

Paper Waste Reduction Efforts Through Digitalization

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ABSTRACT

Paper waste reduction efforts through digitalization. Waste is an endless problem to dealt with, through the ages, humankind necessities have escalated, and with the escalation of humankind necessities, the waste produced by humankind has also escalated. The more advanced a civilization, the more waste is produced. Paper waste is one of the wastes. Paper has becoming a basic need for human which is used as a media for communicating and exchanging information. But to produce paper, a large number of trees had to be cut down, alongside of the byproduct waste come out from producing it. Also, the harmful effect of unhappiness of the paper waste which is one of the main causes of the global warming. Therefore, an act of reducing paper waste is needed. Digitalization is one of the options to reduce paper waste. The definition of digitalization is a process to convert printed form, audio form, and video form to digital form. The purpose of digitalization is to aim for efficiency and optimization for storage purpose, security purpose.

Keywords: waste, paper waste, digitalization

INTRODUCTION

Waste is an endless problem to dealt with, through the ages, humankind necessities have escalated, and with the escalation of humankind necessities, the waste produced by humankind has also escalated. The more advanced a civilization, the more waste is produced. The high number and growth rate of Indonesian population resulted in increased garbage volume. The community's lifestyle also contributes to the increasingly several types of waste, such as packaging waste that is harmful and difficult to dissolved by natural processes or even damaging the environment.

According to research conducted by Irma (2018) Indonesia is the second of world's largest waste producer after China, in which case the garbage that is produced has polluted the surrounding environment, especially the sea, and the big cities are the biggest waste producers. Based on research conducted by Jambeck et al, entitled "Plastic Waste Inputs from Land into the Ocean", it is estimated that there are at least 8 million tons of plastic waste dumped into the ocean each year, and Indonesia contributed for a total of 3.22 million tons according to research conducted by 192 countries.

The high amount of waste is correlated to the amount or level of population density and waste management facilities, for about 80 percent of plastic waste comes from land. Based on data obtained from the Central Statistics Agency (BPS), in 2016, daily highest waste production is in java, specifically Surabaya. In 2015, waste production in Surabaya was 9,475.21 m³ and increased to 9,710.61 m³ in 2016. As for the region outside Java, the highest waste producing city is Mamuju city, which is 7,383 m³ and Makassar city, amounting to 5,931.4 m³ in 2016. Based on the Environmental Statistics checking from 2010 to 2016, they found out that cities in Indonesia in general have increased waste production. Java was undoubtedly as the biggest waste producer because of its higher population density compared to other islands, Therefore, it can be concluded that following the high number of societies the higher the waste produced. Following is a diagram of some of the highest cities in waste generation in 2016:

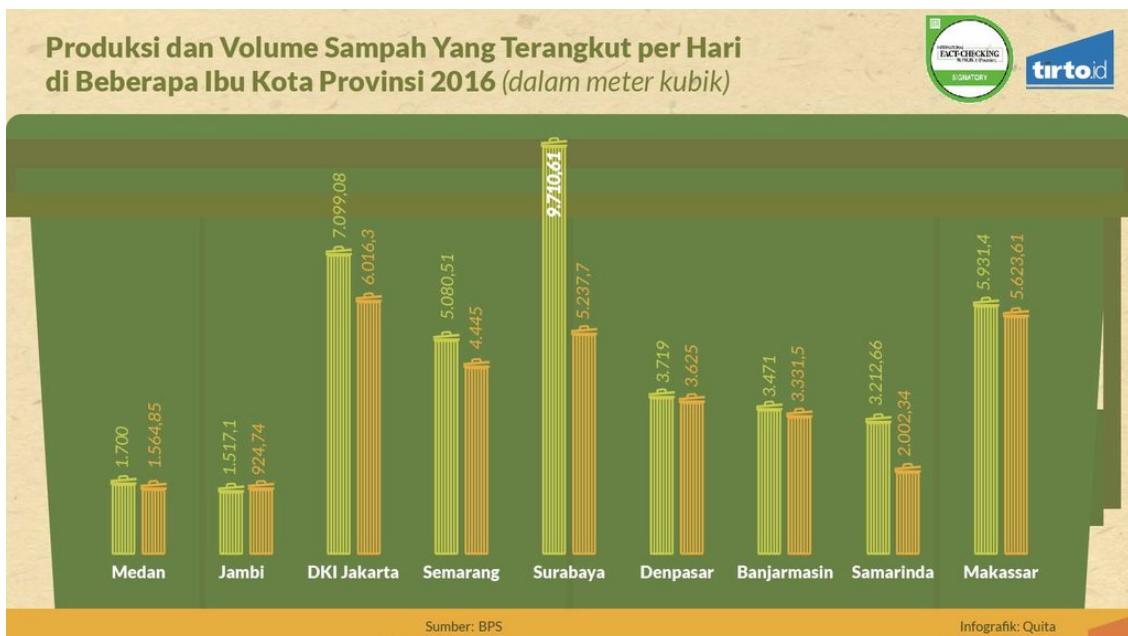


Figure 1. Waste Volume Transported per Day
Source: BPS website

DKI Jakarta, with a population of around 10.25 million people in 2016, has an estimated waste production of 7,099.08 m³, has increased from 7046.39 m³ in the previous year. While Surabaya, as the highest waste production city in Indonesia, despite being inhabited by 2.87 million people in 2017, the amount of waste production in 2016 is 9,710.61 m³. Beside population density, the high production of waste is also caused by the number of industries growing in the city. In addition, there is a lack of balance between the high volume of waste production and the volume of waste transported.

In 2016, from the 30 capitals of the province, the rate of waste transported was only 71.20 percent of total waste production, daily garbage-transfer the volume of waste transported per day according to its type diagram in some capital of the province of 2016 are as follows:

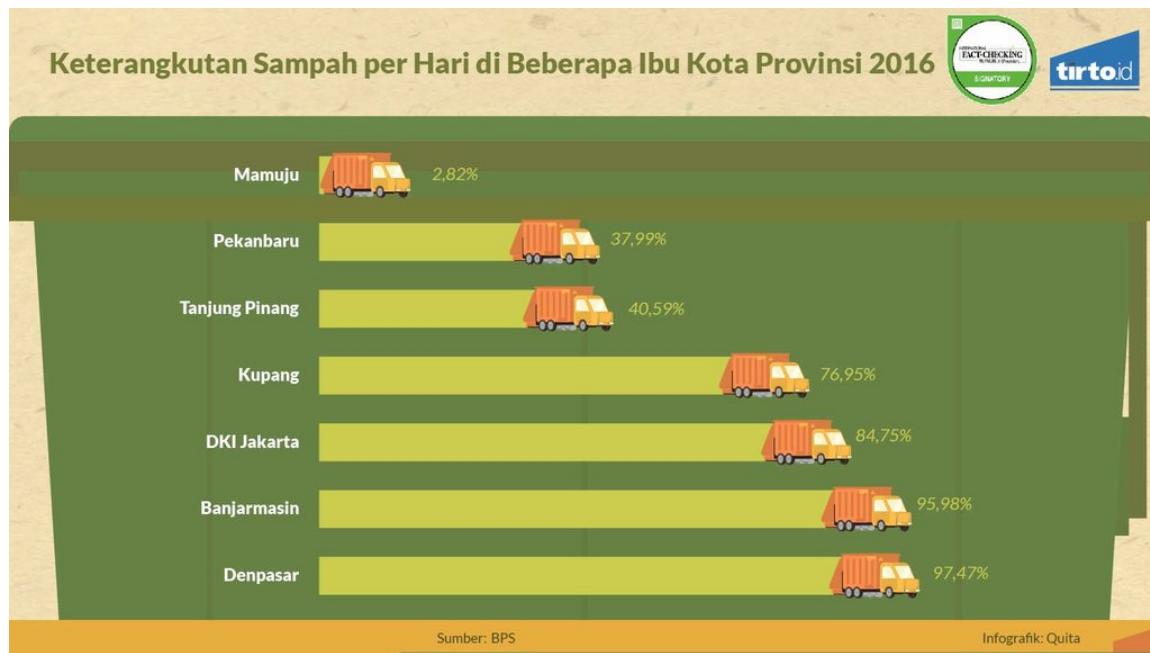


Figure 2. Waste Transported per Day
Source: BPS website

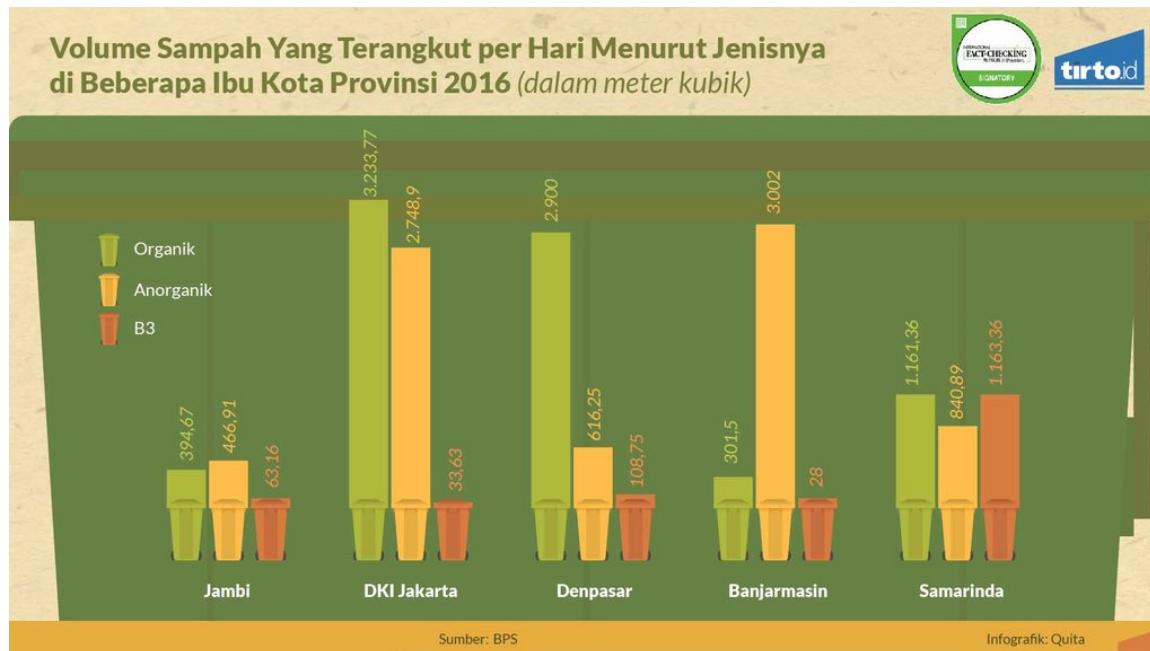


Figure 3. Waste Volume Transported per Day Based on Type
Source: BPS website

Indonesian society still has no awareness to sort out waste by its type. Based on BPS research, on 2013 and 2014, the habit of treating and sorting waste in Indonesia has decreased from 23.69% to 18.84%. Afterward the behavior of non-sorting waste before disposal has increased from 76.31% in 2013 to 81.16% in 2014.



Figure 4. Behavior of Sorting Waste
Source: BPS website

Based on the diagram, North Maluku is the province that has the least awareness to the importance of sorting waste. In 2014, 91.82% of households stated that they did not sort out their waste before disposal. DKI Jakarta as the most crowded city, the society awareness to sort out waste was still low, it found out that 88.65% of households did not sort out their waste. The lack of awareness of sorting waste will cause waste recycling to be more difficult to process in Indonesia. Moreover, with the increasing number of people in major cities and industrial activities, the production of waste is also increasing each year.

One of the wastes types are paper waste. Paper is one of the basic human needs which used as a means of communication, it enables human to exchange information with others (Usman, 2015). However, in producing 1 ton of paper, it produces approximately 72,200 liters of liquid waste, 1 ton of solid waste, and produces approximately 2.6 tons of CO₂ gas which is equal to the amount of emissions gas emitted by cars within 6 months. While the amount of paper consumption in Indonesia per capita is around 27 kg per person - per year, it is equivalent to 11 Rim or 11 Tree Trunks. If the paper is unused and discarded, the paper will become waste, in which the decomposing process of paper waste will produce methane gas, and methane gas is one of the causes of global warming which is far more dangerous than carbon dioxide gas. (Editor, 2016) Since producing paper require many trees to be cut, and the waste produced by paper production and the danger from the paper waste decomposing, therefore it is necessary to take action to reduce the amount of paper waste each day.

RESEARCH METHODS

The research method used in this research is literature study by searching references from theoretical theories which relevant to the problems being researched, which obtained from various sources such as journals, documentation books, internet, and literature. The problem to be discussed is: how to reduce paper waste?

DISCUSSION

Nowadays, the waste treatment can be solved by using 5R formula, as follows:

- Reducing waste.
- Reusing items that are still suitable for use.
- Recycling waste to be to create new goods.
- Replacing disposable items and non-environmentally friendly items to be replaced by items that can be recycled.
- Rethinking our decision to buy or use goods and prefer items that are environmentally friendly (Effendi, 2013).

The paper waste treatment efforts that have been done in Indonesia was to rely on the Recycling method in which the trash bin is divided into several categories namely wet trash and dry trash to sort out the waste. However, this strategy has not been successful in the effort to reduce the amount of paper waste since the lack of public awareness to sort the trash by trash category, although they have been given counseling about the waste sorting program as well as the impact that occurs if the waste piles up. (Sanchez et al, 2016) Nowadays, paper waste is the raw material used for the recycling industry, however it is still not managed optimally, therefore only 70% of all paper waste can be reused or recycled. Consequently, another possibility is needed to reduce paper waste (Wahyono, 2001).

Digitalization is one of the efforts that can be done to reduce the amount of excessive paper waste. The definition of digitalization is the process of changing media from print, audio, and video into digital forms. The purpose of Digitalization is efficiency and optimization in many ways including efficiency and optimization in storage, security from various forms of disaster, to increase the resolution, image, and more stable sound. Currently some aspects of life are undergoing a process of migration to digital technology to obtain including digitalization in the sector of broadcasting, telecommunication, government archive, bank data and others. (Wikipedia, accessed on 28-8-2018) Here are the advantages of digital form:

1. Easier to be searched, accessed, and used based on the user need.
2. Easier to produced, sent, received, filtered, and update the typing format to be sent is same to the one received
3. Not limited to distance and time
4. Sending and receiving is extremely fast and cheap
5. Easy to store and processed and does not need a large space
6. Easy to apply in various media

The digitalization processes can bring a positive impact toward environment especially in case of waste reduction. By changing several items that are important in our lives into digital form, it can reduce the waste produced. This is extremely useful in education sector, with the development of digitalization in Indonesia brings the impact of the

presence of digital library as a form of digitization in the education sector, where previously used printed books then recently use electronic book or commonly known as e-book. With the occurrence of information digitalization into books and supported by the development of a digital library network that stores more e-books.



Figure 5. Online Library
Source: <http://duniaperpustakaansekolah.blogspot.com>



Figure 6. E-book
Source: <http://bookprinting.com/resources/ebook-file-types>

The purpose of the library digitalization in education is as a means of managing and sharing of scientific information in the scope of educational environment and to simplify in sharing information to internal as well as external parties, therefore, it simplify to make cooperation as well as exchanging information with other libraries at local, national, even global level. (Azizah, 2012)

The benefits of digital libraries are as follows (Roesma, 2005):

- Simplify to add collections with better quality
- Speed up access to the information needed and simplify to exchange information with other library users
- Users are not only able to access the printed format, but also are able to access the format of sound, image, video, and other formats.

Digitalization is not only limited on library use, but it can also be applied in terms of administration in the sector of education. The same thing can be applied in office, which recently known the terms of paperless office. The term paperless office was first issued in an article in the Business Week daily in 1975, where the article predicts that future automation in the world of offices can reduce the number of papers, especially on routine activities Day, such as data archiving activities. (Mustika, 2013) Paperless is a policy for reducing the use of paper in managing an organization's administrative system by digitalizing data and documents, which able to increase efficiency and productivity as well as reducing bad impacts toward environment (Nia, 2009)

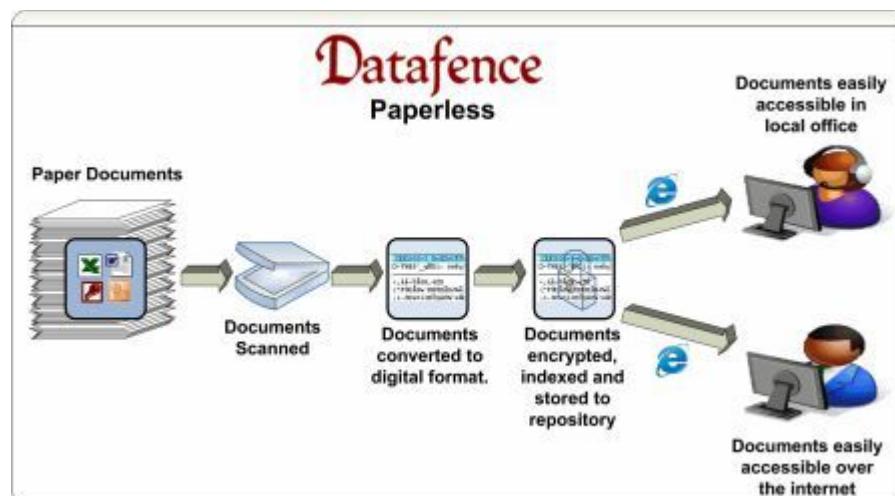


Figure 7. Paperless Process Chart
 Source: <http://khaniatulmaslakhah.blogspot.com/2009/12/paperless-administration.html>

The Paperless process can be described as follows:

1. Document / Data in paper format are converted to digital format by using a Scanner device
2. Documents / Data that have become digital format are then protected so that unwanted people cannot access them, and then stored on the server
3. After the document / data is stored on the server, it can be accessed by related people in the organization and can also be distributed via the internet when needed.

The benefits that can be obtained from this Paperless Office are as follows (Nia, 2009):

1. Efficiency in terms of cost reduction from the use of paper and reducing space used for document storing tools such as filing cabinets etc.
2. Efficiency in terms of time and effort since it simplifies to distribute documents and shorten the time to search the required documents
3. Improving work comfort due to the reduced stack of documents
4. The document security is more reliable since the documents can be protected with encryption so they cannot be accessed by unwanted people.
5. Improve creativity since the digitalization brings out a variety of new media format
6. Able to improve the image of the organization which cares about the environment by reducing the usage of paper

According to Prasetyo (2011) the implementation of a paperless office in Indonesia has a legal basis, namely statute No. 11/2008 concerning electronic information and transactions and Indonesian Presidential Instruction No. 3/2003 concerning national policies and strategies for the development of e-government that aims to educate the nation's life , increasing the effectiveness, efficiency, of public services, providing opportunities for advancement and thought for everyone, providing security and legal certainty for IT services user.

The manifestation of this paperless concept is not to cut the use of paper on all aspect, because it is almost impossible for humans for not using paper at all, especially in the daily administration activities of an organization. This paperless concept is simply to reduce the use of paper daily with the help of technology which get more advanced therefore able to simplify moreover increase the efficiency and effectiveness in daily administration activities.

CONCLUSION

Digitalization is one of the efforts to reduce waste that is quite effective if applied properly. Aside from bringing positive impacts to the environment, other positive effects of digitalization are as follows:

1. Facilitate the society to access information. With the digital information, help the community to get the desired information thus the community gets up to date information. The society can do self-sorting and filtering from various kinds of information required.
2. Able to improve business world. Important customers and employees' data, important corporate data are easier to be accessed, stored, and circulated. And help people to run business, for instance nowadays online stores as well as online shopping is booming.
3. Able to advance the creative industry. With the digitalization of information, help society to be creative in producing various information in a unique and creative way and having a high selling value, for instance, bloggers and vlogger are on the rise in today's profession.

However, to realize and develop this digitalization process requires large investment in infrastructure, since digitalization process is very dependent on the internet quality. While internet quality in Indonesia is still relatively below average, where the average internet speed in the world is 42.71 Mbps and internet speed in Indonesia is 4.1 Mbps. (Kurnia, 2018)

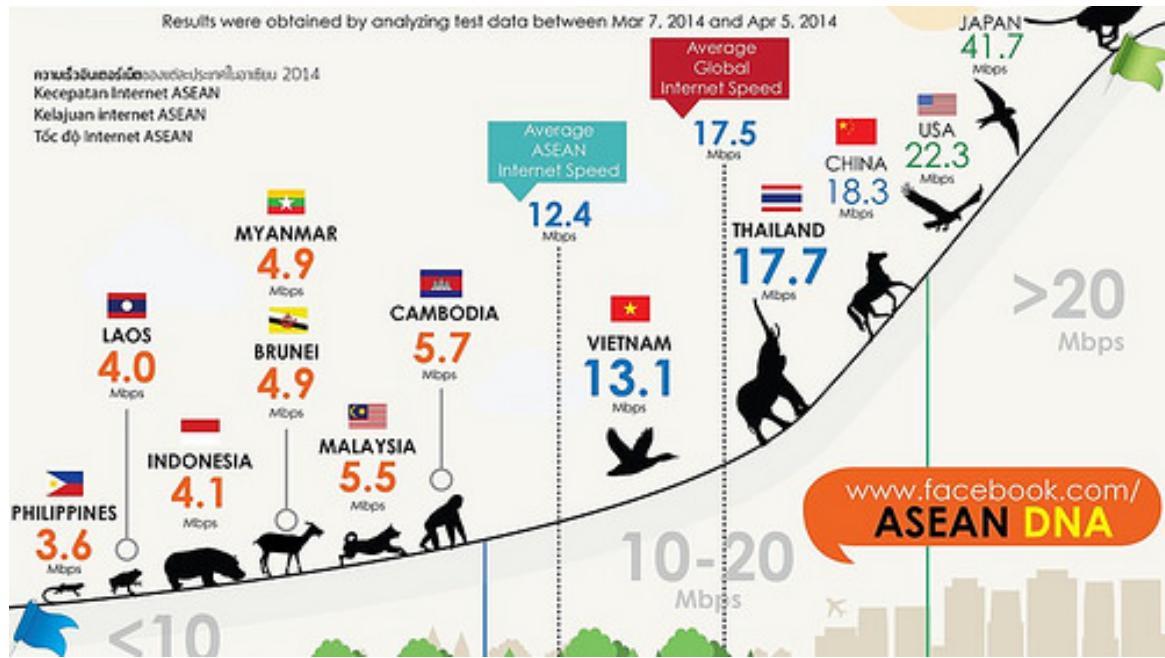


Figure 8. Internet speed diagram in Asia

Source: www.google.com

Some of the reasons that cause the low internet quality in Indonesia is the high number of Internet users, where 50% of the total population of Indonesia is recorded as internet users, where Indonesia considered as the 8th most internet user in the world. This causes the internet network to become over limit, resulting in slow internet speeds.



Figure 9. Internet users in Indonesia

Source: www.google.com

The large number of internet providers in Indonesia also causes the low quality of internet in Indonesia, the more internet providers, the more internet networks to be

divided, consequently each provider gets small proportion of the network. Moreover, the expensive infrastructure that does not yet exist in Indonesia contribute to the low quality of the Internet in Indonesia.

Besides that, the digitalization process also has negative effects to be considered, namely:

1. Due to the easiness of digital information to be shared, thus the information is also easy to be reached by irresponsible parties and misused it.
2. Due to the easiness to be searched and accessed, thus digital information can be consumed by all people without filtered in advance, so unrelated people can receive the information.
3. Due to the easiness of being updated, digital information can also be easily manipulated and shared, this would be extremely dangerous when irresponsible parties use it, for instances recently the wide spread of hoaxes.

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