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Implementation Of Indonesia's Cooperation With Denmark In Waste Management

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ABSTRACT

Garbage is a problem for every country in this world, including Indonesia that has large population and is related to the amount of garbage in Indonesia. To slove this problem Indonesia goverment need thecnology and good waste management in Indonesia. Denmark has good waste management and thecnology to turn waste become energy, because of that Indonesia coorperates with Denmark in waste management. This study aims to describe the coorperation between the Indonesia and Danish (Denmark) goverment in waste management in DKI Jakarta. The methedodology used is descriptive qualitative through secondary data which then answerd by using international cooperation theory and waste management concept. The results showed that in the collaboration carried out by Indonesia and Denmark, there were 8 points of cooperation but only 2 points were implemented in DKI Jakarta, namely pilot projects, planning, including technology transfer and regulations in certain provinces and cities or regencies, in this point of cooperation Indonesia and Denmark built PLTSa in DKI Jakarta, precisely at TPST Bantargebang, this PLTSa waste management method uses waste and uses steam from its combustion to be used as electricity and capacity building through workshops, training, scholarships, internships and seminars, which are manifested in Information Transfer (ToI) to monitor the waste management system in Indonesia and the efficiency of energy use and utilization, which is carried out in two programs, namely Capacity Building: Training for Jakarta Building and Energy Efficiency Seminar, in this program Denmark aims for Indonesia to conduct Business Par partnerships with partners energy company in Denmark.

Keywords *Implementation, Cooperation, Indonesia, Denmark, Waste Management, DKI Jakarta*
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INTRODUCTION

Based on data from the World Bank, it is revealed that there will be an increase in the amount of waste in countries in the world by 70 percent from 2012 to 2025, with the amount of waste of 1.3 billion tons per year to 2.2 billion

tons per year. Unmanaged waste is a source of environmental pollutants both for water, soil and air and will be the cause of environmental imbalances so that the problem of waste and its management becomes a very priority problem to be resolved immediately. Waste is one of the complex problems faced by developing countries and developed countries in the world, including Indonesia.

Waste that has not been managed by the Indonesian government is 24% or around 15 million tons of waste from the 65 million tons of waste produced, the unmanaged waste pollutes the ecosystem and the environment, while only 7% of the return is managed, and the remaining 69% is in landfills (litbang.kemendagri.go.id, 2018).

This waste problem also occurs in several provinces and cities in Indonesia, the problem of waste is the increase in waste without good management or recycling. The largest producer of waste is in Java Island. Java Island has many provinces and one of them is DKI Jakarta. DKI Jakarta is a province with a large waste producer. DKI Jakarta as a province with a population of around 10.25 million people (in 2016) is estimated to produce waste produced by 7,099.08 cubic meters, an increase from 7046.39 in the previous year (sampahmasyarakat.com, 2016).

This problem then encourages Indonesia to cooperate with Denmark, the Government of Indonesia through the Ministry of Environment and Forestry (KLHK) cooperates with the Danish government to carry out waste management which has been the main problem. Siti Nurbaya, who is also the Minister of the Ministry of Environment and Forestry, said that their party wants to work with the Indonesian Government to manage waste into energy sources. Cooperation with Denmark was agreed by the Indonesian government because Denmark has technology and experience in dealing with waste problems. This collaboration will later take the form of a Trasnfer of Technology, which is the process of transferring capabilities, knowledge, technology, manufacturing methods, samples of manufacturing results and facilities between the Government, Universities and other institutions that ensure that the development of science and technology can be accessed by many users and will also conduct practical examples in the field (republika.co.id, 2017).

The cooperation began to be approved by both Parties of Indonesia and Denmark, with reference to the Statement of Will signed in Jakarta on May 2, 2017, between the Ministry of Environment and Forestry of the Republic of Indonesia and the Ministry of Foreign Affairs of the Kingdom of Denmark (representing the Ministry of Environment and Food). Recognizing the parties'

common interest in the growth of an environmentally friendly green and sustainable economy and developing valuable resources through *a circular economy* to reduce negative environmental impacts on life, economy, and health (treaty.kemlu.go.id. 2017).

This is what makes writer interested in researching the cooperation between Indonesia and Denmark in the field of waste management because, Denmark has similarities with Indonesia. Through a statement from the Danish ambassador, who stated that 20 years ago garbage was only collected without being fully utilized. But now, waste handling in his country has been carried out using technology that allows waste to be recycled into one of the renewable energy sources, for the procurement of electricity in addition to wind power and solar energy. In the past, Denmark depended on the availability of its energy sources from other countries but now, Denmark even must import waste from the UK because the country no longer has enough waste to be recycled into energy sources.

Denmark built a large sewage treatment plant that is converted into energy which is located right in the middle of the city. This factory is even designed to be a public space were skiing and family playgrounds. Proper handling of waste in Denmark can even be a source of income for its community members. Waste, especially plastic packaging, has a high economic value, and in Denmark, every family can exchange their plastic waste for a sum of money through a garbage receiving machine.

Theoretical and Conceptual Framework

Theory of International Cooperation

International Cooperation is a relationship between nations that also has a purpose based on national interests. International Cooperation also consists of a set of rules, principles, norms, and decision-making procedures that regulate the course of international regimes. In addition, countries that carry out international cooperation have a common goal or common interest because, the absence of common interests in cooperation is a very impossible thing (Lisa L. Martin. 2007).

International Cooperation according to Thomas Bernauer quoted from Kate O'Neil, change the behavior or states and other actors in the direction intended by the cooperating parties, solve the environmental problem they are designed to solve and do so in an efficient and equitable manner. In International Cooperation the state will tend to change its attitude according to the agreements taken within the institution of such cooperation, then the actors will focus on what problems they will face and plan the problem-solving schemes that are considered the most effective (Kate O'Neill. 2009).

International cooperation in society is a necessity because of the existence of interdependently relations and the increasing complexity of human life in international society. International cooperation occurs because of the existence of a national understanding that has the same pattern and goals, as well as a desire that is supported for international conditions that need each other, cooperation is also based on the existence of common interests among countries that establish cooperation. Sometimes this international cooperation includes plans and proposals that are not conceptualized by national governments but by international civil officials who negotiate as representatives of the country. In addition, this international cooperation was continued with the creation of negotiations and agreements that continued (K.J Holsti, 1988).

There are two basic types that this international cooperation is trying to solve. The first type includes international environmental conditions that, if not regulated, will threaten the countries involved. The second type includes certain domestic social, economic, and political circumstances that are considered to have far-reaching consequences for the international system so that they are perceived as a common international problem (William D Coplin, 1992).

There are also several types of international cooperation that are classified, one of which is functional cooperation, namely cooperation based on their respective functions, usually this cooperation improves certain areas, for example, economic, socio-cultural politics and the environment. Based on the definition and type of international cooperation above, the cooperation carried out by Indonesia and Denmark in waste management is an international cooperation that is included in the form of functional cooperation because this cooperation aims to improve a cleaner and better environment.

Waste Management Concept

Waste management is the collection, transportation, processing, recycling, or disposal of waste materials. This waste material is produced from human activities and is usually managed to reduce its impact on health, the environment or beauty, waste management is also carried out to restore natural resources and can involve solid, liquid, gaseous or radioactive substances with special methods and expertise for each type of substance. Some ways or mechanisms of waste management are as follows:

a. Recycling, there are several ways of recycling, the first is to take the waste material to process again or take calories from the material that can be burned to generate electric power.

b. Physical management, this method is the most popular way of recycling, which is to collect and reuse waste that has been thrown away, for example used bottles that are collected again for reuse.
c. Biological processing, organic waste materials such as plant substances, food residues or paper can be processed using biological processes for composting or known as composting, the result is compost which can be used as fertilizer and methane gas which can be used to generate electricity.
d. Energy recovery, the energy content contained in waste can be taken directly by making it a fuel, or indirectly by processing it into another type of fuel.
e. Burning/scraping, converting waste into heat, gas, steam, and ash. Parequalization is carried out by individuals or by industries on a large scale, this can be done for solid, liquid or gas waste (alpensteel.com. 2017).

Waste management aims to be able to create or manage waste so that it can have economic value or turn it into raw materials that are not harmful to the environment. We can help to reduce the negative impact of waste on the environment if we manage household waste properly (dbs.com, 2016).

The form of waste management or sorting varies depending on many such as the type of waste substance, soil for processing and the availability of areas where the method is generally in the form of (Alex S. 2009):

1. *Solid waste generated*: determination of waste generation.
2. *On site handling*: on-site handling on-site or at the source. This stage is divided into three, namely:
   a. Collecting is defined as managing waste from its original place to a temporary dumping site before going to the next stage.
   b. Transportation (*transfer and transport*) carried out using means of assistance in the form of certain means of transportation to the landfill / processing. At this stage, it also involves manpower that at a certain period transports waste from temporary disposal to landfills.
   c. Processing (*treatment*), such as deformation, burning, composting and energy recovery (waste as an energy producer),
3. Final disposal: the final disposal of waste must meet the requirements of health and environmental sustainability.

One of the three methods then used for the author's research on Indonesia-Denmark cooperation in waste management in DKI Jakarta 2017-2022 is the second method, namely on-site handling which focuses on processing or treatment.

In the process *of processing* (treatment) waste can be applied the 3 R principle consisting of *reduce, reuse,* and *recycle*. The 3R principle is the result of the sricular economic movement put forward by Dame Ellen MacArthur who

founded the *Ellen MacArthur Foundation* to formulate the principles of circular economy very elegantly, and easily remembered. First, the design eliminates waste and pollution. Second, the products and materials are certain to continue to be used. Third, the natural systems it produces are regenerative.

The principle of this circular economy is in line with Law No. 18/2008 on Waste Management and Government Regulation No. 81/2012 on Management of Household Waste and Similar Household Waste, which is in accordance with the 3R slogan, namely *reduce*, *reuse*, and recycle. *Reduce* means reducing materials that can cause a buildup of excess waste. Activities that can be done are such as avoiding or minimizing the purchase of something that can produce a lot of waste, for example buying products in the form of *sachets* which will later hoard a lot of waste and better replaced by buying bottle packaging products. *Re-use* means reusing. Meanwhile, according to *Tharsya, re-use* means using or reusing waste that has been used before. Its use it can be for the same function or a different function. *Recycle* means reprocessing our waste so that it becomes an object that is useful and can be used. The above opinion can be concluded that *recycle* is the process of processing waste into new useful products. Recycle activities usually take a lot of time and effort compared to *re-use* activities (Tharsya, Reiskyana. 2011).

Principle 3 R (*Reduce, Reuse, Recycle*) is contained in the explanation of article 11 paragraph (1) letters a, b, and c, Government Regulation Number 81 of 2012 concerning Management of Household Waste and Similar Household Waste. The 3 R principle is an effort to minimize the accumulation of waste that is carried out from before the production of a packaged product until the time of completion of the use of the product. Examples of restrictions on garbage heaps are:

a. The use of recyclable and biodegradable goods and/or packaging by natural processes.
b. Limiting the use of plastic bags.
c. Avoiding the use of disposable goods and/or packaging.

The restriction of waste stockpiles is one of a series of waste management. Waste management is a whole activity carried out in handling waste from the time it is caused until the final disposal. Broadly speaking, activities in waste management include controlling waste generation, collecting waste, transferring, and transporting, processing and final disposal (Yudhi Kartikawan, 2007).

At the final disposal / processing stage, the waste will undergo processing both physically, chemically, and biologically in such a way that the completion

of the entire process is complete. So, it requires cooperation with various parties to solve the problem of waste.

RESEARCH METHODE

The author uses a descriptive type of research using secondary data which is then answered using the theory of international cooperation and the concept of waste management. The data collection technique used in this study is a literature study through previous research. The data analysis technique used in this study is a qualitative method.

RESULT AND DISCUSSION

In *the Memorandum of Understanding* (MoU) between Indonesia and Denmark signed on May 2, 2017, covering 8 areas of cooperation discussing waste management, this cooperation was then carried out in DKI Jakarta, namely at the Bantargebang TPST, according to the theory of international cooperation there are two basic types that want to be solved from international cooperation.

The first type includes international environmental conditions that, if not regulated, will threaten the countries involved. The second type includes certain domestic social, economic, and political circumstances that are considered to have far-reaching consequences for the international system so that they are perceived as a common international problem (William D Coplin, 1992).

This collaboration between Indonesia and Denmark is included in the first type carried out to deal with environmental issues that occur in DKI Jakarta, namely waste that continues to increase in volume and cannot be handled by the Indonesian government or the DKI Jakarta government.

There are also several types of international cooperation that are classified, one of which is functional cooperation, namely cooperation based on their respective functions, then the cooperation carried out by Indonesia and Denmark in waste management is an international cooperation that is included in the form of functional cooperation because this cooperation aims to increase resilience to a cleaner and better environment. The cooperation implemented in DKI Jakarta was successfully implemented in accordance with the agreed MoU.

The first ongoing cooperation between Indonesia and Denmark is a pilot project, planning, solution including technology transfer and regulations in a particular province and/or city or district; through the construction of a Waste Power Plant (PLTSa) at TPST Bantargebang, DKI Jakarta, which was then

further strengthened by the signing *of a Letter of Intent* (LoI) on May 4, 2017, in Jakarta.

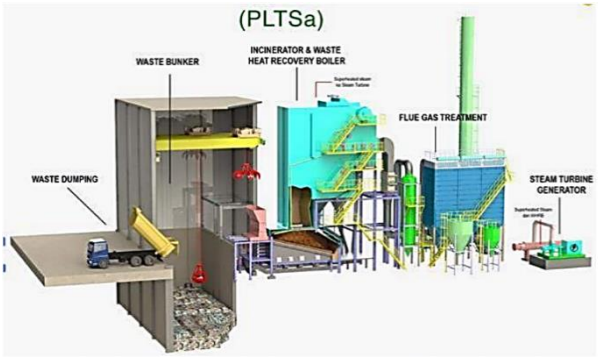
The construction of this PLTSa is a pilot project and technology transfer carried out by Denmark to DKI Jakarta, the Waste Power Plant Construction Program (PLTSa) using a thermal system built by the governments of DKI Jakarta and Denmark within a period of 1 year which in its construction is carried out by the Center for Environmental Technology (PTL) and the Agency for the Assessment and Application of Technology (BPPT), The construction of PLTSa is also a pilot project in processing thermal process waste to be able to reduce waste at TPST Bantargebang. In planning the construction of the PLTSa with this thermal process, it was carried out at the BPPT office in 2017, and the construction process was carried out in 2018 (jakarta.bisnis.com. 2018).

On March 21, 2018, *a groundbreaking* was carried out which was the beginning of the construction of the PLTSa at TPST Bantargebang carried out by BPPT and the DKI Jakarta government, as shown in the following picture:

Picture 1 .
***Groundbreaking* PLTSa Bantagebang**

The construction of this PLTSa uses an area of about 9,000 meters2 and can produce electricity up to 700 kw per hour with a waste capacity of 100 tons per day, this PLTSa is also able to operate for 24 hours, so that it can solve the problem of waste buried in the Bantargebang TPST which can produce 7,702.06 tons of waste a day (metro.tempo.co. 2018).

Thermal process PLTSa has the benefit of making a pile of waste into electrical energy, this process is shown in the following Picture.



Picture 2 .
Process in PLTSa With Thermal System

In the picture, there are 5 processes or 5 stages to convert waste into electrical energy, the first stage is the placement of waste into a waste bunker or garbage bunker made of concrete to store waste with a closed and airtight design, so that the smell produced by the garbage does not come out. In the concept of waste management, the activities carried out by PLTSa are included in the 3R, namely *Reduce* (reduction) and *Recycle* (recycling).

In the construction of this PLTSa, there is also cooperation in sharing knowledge, experience, expertise and learning about policies, governance, and regulations in planning, implementing, and transferring technology among the Parties, namely Denmark, participating in supervision of smoke emitted from the combustion of incinerators in the PLTSa, this supervision is carried out so that the smoke produced from burning waste does not harm the community and the PLTSa management. This collaboration was carried out in conjunction with the completion of the construction of the Bantargebang TPST PLTSa, namely on March 25, 2019.

The next implementation of cooperation is facilitating the dissemination of adequate technology and services in waste management. In the construction of the PLTSa, Denmark also carried out a *Transfer of Technology* (ToT) with Indonesia by *providing full-condensing multistage turbines, Quencher, Dry Scrubber and Bag filters* which are useful in filtration of combustion air. The provision of this technology was carried out during the pltsa construction process, namely on January 27, 2019.

The facilities provided by Denmark have also passed the feasibility test, after completion on March 25, 2019, the Bantargebang PLTSa was given the name as the Red and White PLTSa, here is a picture of the Red and White PLTSa:

Picture 3.
Red and White PLTSa

Although this PLTSa has passed the feasibility test by Denmark, it requires a one-year trial of use by the DKI Jakarta government, this is also a form of training for the workers who operate the PLTSa (greeners.co. 2019). After the trial, the DKI Jakarta government will sell the electrical energy produced by PLTSa through BUMD to PT. State Electricity Administration (PLN). In the concept of waste management, which is carried out by DKI Jakarta and Denmark in the construction of this PLTSa is included in waste management through burning or parwing by converting waste into heat, gas, steam, and ash carried out by the DKI Jakarta government on a large scale, using the on-site handling method or handling on the spot or at the source which has 3 stages, that is:

1. Collecting is defined as managing waste from its original place to a temporary dumping site before going to the next stage.
2. Transportation (*transfer and transport*) carried out using means of assistance in the form of certain means of transportation to the landfill or processing site. At this stage, it also involves manpower that at a certain period transports waste from temporary disposal to landfills.
3. Processing (*treatment*), such as deformation, burning, composting and *energy recovery* (waste as an energy producer)

In addition, the implementation of cooperation between Indonesia and Denmark continues with the cooperation "Capacity building through workshops, training, scholarships, internships, and seminars", where Denmark provides training to BPPT and the DKI Jakarta Environmental Agency (DLH) as the manager of the Bantargebang, PLTSa, this program is Capacity Building: Training for Jakarta Building which was carried out on December 13, 2018, this program contains training in the installation and use of management technology waste such as, regulation of temperature in the incinerator and if there is a problem in the full-condensing multistage turbine used, in addition to

also transferring of information (ToI) regarding the use of ash produced by burning waste, one of which is that it can be used as fertilizer (danish-energy-agency.mynewsdesk.com. 2018).

Denmark and the DKI Jakarta government also held discussions on other actions and technologies besides PLTSa to deal with waste in rivers and handling plastic waste.

Picture 4.

Capacity Building: Training for Jakarta Building

Before conducting *Capacity Building: Training for Jakarta Building*, Denmark conducted a survey on waste produced by the community in DKI Jakarta, and the use of energy carried out by the people of Indonesia, this survey will then be used in sustainable development of waste management and the construction of PLTSa.

In addition, Denmark also conducted an Energy Efficiency Seminar which was held on August 31, 2018, in Jakarta and in the event those who attended were the DKI Jakarta government, the Minister of Public Works and Housing of Indonesia, the Minister of Energy and Mineral Resources, and from Denmark presented its country's technology company, the Danish Energy Agency and the Danish Embassy to Indonesia.

Picture .

Energy Efficiency Seminar

In the picture showing a presentation from a Danish company in the use of more efficient energy to be used as energy purposes in DKI Jakarta, Denmark also explains the efficiency of energy use that is widely used in Danish companies and an explanation of the origin of the energy used (pl-pl.facebook.com. 2018).

The seminar also presented solutions from Denmark in the use of energy that are very relevant to improve energy efficiency and the energy referred to in this seminar is electrical energy.

In this point of cooperation, Denmark asked the Indonesian government and DKI Jakarta to be able to recommend Danish energy companies to large companies in Indonesia so that a Business Partnership between the two countries could be established.

However, there are several cooperation's that have not been implemented in the MoU between Indonesia and Denmark, namely:

1. The first is a community-based project in waste management to advance *the circular economy* through waste bank mechanics. This collaboration has not been implemented because the Indonesian government is still collecting waste bank data from various regions in Indonesia to form the Main Waste Bank (BSI) and make it easier for Denmark to help use waste banks (Citra Ayu Pratiwi, 2021).
2. The second is to develop a mechanism or system for the promotion of waste utilization from the source. This collaboration is not yet running because the Indonesian government is still in the stage of making an online-based waste utilization system, so Denmark has not been able to help the running of this collaboration.
3. Furthermore, the collaboration that is not running is conducting research in the field of potential environmental on specific waste and plastic waste in the sea through collaboration between Danish and Indonesian research institutions. This collaboration is not carried out in Jakarta because the government is still focusing on waste management at the Bantargebang TPST.
4. The last unsustainable collaboration is the further development of the success of ESP3 (*Environmental Support Programmed Phase* 3) activities related to waste management, this is because there has not been an evaluation of the ongoing work.

So that of the 8 cooperation's agreed between the Governments of Indonesia and Denmark to be carried out in DKI Jakarta that are running are 4 cooperation's while the other 4 are not yet running.

In addition, the cooperation that was successfully implemented by the DKI Jakarta government also showed problems so that there were obstacles in the running of the cooperation. Especially the cooperation in the construction of PLTSa, according to the Indonesian Environment Agency (WALHI) this PLTSa project only moves the problem of waste into the air, so the construction of PLTSa is considered by WALHI not the best solution in handling waste. WALHI disputes the remaining burning of waste in the form of ash, according to WALHI, the ash may not be included in the B3 group, and the ash may contain chemicals and heavy metals, so it can be harmful to the surrounding community (validnews.id. 2019).

The problems that occurred in this development then had made the trial of the Red and White PLTSa disturbed for more than 2 months, because renovations were carried out to reduce sound and make room for ash produced by the PLTSa.

CONCLUSION

In the cooperation carried out by the Indonesian and Danish governments in DKI Jakarta, only managed to carry out 4 implementations, namely:

1. Pilot projects, planning, solutions including technology transfer and regulations in certain provinces and cities or districts, in this point of cooperation Indonesia and Denmark built a PLTSa in DKI Jakarta, precisely at TPST Bantargebang, this PLTSa waste management method by burning waste and using steam from its combustion to be used as electricity.
2. Sharing knowledge, experience, expertise and learning about policies, governance, and regulations in planning, implementing, and transferring technology among the Parties. By sharing knowledge and experience in handling combustion smoke from PLTSa.
3. Facilitating the dissemination of adequate technology and services in waste management. By providing waste management technology to complement the PLTSa in DKI Jakarta.
4. Capacity building through workshops, trainings, scholarships, internships, and seminars, which are embodied in the Transfer of Information (ToI) to strengthen the waste management system in Indonesia and the efficiency of energy use and utilization, which is carried out in two programs, namely Capacity Building: Training for Jakarta Building and Energy Efficiency Seminar, in this program Denmark aims to make Indonesia conduct a Business Partnership with energy companies in Denmark.

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