

UDC 332

ECONOMIC, SOCIAL AND ENVIRONMENTAL ASPECTS IN WASTE HANDLING

Pertiwi Ni Luh Gde Ana*, Utama Made Suyana

Faculty of Economics and Business, University of Udayana, Bali, Indonesia

*E-mail: anasparkyu@gmail.com

ABSTRACT

The problem of waste pollution is a very serious problem and must be addressed immediately, because of its impact on the environment and health. Dense population in Denpasar City affects the volume of waste produced, thus making Denpasar City contributor to the highest volume of waste in Bali Province. Waste processing that implements a multi-stakeholder partnership strategy, such as the Waste Bank, is an alternative idea that can solve the problem of increasing waste volume. This research is a descriptive study where data is collected through secondary sources such as: literature books, statistical data, research reports, journals, and electronic publications. The results shows that the waste management activities realized through the Waste Bank are a manifestation of the implementation of the Social Entrepreneurship concept, so the success rate of this Waste Bank can be seen from how many benefits can be felt by the essential aspects elaborated in the Waste Bank business activities such as environmental, social, and economic benefits. All elements of development actors including the community, government and private sector should enhance a more structured collaboration to increase the participation of each party in the problem of waste management.

KEY WORDS

Waste management, waste bank, economic aspects, social aspects, environmental aspects, social entrepreneur.

The implementation of development in Indonesia in the SDGs (Sustainable Development Goals) era is stated in Presidential Decree Number 59 of 2017, concerning the Implementation of Achieving the Sustainable Development Goals. By the end of 2015, Indonesia had not fully succeeded in achieving the MDGs targets. SDGs continues the MDGs targets in terms of how to realize human development. One of the targets yet to achieve in the MDGs era is the availability of clean water and sanitation (Sustainable Report, 2017). According to Jenna Jambeck et al. (2015), Indonesia is ranked second out of 192 countries as a contributor to plastic waste to the oceans. The problem of waste pollution is a very serious problem and must be addressed immediately, because it can damage the environment and have an impact on health.

Denpasar City, as the capital city of Bali province with very dense population also affects the volume of waste generated, thus making Denpasar City the highest contributor to the volume of waste in Bali Province. If this increase in waste volume is not handled immediately, it will damage the environment and health.

According to Khairunisa (2016), waste processing that implements a multi-stakeholder partnership strategy, such as the Waste Bank, is an alternative idea that can overcome the problem of increasing waste volume. Waste Bank activities aim to enable all levels of society, the government and the private sector to carry out activities to limit waste generation, namely Reduce, Reuse and Recycle (3R) through smart, efficient and programmed efforts. According to Nurcahyanti et al. (2014), the existence of a Waste Bank in Semarang City can reduce the volume of waste per week, but it still needs attention from the government to be able to establish an organization that can embrace all waste business players.

The Waste Bank activity is a manifestation of the implementation of the Social Entrepreneurship concept. When examined, the Waste Bank can actually be described as more than just a company that is established and has a dominant focus on community empowerment from a social aspect, but also as a movement to save the environment. In the

end, ecological principles cannot be separated from the establishment and operation of the Waste Bank. On the other hand, the Waste Bank turns the environment into a primary ideology, which is then sliced down with economic orientation and social interests. Economic, social and environmental aspects are intertwined into the concept of a Waste Bank, so it is clear that a waste bank is not simply and singularly seen only from its economic values, but is also built on the foundation of multidimensional aspects. (Pratama, 2012). Based on the aforementioned background, it is necessary to have a waste management system that implements a multi-stakeholder partnership strategy, such as a Waste Bank which has multidimensional aspects from economic, social and environmental aspects that are tied together in the concept of a Waste Bank

METHODS OF RESEARCH

This research method uses a literature review. Material in the form of reviews, summaries, and thoughts about several library sources (articles, books, slides, information from the internet, etc.) on the topic being discussed is part of the writing of a Literature review. Writing that is relevant, up-to-date, and adequate reflects the writing of a good Literature review.

RESULTS OF STUDY

The volume of waste generation in Province of Bali, especially in Denpasar City, just like other big cities also has problems related to waste. The total waste generated is 3500 cubic meters or the equivalent of 1200 tonnes a day. This makes Denpasar City has the highest estimate of waste generation in the Province of Bali. The Denpasar City Sanitation and Gardening Agency (DKP) stated that the volume of waste in Denpasar continued to increase from 2010-2015. The city of Denpasar produces 1200 tons of this waste, which is equal to 530 times transported to the Suwung Final Disposal Site (TPA). Of this amount, nearly 90 percent is generated by households. While the remaining 10 percent is produced by restaurants and hotels. 80 percent of waste production in Denpasar City is dominated by organic household waste. The daily waste production in Denpasar City reaches 2500m³ or close to 750 tons per day. Of this amount, 80 percent is organic waste and 20 percent is dry organic waste. This data shows that the problem of handling waste is the responsibility of all elements of development, so that the management of waste is effective and efficient.

According to Alexis et al. (2008), Waste management systems in developing countries must be collaborative and sustainable. The important correlation between the involvement of all stakeholder elements in development is supported by the fact that the three factors of sustainable waste handling (waste collection and separation, waste management strategies, and local recycled materials) markets require full collaboration from government, society and the private sector.

Integrated sustainable waste management or ISWM involves three dimensions - all stakeholder elements involved and all 'aspects' of the 'enabling environment' (political, institutional, social, financial, economic, and technical). Used especially in developing countries. (Scheinberg, 2010). Klundert et al. (2001) which states that sustainability in waste management in an area is not a mere technical issue, but other aspects also need to be considered such as environmental, socio-cultural, economic, political / policy aspects.

According to Chung et al. (2003) used four criteria in assessing the sustainability of waste management in Hong Kong, namely the criteria for environmental carrying capacity, economic optimization, public acceptance, justice and administrative provisions. In addition, it is shown how each of the three dimensions of sustainability (economic, social and environmental aspects) becomes the standard goal for related institutions in influencing the performance of waste management in developing countries.

The three aspects of sustainability (economic, social and environmental aspects) in waste management in Denpasar City are implemented with the establishment of 128 Waste Bank units spread across various sub-districts in Denpasar City. Waste management in the

Waste Bank is one form of the implementation of the concept of Social Entrepreneurship, which is a term derived from entrepreneurship. Social Entrepreneurship in this case is an economic activity that is carried out not on an orientation to fully take a nominal profit but also prioritizes social aspects.

In accordance with the social entrepreneurship concept that exists in the Waste Bank business activities, to measure the indicators contained therein will also prioritize aspects that are its social targets, namely providing more social benefits to the community. The level of success of this Waste Bank can be seen from how many benefits can be felt by the essential aspects elaborated in the Waste Bank business activities such as environmental, social and economic benefits.

The Waste Bank can actually be described as more than just an established company and a dominant focus on community empowerment from a social aspect, but also as a movement to save the environment through extending the life of waste. In the end, ecological principles cannot be separated since the establishment and operation of the waste bank. On the other hand, waste banks make the environment the primary ideology, which is then sliced with economic orientation and social interests. This is why the practices of an economic, social and environmental mindset are interlinked into the concept of a Waste Bank. Clearly, waste banks are not simply and singularly seen only from their economic values but are also built on the foundation of multidimensional aspects. The waste bank is an example of how an economic entity shows creativity in seeking profit through the elaboration of other aspects which, if felt, cannot always be related to the economy. (Primary, 2012)

Economic Aspects in Waste Management

According to Wilson et al. (2013), Integrated sustainable waste management in cities in developing countries in overcoming their solid waste problem, with integrated waste management, which is mostly used in the context of technology integration of developed countries. Instead, it is integrated sustainable waste management, seen from both physical components (collection, disposal and recycling) and governance aspects (inclusiveness of users and service providers; financial sustainability; coherent, healthy institutions underpinned by proactive policies).

The data shows that the performance of sewage treatment has been significant over the past 10 years. Coverage rates for controlled collection and disposal are 95% in medium-income cities, and 50% in low-income cities, and 20-30% recycling rates are achieved by the informal sector in many low-income countries, without major costs. This is a great opportunity for all stakeholders if some obstacles can be resolved continuously, showing that the system being implemented is efficient, effective and affordable. The system is adapted to local needs and conditions, developed with the direct involvement of service recipients. Despite the remaining challenges, recent increasing evidence suggests that sustainable solid waste management and resource management is feasible for developing countries to develop.

According to Wakolbinger (2008), general economic aspects can be better understood, for example, seen from the benefits and costs generated in a business and being able to allocate optimal resources for CSR activities when considering multi-period timeframes. From an economic perspective, municipal solid waste management has economic value if the waste is processed into useful goods. This is due to the demand for these goods which are generally needed by other parties by re-processing used materials from waste, for example into industrial raw materials or handicrafts. Examples of waste utilization that have been implemented in general are carried out at several Waste Banks in Denpasar City, including being useful items such as making bags, clothes, and other equipment that can also make organic fertilizer from these rubbishes. In realizing this, the Waste Bank collaborates with the government and the garbage collectors in a multi-stakeholder manner.

In waste processing activities, according to Usman (2015), it can cause a multiplier effect through the use of appropriate technology. The community has begun to be stimulated to create various supporting technologies for waste management, ranging from technology for collecting household waste to be used as compost, technology for utilizing waste to become economically valuable products and marketing waste processing products. All of the

supporting technology that is produced is very likely to be carried out in households as a business opportunity. The benefits of this activity are to increase efficiency and cost effectiveness and have a good impact on the environment, and can be carried out independently by the community or in collaboration with the informal sector. Apart from the benefits that can be felt by the community, there are also costs required to carry out this activity. Therefore, it is necessary to conduct a study of the benefits and costs of integrated waste management on an area scale to determine the benefits from economic and environmental aspects, as well as to analyze market opportunities for recycled products.

According to Handayani et al. (2009) stated that waste has different economic values according to the composition of each waste and treatment before sale. Types of organic waste that can be recycled include household waste), namely vegetables and fruits that are discarded in the cooking process. Meanwhile, the types of inorganic waste are plastic, paper, aluminum, wood, organic waste, used tires, and others. Plastic waste cannot be dumped directly on the ground because plastic takes a long time to break down. Therefore, it is necessary to process plastic waste so that it can be reused and reduce its amount.

The practice of waste management in Germany is also one of the countries that is successful in its waste management. The government also provides a yellow plastic bag named Gelbersack to each household for waste that can be recycled. Garbage collection that is carried out at home or in offices or public places in Germany has previously been carried out by separating waste from the very beginning. Ulum (2010) explained that several supermarkets in the city of Bremen have provided machines shaped like ATM machines to exchange bottles of mineral water and recycled carbonated soft drinks. The bottles are put into the machine and then a receipt will come out which can be exchanged for money at the supermarket cashier. Each 0.1-to-3-liter bottled water bottle costs € 25. Germany is currently listed as the country that has the most modern waste handling methods in the world and does not damage the environment. Garbage in Germany, apart from being recycled, other waste that has been separated will be burned and directly channeled as electrical energy.

Social Aspects in Waste Management

Waste Bank activities as one of the efforts to deal with waste, have a strong social aspect in them, that is, there is a process of education for the community about the environment, especially in sorting waste. The existence of the Waste Bank itself can be said to be more of a social strategy. Talking about waste, of course, cannot be separated from its main sources, namely humans and households. This problem focuses on the discussion of the patterns and behavior of human consumption, even this will directly correlate with human attitudes and behavior in disposing of waste.

Roshan et al. (2017) and Herremans et al. (2000) stated that environmental handling problems include awareness and attitudes that lead to waste handling actions and performance (behaviors). Research on municipal solid waste management focuses a lot on household participation and attitudes about recycling behavior. Maycox (2003) states that understanding behavior is very important to minimize urban waste. but there are very significant barriers, such as a lack of knowledge among the general population and negative social norm practices which can have a negative impact. Kulatunga et al. (2006) stated that success in implementing waste management really requires collective efforts from all parties involved. Teo et al. (2001) stated that individual attitudes or views towards waste reduction are one of the reasons for the difficulty in waste management in the construction industry.

Loosemore et al. (2002) and Skoyles (1987) both highlight the importance of the human factor in minimizing waste and both argue that waste can be prevented by changing attitudes. Teo et al. (2000) stated that labor-intensive activities from various construction activities are obstacles that tend to significantly affect waste. Tam et al. (2007) show that different types of construction projects have different levels of waste generation. Lingard et al. (2001) also stated that the extent to which reduction, reuse and recycling of waste can be achieved largely depends on the influence of motivation on the behavior of construction workers.

According to Rawshan et al. (2009), factors such as education are the most significant

factors affecting individual behavior regarding waste management. These factors influence individual attitudes and behaviors for effective waste minimization and management related to waste reduction efforts, waste disposal behavior, and attitudes towards waste management. Barr et al. (2001) emphasize the complex relationship between attitudes and actions in environmental matters; which produces a conceptual framework with three predictors namely, behavior, in environmental values, situational characteristics and psychological factors. This shows that waste recycling activities are influenced by behavior, comfort, knowledge, and access. Meanwhile, the behavior of waste minimization is driven more by concerns about environmental problems. According to Barr (2007), again found that environmental values, situational characteristics and psychological factors play an important role in predicting waste management behavior.

Discussion on integrated waste management, of course, does not only talk about technical issues or tangible assets, but also cannot be separated from intangible assets. This invisible asset is what researchers say as social capital. the development of Waste Bank management that relies on empowering social capital

The embodiment of the value of social capital can explain how massive the cultural role of citizens is in the development process and even the operation of a waste bank. In the end, the spirit of mutual cooperation is assumed to be quite successful in running a waste management company. According to Mujiburrahmad (2014), community participation has a significant effect on waste management performance. The success of waste management in an area is a reflection of the increasing public awareness of the importance of the environment. Community participation is a strategy that can be carried out to empower and develop society so that the community plays an active role in the planning, implementation and maintenance processes in community development carried out jointly.

Putnam (1993) states that high social capital will have an impact on the high participation of civil society in various forms. The positive result is that the government will have stronger accountability. Social capital can increase the degree of public awareness of the importance of good waste management. This awareness is a driving factor in the institutionalization of values and norms at all levels of society regarding the importance of waste processing problems.

However, in order to understand the definition of the performance of environmental and social aspects, the measurement is often not so clear. In the environmental aspect, it is often related to reducing the generation of disasters, reducing pollution, energy efficiency, reducing emissions and reducing consumption for the consumption of hazardous materials.

Environmental Aspects in Waste Management

Waste management is very important to achieve a clean and healthy environmental quality, thus waste must be managed as well as possible so that things that are negative for life do not happen. Waste management is an effort to regulate or manage waste from the process of collection, separation, transfer to processing and final disposal (Hartanto, 2006). Waste management consists of 2 types, namely local management (individual) and centralized management for the environment or urban areas.

Waste management aims to improve public health and environmental quality and make waste a resource (Law No. 18 of 2008). According to Tchobanoglous et al. (1993) define solid waste management as a discipline related to the control of generation, collection, storage, transfer and transportation, processing, and disposal of solid waste in a manner consistent with the principles of public health, economics, engineering, conservation, aesthetics, and environmental considerations. others, and it's also responsive to public attitudes.

Waste management practices can vary between developed and developing countries, between urban and rural areas, between residential areas and industrial areas. One of the developed countries that has been successful in its waste management is Japan. Waste management in urban areas in Japan is known as Muncipal Solid Waste Management (MSWM). The approach taken in implementing MSWM in Japan is stated by the Japan Institute of Infrastructure (Ivonilia, 2009), namely MSWM in Japan combines waste reduction,

reuse, and recycling as an inseparable part of the stages of waste management as a whole). Therefore, it can be seen that the 3R movement in waste management in Japan is something that has been patented and continues to be developed in order to create a maximum waste management infrastructure in dealing with existing waste problems.

Soma (2010) explains that generally, waste management abroad especially in Europe, has started at the household level by separating organic and inorganic waste. Garbage bags are made from materials that are recycled. Bag colors are distinguished for organic and inorganic waste. Organic trash bags are green, inorganic are brown, and toxic trash bags are red. The construction of the trash can is made in such a way that it is easily transported by trucks to the processing site. Organic waste is picked up by trucks with rotating drums equipped with chopping blades and organic matter degrading microbes. Mixing can be carried out efficiently and evenly, because the volume is not that large. Waste that is rubbish at the processing site is then poured into a storage area, then transported using a conveyor to be separated from inorganic waste (iron) using a magnetic separator. Separation from plastic, paper and fabric waste using a rotating drum. Heavy materials such as glass or pieces of wood are separated using an air classifier. Then the waste is transported to the composting room. Inorganic materials that can be recycled are separated, while those that cannot be burned using an incinerator.

Waste management in Indonesia is currently being intensified at the community level through the Waste Bank. The activity was first carried out since 2008 in Badegan Village, Bantul Regency, Yogyakarta Special Region Province, under the name Gemah Ripah Waste Bank. The idea to establish it was sparked by the large number of cases of dengue fever in Bantul, and the cases increased sharply along with the large pile of garbage.⁵ After that, other regions also established Waste Banks, and from time to time its development has increased.

The Ministry of Environment is developing the concept of a Waste Bank in various provinces. Statistics on the development of Waste Bank development in Indonesia in February 2012 show that as many as 471 Waste Banks have been running. With the number of savers as many as 47,125 people and the amount of waste that has been managed is that until 2013 there have been 1,443 Waste Banks in 56 cities, spread across 19 provinces. More than two million kilograms of waste per month are successfully processed by the Waste Bank. As savers, people immediately get economic benefits. Waste that can still be recycled, such as organic materials, can be used for compost or biogas. Meanwhile, nonorganic materials are recycled into various furniture such as bags, sandals, and others. There are several Waste Banks that have their own processing equipment such as composter, plastic pellet maker, so they can sell recycled items at a higher price. However, there is also a Waste Bank which only functions as a supplier for collectors. They work together with collectors who routinely collect economical waste for recycling. Waste Bank workflow can be seen in Figure 1.

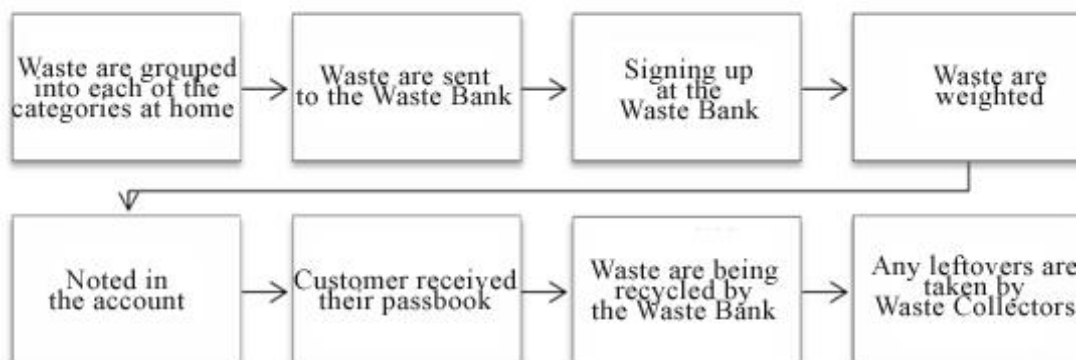


Figure 1 – Waste Bank workflow (Environmental Agency of Denpasar City Government, 2018)

Denpasar City Government in its dedication to create a better Waste Bank system is also realized by online-based innovation, with the creation of the SIDARLING application (Denpasar City's Environmental Awareness and Care Information System) which can be accessed and downloaded via the playstore. In this application, the name and location of the Waste Bank closest to our location is presented and briefly shows the number of customers and the amount of savings they have. So far, 54 of the 128 waste banks in Denpasar City have joined the Sidarling application. Of that number, waste bank customers have also reached 5,111 customers. In operating this application, the Environmental Service and Cooperatives, Small and Medium Enterprises also collaborate by creating a reward system in the SIDARLING application based on the number of points, namely silver with 0-24 points accumulating will get free school bus services; gold by collecting 25-75 points with the services obtained, namely free school buses, shopping discounts at several shops, priority services (KK, KTP, licensing, BD, payment of water / electricity), hospital and puskesmas services; and platinum with a collection of 75 points and above with services obtained by free school buses, shopping discounts at several shops, priority services (KK, KTP, licensing, BPD, water / electricity payments), hospital and puskesmas services, and scholarships for school students.

CONCLUSION

Waste management activities manifested through the Waste Bank are a manifestation of the implementation of the Social Entrepreneurship concept, so the success rate of this Waste Bank can be seen from how many benefits can be felt by the essential aspects elaborated in the Waste Bank business activities such as benefits for other aspects. environmental, social and economic. The economic aspect shows the economic value of waste processing products, the social aspect shows the attitudes and behavior of individuals in waste management efforts and the environmental aspect shows the mission or goals to be realized in an effort to improve environmental quality.

All elements of development actors including the community, government and private sector should enhance a more structured cooperation to increase the participation of each party in waste management issues, so that multidimensional aspects such as economic, social and environmental aspects contained in elements of sustainable waste management can be achieved by more optimally, so that social missions in maintaining and improving the quality of the environment can be achieved properly

REFERENCES

1. Alexis M. Troschinetz, James R. Mihelcic, 2009, Sustainable recycling of municipal solid waste in developing countries, Department of Civil and Environmental Engineering, Sustainable Futures Institute, Michigan Technological University, pp. 9.
2. A Satria Pratama, 2012, Managing Trash: Social-Preneur-Vironment (SPV) concept by Bank Sampah "Gemah Ripah" Badegan, Universitas Gadjah Mada, Yogyakarta, pp. 15-18.
3. Barr S, Gilg AW, Ford NJ., 2001 A conceptual framework for understanding and analyzing attitudes towards household-waste management. *Environment and Planning Journal*, pp. 48.
4. Barr S., 2007, Factors influencing environmental attitudes and behaviors a UK. case study of household waste management. *Environment and Behavior Journal*, pp. 73-435.
5. Cruz, Jose M. & Wakolbinger, Tina, 2008. "Multiperiod effects of corporate social responsibility on supply chain networks, transaction costs, emissions, and risk," *International Journal of Production Economics*, Elsevier, vol. 116(1), pp. 61-74.
6. Chung, S. S., & Lo, C. W. H. (2003). Evaluating sustainability in waste management: The case of construction and demolition, chemical and clinical wastes in Hong Kong. *Resources, Conservation and Recycling Journal*, 119–145.
7. Handayani DS, Budisulistiorini SH, Nuraini MR. 2009. *Kajian Nilai Ekonomi Penerapan*

- Konsep Daur Ulang pada TPA Jatibarang Semarang. *Jurnal Presipitasi*. 7(2), pp. 35-44
8. Herremans, I. and Allwright, D.E. (2000) Environmental management systems at North American universities: What drives good performance? *International Journal of Sustainability in Higher Education*, 1 (2): 168-181.
 9. Ivonilia. 2009. Gerakan 3R Pengelolaan Sampah di Jepang Sebagai Proses Sosial: Analisis dari Teori Struktural Giddens, Jakarta (ID), Universitas Indonesia, *Journal UI*. pp. 25.
 10. Jenna, R. Jambeck, Roland Geyer, Chris Wilcox, Theodore R. Sieglar, Miriam Perryman, Anthony Andrady, Ramani Narayan and Kara Lavender Law, 2015. Plastic waste inputs from land into the ocean Research Report, University of Georgia pp. 768.
 11. Khairunisa, Vidya. 2011. Analisis Daya Dukung Lingkungan and Kelayakan Ekonomi Unit Pengolahan Sampah "Mutu Elok" di Perumahan Cipinang Elok Jakarta Timur, *IPB e-Journal Pasca Sarjana*, IPB, Bogor.
 12. Kulatunga U, Amaratunga D, Haigh R and Rameezdeen R., 2006 Attitudes and perceptions of construction workforce on construction waste in Sri Lanka. *Management of Environmental Quality: An International Journal*, pp.57-72.
 13. Lingard H, Gilbert G, Graham P., 2001 Improving solid waste reduction and recycling performance using goal setting and feedback. *Construction Management and Economics Journal*, pp.908.
 14. Loosemore M; Lingard H; Teo M, 2007, 'Waste management in the construction industry', in, pp. 256 – 275 Skoyles ER.
 15. Maycox A., 2003, The village initiative project: achieving household waste minimization in the rural locale. *Chartered Institution of Wastes Management (CIWM): Scientific and Technical Review*, pp.7-10.
 16. Mujiburrahmad and Firmansyah, 2014, Hubungan Faktor Individu and Lingkungan Sosial Dengan Partisipasi Masyarakat Dalam Pengelolaan Sampah Rumah Tangga (Kasus Kampung Sengked, RT 03/RW 03 Desa Babakan Kecamatan Dramaga, Kabupaten Bogor), *Jurnal Agrisepe Vol (15) No. 1*, Fakultas Pertanian Universitas Jabal Ghafur, Sigli, pp. 16.
 17. Peraturan Presiden Nomor 59 Tahun 2017 tentang Pelaksanaan Pencapaian Tujuan Pembangunan Berkelanjutan.
 18. Robert Putnam, 1993 *The Prosperous Community, Social Capital and Public life*, *The American Prospect* no.3
 19. Roshan Kumar Yadav, Mukesh Pandey, and Sohit Agarwal, 2017, Attitude of Construction Participants on Building Materials Wastage, *International Research Journal of Engineering and Technology (IRJET) Volume: 04 Issue: 07*, pp. 5.
 20. Rawshan Ara Begum, Chamhuri Siwar, Joy Jacqueline Pereira and Abdul Hamid Jaafar, 2009, Attitude and behavioral factors in waste management in the construction industry of Malaysia, *Institute for Environment and Development (LESTARI)*, University Kebangsaan Malaysia.
 21. Skoyles JR, 1987, *Waste prevention on site*. London: Mitchell Publishing.
 22. Sulistya Rini Pratiwi, Said Usman, 2015, Analisis kelayakan usaha proses pengelolaan sampah rumah tangga sebagai upaya perbaikan kualitas lingkungan yang berbasis masyarakat, *Jurnal Fakultas Ekonomi Universitas Borneo Tarakan*, pp. 25.
 23. Scheinberg A. 2010. *The Need for the Private Sector in a Zero Waste, 3-R, and Circular Economy Materials Management Strategy*. Discussion paper for the CSD 18/19 Intercessional, Tokyo, Japan.
 24. Soma S. 2010. *Pengantar Ilmu Teknik Lingkungan Seri: Pengelolaan*.
 25. Sari Dewi Nurcahyanti and Joesron Alie Syahbana, 2014, Peran Kegiatan Operasional Bisnis Persampahan Dalam Pengelolaan Sampah di Kota Semarang, *E-Journal Undip*, pp. 17.
 26. Teo MMM, Loosemore M., 2001, A theory of waste behavior in the construction industry. *Construction Management and Economics*, pp. 51.
 27. Tchobanoglous G, Kreith F, Williams ME. 2002. Chapter 1 Introduction. In G. Tchobanoglous & F. Kreith, *Handbook of Solid Waste Management Second Edition*.

McGraw-Hill. United States of America.

28. Teo MMM, Loosemore M, Masosszky M, Karim K., 2000, Operatives attitudes towards waste on a construction project. In: Proceedings of the annual conference—ARCOM, vol. 2, p. 170-570.
29. Tam VWY, Tam CM, Zeng SX, Ng WCY. 2007, Towards adoption of prefabrication in construction. *Building and Environment journal*, pp. 3642-3654.
30. Ulum B, 2010, Olah Sampah Ala Jerman, [Online]. Tersedia di http://www.makassarpreneur.com/index.php?option=com_content&view=article&id=115:olah-sampah-ala-jerman&catid=36:catatanperjalanan&Itemid=49, [Diakses: 19 September 2019].
31. Undang-undang No. 18 Tahun 2008 tentang Pengelolaan Sampah.
32. Van de Klundert, A, Anschutz, J, 2001, Integrated sustainable waste management - the concept, Gouda, The Netherlands, *Waste*, pp. 24-25.
33. Widi Hartanto. 2006, Kinerja Pengelolaan Sampah Di Kota Gombong Kabupaten Kebumen. *Journal Universitas Airlangga* p. 11.
34. Wilson, DC, Velis, CA and Rodic, L (2013) Integrated sustainable waste management in developing countries. *Proceedings of the Institution of Civil Engineers: Waste and Resource Management Journal* 166 (2), ISSN 1747-6526, pp. 52 - 68.