienced by various countries in the world (Fauzi et al., 2024). Plastic is one of the human inventions that has properties like a double-edged sword on the one hand, plastic helps humans in their daily activities, but the uncontrolled existence of plastic also affects the environment which will ultimately have a negative impact on humans (Syahroni & Sholehuddin, 2022). This can happen because waste has properties that are difficult to decompose. Knowing its properties that are difficult to decompose does not reduce the amount of waste, what is happening now is an increase in waste accumulation every year. Various industries in the world use plastic to package their products. In the long term, plastic waste pollution causes damage to human health, ecosystems, and the climate. Meanwhile, plastic production has always increased from year to year. This increase is mainly due to the increasing demand or need for plastic packaging. Plastic production has increased 20-fold since 1964. In 2014, production reached 311 million tons, and will double in the next 20 years and quadruple by 2050. Although plastic is a useful product, around 50 percent

is only used once and thrown away (Alfitri et al., 2024). The instant food and beverage industry, for example, chooses aluminum foil-coated plastic or multilayer plastic as packaging because it is considered safe and can keep the product fit for consumption. In addition, this packaging material does not increase production costs. Manufacturers can still sell retail products at affordable prices. The same thing is done by manufacturers of shampoo, candy, milk and medicines. Aluminum foil-coated plastic packaging replaces glass, cans and paper as packaging materials. So at the same time, without realizing it, industrial products are abundant, human needs become complex, people continue to shop and need bags to carry their goods. With the presence of plastic, it then becomes the answer to current needs because plastic has characteristics that are cheap, strong, light, rust-free, thermoplastic, can be labeled with various creations, can always be made attractive and can be an effective branding tool (Malihah & Nazairin, 2023). Plastic can finally be found with certain business brands in supermarkets, bookstores, boutiques, electronics stores to baby supply stores (Hosien, 2022). Before plastic bags appeared, humans used bags made from natural materials such as knitted rattan roots, leaves and cloth. Currently, even though they have brought quite large bags, many people still ask for plastic bags when shopping because currently plastic has become part of the human lifestyle from remote areas to cities.

2. LITERATURE REVIEW

Indonesia is the second largest contributor of plastic waste leaking into the ocean after China. According to the Ministry of Environment and Forestry, the waste produced by Indonesian citizens reaches 0.8 kg per person per day with a composition of 15% plastic waste which accumulates as much as 189 thousand tons of waste per day. Therefore, the high amount of waste production must be comparable to the percentage of waste that is processed while the rest is not managed and can cause environmental pollution (Maskun et al., 2023). Indonesia already has special regulations related to the waste problem, namely Law No. 18 of 2008 concerning Waste Management. The existence of the Waste Management Law still leaves legal uncertainty which causes ineffectiveness in overcoming various waste problems that are growing rapidly along with the increasing population and increasing public consumption (Wibowo et al., 2023). The existence of the polluter pays principle has been widely recognized in the environmental legal regime. However, the normative power of this principle is still vague in a special mechanism to facilitate and urge business actors or producers to be responsible for the products/packaging they produce until they eventually become waste. Although based on Article 15 of the Waste Management Law, it is stated that producers are required to manage packaging and/or goods they produce that cannot or are difficult to decompose by natural processes. In the development of environmental law, this is referred to as the principle of Extended Producer Responsibility (EPR) which can simply be interpreted as the principle of extended producer responsibility (Verawati, 2018). Extended Producer Responsibility (EPR) is a responsibility that must be carried out by producers to be able to collect the plastic waste they produce or by changing the design of their products to be more environmentally friendly or easy to recycle (Saefudin, 2020). EPR aims to shift the responsibility for environmental management from the community to producers (Malinda & Maharani, 2024). EPR encourages producers to design their products to be more durable, recyclable, or easy to recycle. This reduces the amount of waste that goes into landfills. EPR supports the recycling industry and promotes the reuse and recovery of products, which helps reduce pressure on natural resources. Many countries and regions have implemented regulations on EPR efforts that require producers to be responsible for the management of their product waste, thereby maintaining compliance with the regulations.

Waste is still a problem that has not been fully resolved in Indonesia. (Muhardono et al., 2023), Usually the last way to destroy plastic is by burning it, namely to eliminate the unsightly

view that can disappear from sight in an instant, so it is known that community involvement in reducing the use and recycling of plastic is still very minimal. This can be seen that the waste that we have so far just thrown away can actually be reprocessed, including in the form of crafts with economic value, artistic and unique taste and the potential to manage plastic waste by utilizing plastic into creative products can provide added value and livelihood. Therefore, waste must be processed or recycled properly so as not to pollute the environment and interfere with human health (Nurmalasari et al., 2024). However, the responsibility of producers to manage waste from the packaging they produce is not impossible to implement in Indonesia. Of course this is not easy, because it instinctively contradicts the basic principles of the company to obtain maximum profit, by increasing production costs. But this must be done for sustainable efforts, to ensure that the carrying capacity and environmental capacity still allow for future human activities. So that all possible efforts need to be tried to maximize efforts to overcome the problem of plastic waste which has become a global problem today. Therefore, the focus of this study is to determine the research trend regarding Extended Producer Responsibility (EPR) as a corporate social responsibility. With the bibliometric analysis method in seeing the development of trends that are developing in research and it is hoped that it can be used as a reference for researchers who are interested in taking up the topic of discussion about Extended Producer Responsibility (EPR). Given that this topic has the potential to continue to develop because recently the topic of EPR has developed rapidly in the realm of international environmental law. By using Vosviewer software which is used as a tool to help bibliometric analysis to see trends, patterns, and areas that are right on target for use in future research

3. METHOD

This research is a descriptive quantitative research with a bibliometric approach. Bibliometrics is a method used, namely several articles with a certain topic that are summarized into one (Susanti et al., 2022). This type of research focuses on observing the development of research publication trends obtained from database applications on a topic. The search for research articles was carried out using the Harzing's Publish or Perish application. Then mapping and grouping were carried out through bibliometric visualization assisted by Vosviewer software and analysis was carried out which then conclusions were drawn from the results of the analysis (Amaliyah et al., 2023). Data collection by searching for scientific literature using keywords identified using a bibliometric database, one of which is Google Scholar (Paujiyah, 2023). The data obtained came from the Google Scholar database based on the Open Journal System (OJS) which discusses Extended Producer Responsibility (EPR) for the period 2000-2023. Google Scholar is used as a data source in this study because Google Scholar is the largest database compared to other data sources and also access to published articles is greater and is accessed for free compared to Scopus or Web of Science. The development of research related to Extended Producer Responsibility (EPR) resulted in a search of 100 documents that were downloaded and then saved in RIS format. The results of data export in RIS format were then processed and analyzed using Vosviewer software. The results of the analysis display three visualizations, namely network visualization, overlay visualization, and density visualization. Through this scientific writing, it is hoped that it can provide references for further research to use discussion topics that are still rarely used.

4. RESULTS AND DISCUSSION

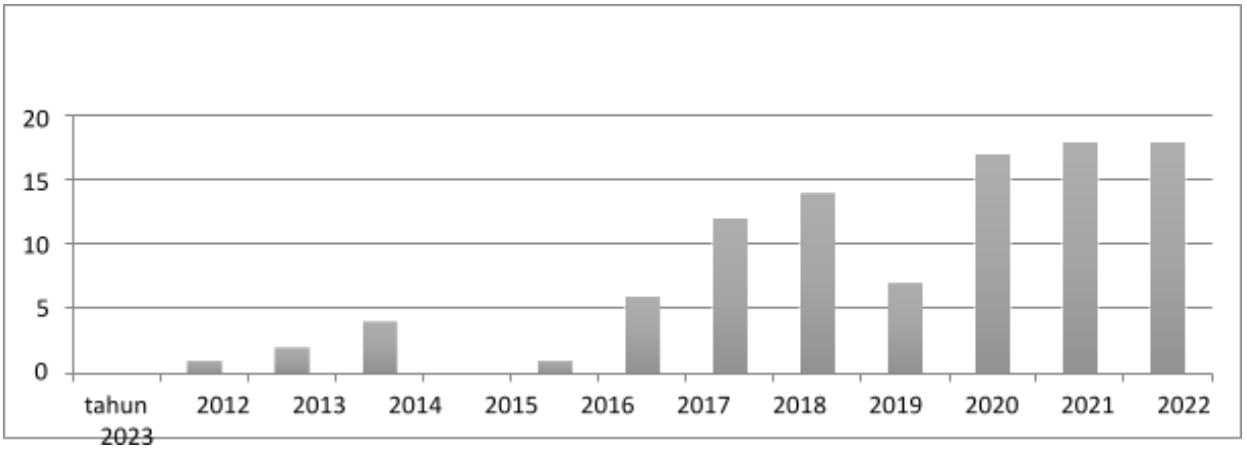
Table 1.
Research Development on Extended Producer Responsibility (EPR) in Indonesia 2000-2022

Years of Publications	Number	Percentage
2000	0	0%
2001	0	0%
2002	0	0%
2003	0	0%
2004	0	0%
2005	0	0%
2006	0	0%
2007	0	0%
2008	0	0%
2009	0	0%
2010	0	0%
2011	0	0%
2012	1	1%
2013	2	2%
2014	4	4%
2015	0	0%
2016	1	1%
2017	6	6%
2018	12	12%
2019	14	14%
2020	7	7%
2021	17	17%
2022	18	18%
2023	18	18%
Amount	**100**	**100%**

Source: Processed by the author, (2024)

Table 2.

Research Development Graph on Extended Producer Responsibility (EPR) in Indonesia 2000-2022



Based on the table and graph above, it is known that publications related to EPR only existed in 2012, where in that year there was only one publication with the theme of EPR. Then in 2013- 2014 it began to increase by 2 to 4 publications with the theme of EPR. However, in 2015-2016 there was a decline, there was only 1 publication in 2016 while in 2015 there were no publications researching the theme of EPR. Research with the theme of EPR increased again in 2017-2019 by 6 to 14 publications. It decreased again with only 7 publications in 2020. Furthermore, in 2021-2022 it increased by 17 to 18 publications, while in 2023 there was no increase, there were only 18 publications the same as in 2022. Thus, the development of research with the theme of EPR has fluctuated from year to year. The bibliometric analysis in this study uses the Vosviewer application. There are 100 scientific works on Extended Producer Responsibility (EPR) obtained from 2000-2023 published on Google Scholar which are downloaded in RIS format via the Publish or Perish application which will later be processed in Vosviewer. Then the researcher carries out the process of filtering the intensity of keywords displayed in the visualization to form 7 clusters or mapping groups. From the data processing using Vosviewer, three visualizations are produced, namely network visualization, overlay, and density.

Table and figure are centered in the position. The table title must be written over the table, and the figure title must be under the figure. Both are written in Times New Roman, 10 point. The font used in the table is Times New Roman 10 point and 1 space. Tables should be illustrated as simply as possible to avoid misprints. The Table and Figure must be referred in the paper. The Table and Figure are inserted as close as possible to the description that refers them for the first time. The numbering of the Table and Figure is arranged from the number 1 onwards. The example of table can be seen in the Table 1. Fonts for the information of the Figure should be bigger and more visible, so it can be read easily.

1. Research Mapping on Extended Producer Responsibility (EPR) in Indonesia

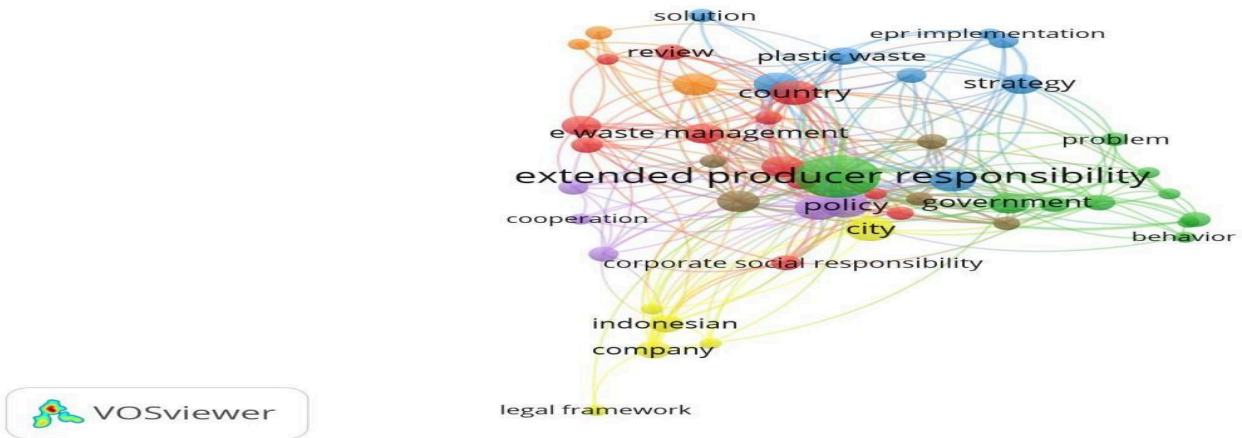


Figure 1. Network Visualization About Extended Producer Responsibility (EPR) in Indonesia 2000-2022

Network Visualization or network visualization illustrates the relationship between keywords in one scientific work and another. In this visualization, items are indicated by the size of the circle. The larger the circle size, the higher the intensity of research containing the words in the item (Amaliyah et al., 2023). Based on the image of the results of the publication network visualization with the EPR theme from 2012-2023, there are 49 items or keywords related to EPR, 7 clusters or keyword groups, and a total of 453 lines (links). The first keyword in red consists of Conceptual framework, corporate social responsibility, country, e-waste management, epr concept, industry, producers responsibility, product, review, role, state, and waste bank implementation. The second keyword in green is Behavior, community participation, comparative study, electronic waste, electronic waste management, extended producer responsibility, government, obligation, problem, and waste bank. The third keyword in blue consists of Challenge, circular economy, epr implementation, plastic waste, solution, strategy, waste management, and waste management policy. The fourth keyword in yellow is City, company, electronic waste recycling, Indonesian, legal framework, and waste concept. Then the fifth keyword in purple consists of Cooperation, Indonesian government, policy, program, and recycling. Furthermore, the sixth keyword in brown is Case study, electronic product, environment, manufacturer, and recovery. Finally, the seventh keyword in orange consists of Conceptual model, e-waste management system, and regulation. Of all the keywords, the most frequently found keyword based on network visualization is the keyword extended producer responsibility. This can be seen that the keyword extended producer responsibility has a larger circle size than the other keywords. The larger the circle size, the more the keyword has been used in relation to research with the EPR theme.

2. Overlay Visualization

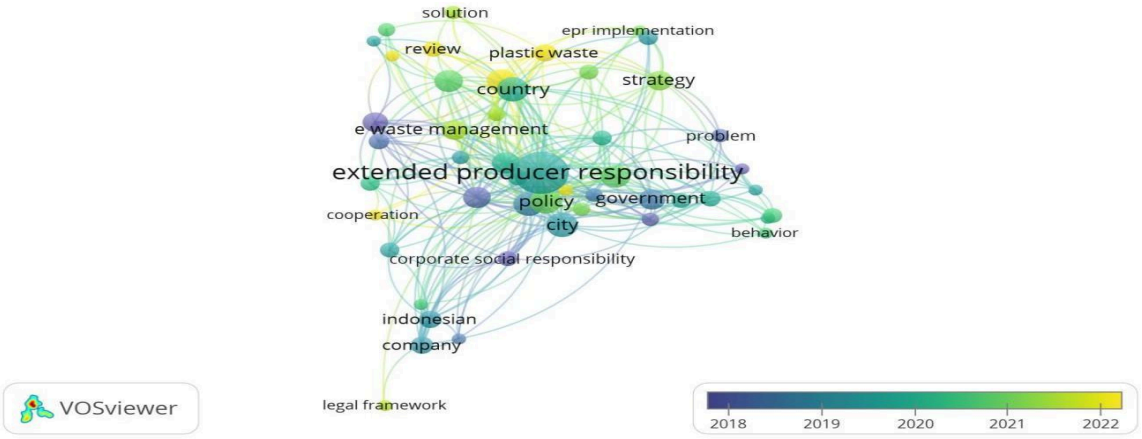


Figure 2. Overlay Visualization About Extended Producer Responsibility (EPR) in Indonesia 2000-2022

Overlay visualization shows several keywords related to extended producer responsibility (EPR) based on the year of publication. It can be seen in the image that the time span in the visualization is from 2018 and below, waste 2022 and above. Through this visualization, the novelty of the topic related to EPR can be seen. The color shown is the more yellow the connecting line color, the younger the year of the research and the topic has been discussed in recent years but with not too many studies (Ardiansyahroni et al., 2023). If the color of the circle is darker, this indicates that the topic has been discussed for a long time. With this visualization, the novelty related to the research can be seen and gaps can be found through the keywords displayed. In the overlay visualization, the novelty of a research topic is shown in a brighter color. Based on image 2, keywords in bright yellow, namely review, cooperation, and plastic waste, were widely published in 2022. These keywords indicate the novelty of the EPR topic in Indonesia. While the keywords with darker colored circles are problem, government, and corporate social responsibility. This shows that the topic related to the keyword has been discussed for quite some time.

5. Density Visualization

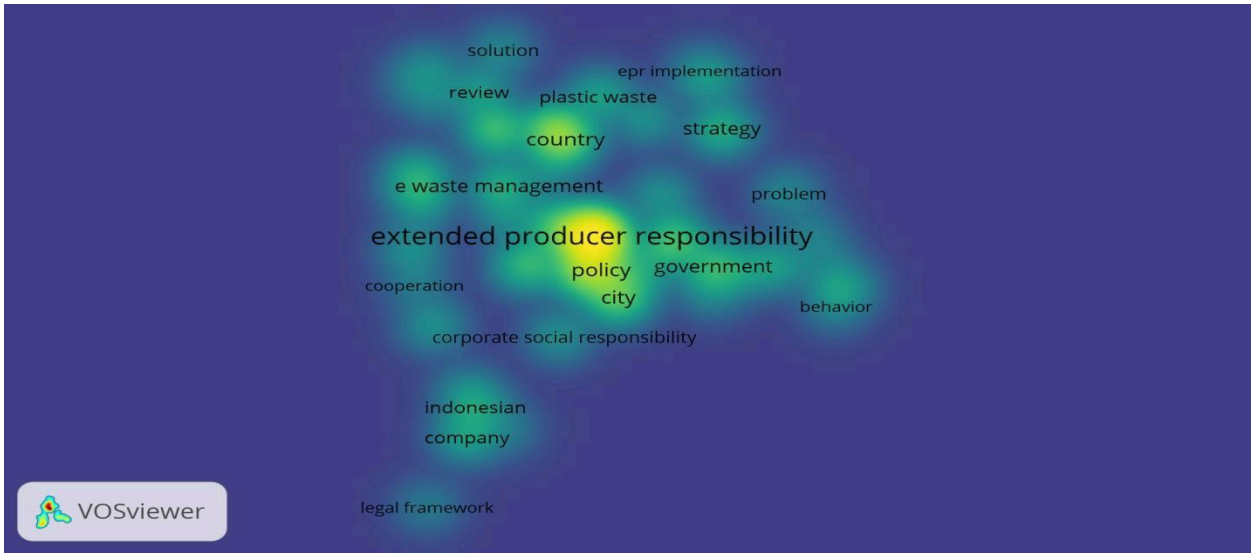


Figure 3. Density Visualization About Extended Producer Responsibility (EPR) in Indonesia 2000-2022

In the visualization of area density with lower light intensity indicates topics that appear less frequently or are less related to the analysis (Judijanto et al., 2023). In the visualization above, it is shown with a color that tends to be dimmer. The brighter the color that appears in this visualization related to a topic means that the topic is often studied by researchers and the dimmer the color in the visualization, the less the topic is studied.

Based on the results of the density visualization, it can be seen that the keywords legal framework, problem, solution, cooperation, and corporate social responsibility related to the EPR topic appear dimmer than other keywords. This shows that research containing these keywords is still limited and there are not many studies that examine and have the opportunity to be used as research in the future.

In reality, unmanaged and unutilized waste will be a factor causing pollution and environmental damage, this is in line with Sumartini et al., (2021) which states that waste if utilized and managed properly will bring economic opportunities. A firm framework and policy are needed regarding waste management so that it can reduce the impact of environmental damage (Septianingrum et al., 2023). Producers and consumers are subjects of environmental pollution, especially in river flows, the government as a policy maker has the authority to regulate waste management, one of which is through EPR (Sani, 2022). Awareness and active role of the community are very much needed to overcome the impact of environmental damage (Malihah, 2022). Social and cultural factors of the community also play an important role in environmental improvement efforts (Tristiana, 2018).

6. CONCLUSION

Publications related to EPR in Indonesia have only been around since 2012 and increased in 2023. In the network visualization, the most frequently found keyword is extended producer responsibility. This can be seen from the keyword extended producer responsibility having a larger circle size than other keywords. The larger the circle size, the more widely the keyword has been used. In the visualization of the expanse of the novelty regarding a research topic, it is shown in a brighter color. Keywords with bright yellow colors are review, cooperation, and plastic waste. While keywords with darker colored circles are problem, government, and corporate social responsibility. This illustrates that the topic has been discussed for quite a long time. The results of the visualization of the density show that the keywords legal framework, problem, solution, cooperation, and corporate social responsibility look dimmer than other keywords. This shows that these keywords are still few and not diverse in research and therefore have the potential to be used as research in the future.

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