

UDC 332

HOUSEHOLD WASTE MANAGEMENT STRATEGIES AND ITS OBSTACLES IN DENPASAR CITY

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ABSTRACT

Denpasar City, which is the capital city of Bali, is an important center for economic growth in Bali. Denpasar City was ranked first with the densest population and the highest number in the province of Bali. This affects the volume of waste in Denpasar City because the level of public consumption also tends to increase. DLHK Denpasar City noted that 70 percent of waste production in Denpasar City is dominated by household waste. The waste problem in Denpasar City is not only caused by population density, but also due to the lack of community participation and the weak management of the solid waste system in Denpasar City. The focus of this research is to get an in-depth picture of the Household Waste Management Strategy and its Barriers in the Province of Bali. The research method used in this study is a literature review. The results in this study are the obstacles, namely the lack of community participation and the behavior patterns of the people who still do not do a lot of waste sorting and recycling activities, obstacles to regulations and legal rules that are less strict, obstacles to the lack of transportation facilities and transportation facilities for waste transportation and obstacles to the funding aspect of household waste management. The strategy that can be done in Denpasar City in handling household waste is to increase community participation and behavior by conducting campaigns and making systematic and consistent environmental awareness programs, make regulations that are uncomplicated and on target as well as reinforce the rule of law in terms of waste management, provide facilities, and routinely perform maintenance on the transportation of waste disposal, create a targeted and transparent funding system, and maximize CSR schemes to increase funding sources in handling household waste in Denpasar City.

KEY WORDS

Waste handling strategy, waste handling barriers, household waste handling.

Traditional waste management in Bali since the past has been known for traditional organic waste management, namely by making waste as fodder for pigs and as green manure by planting in rice fields or on dry land/gardens, and others by burning. In the division of yard land which is generally divided into 3 parts (tri mandala: utama mandala, madya mandala, and nista mandala), in the nista mandala section is the most downstream part of the yard (Balinese: teben) usually used as a place to manage waste, a place for raising and cultivating orchards and various types of timber trees for building materials. This traditional waste management pattern can bring double benefits, namely the volume of waste can be reduced, Pigs can grow and develop relatively quickly and the condition of arable land (moor land or rice fields) becomes fertile (stable). Waste management like this is possible because the population is not yet dense, and there is still a lot of vacant land, and the type of waste produced is mostly organic waste (Wardi, 2008).

The development of modern technology, which is accompanied by rapid population growth and the entry of the money economy system, will result in a shift in cultural values which is marked by the spirit of community cooperation starting to thin out. In addition, the traditional waste management pattern as mentioned above is no longer possible in urban environments (Troschinetz et al, 2009). This is because the population is getting denser, and the average land ownership is relatively narrow, so it is very difficult to procure a nista mandala because land prices are very expensive, and the type and quality of waste produced by modern society has changed, namely the volume of inorganic waste tends to

dominate. Migration of population from rural to urban areas (urbanization) and the tendency to change the status of suburban villages to urban areas is one of the factors that accelerates the growth of the urban population in Bali, and contribute to the formation of slum areas and waste problems and environmental sanitation problems in urban areas. The total population of Bali in 2016-2020 is shown in Table 1.

Table 1 – Total Population of Bali per Regency/City in 2016-2020

Regency/City	Population (Thousand's people)				
	2016	2017	2018	2019	2020
Jembrana	273,3	274,9	275,6	273,3	274,9
Tabanan	438,5	441,0	443,5	445,0	445,5
Badung	630,0	643,5	644,0	645,3	646,8
Gianyar	499,6	503,9	504,5	506,6	508,9
Klungkung	176,7	177,4	178,7	179,7	187,4
Bangli	223,8	225,1	226,6	227,8	228,1
Karangasem	410,8	412,8	413,7	414,8	416,8
Buleleng	650,1	653,6	656,2	658,1	659,6
Denpasar	897,3	924,3	930,6	947,3	962,3
Bali	4.200,1	4.246,5	4.273,4	4.297,9	4.330,3

Source: BPS Bali, 2020.

Table 1 shows that the population in Bali is increasing from year to year. Each regency/city experiences an increase in population which causes the total population density in each regency/city to also increase. From Table 1, it can be seen that the area with the highest population increase is in Denpasar City and the lowest is in Klungkung Regency. This shows that Denpasar City is the area with the largest population and recipient of migrants. BPS data (2020) shows that the proportion of the number of migrants living in Denpasar City is greater than the original population living in Denpasar City. This condition makes Denpasar City quite dense, because with an area of 127.78 km², the population density of Denpasar City has reached 9,155.46 people/km².

The increase in population will also have an impact on the volume of waste in Bali. Just like other big cities, Denpasar also has problems related to waste. The total waste generated is 3500 cubic or the equivalent of 1200 tons in a day. This makes Denpasar City have the highest estimated waste in Bali. The estimated total waste generated in Bali itself throughout 2020 is estimated to reach 11,836.51m³/day which has increased to 976.45 m³/day from 2019. Figure 1 shows a comparison of the volume of waste generated by each Regency/City in Bali from 2019-2020.

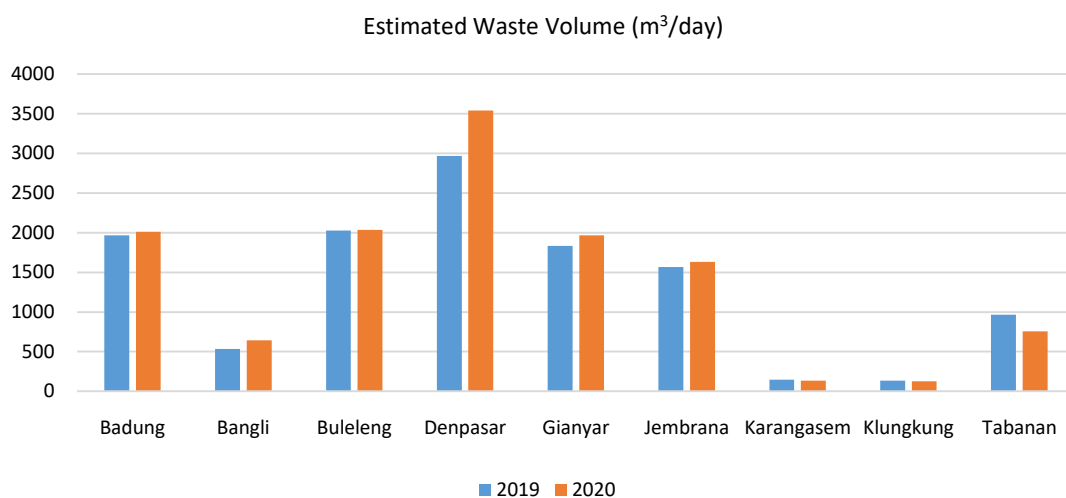


Figure 1 – Comparison of Regency/City Waste Estimates in Bali from 2019-2020
(Source: Regional Environmental Status Report of Bali, 2020)

One type of waste that is produced in Denpasar City is plastic waste. Plastic waste is known to still be found in the Suwung TPA. This is due to the high public consumption of plastic, especially plastic bags, which results in the high amount of plastic waste produced. Plastic packaging has several advantages such as being strong but light, inert, not rusty and thermoplastic (heat seal) and can be colored, making it difficult to replace with other materials. In fact, Indonesia is known to be the second largest producer of plastic waste into the sea after China (Jambeck et al, 2015). The type of waste generated in Denpasar City is dominated by household waste which has a high percentage of 70%. The number of food wrappers made of plastic which is more practical than leaves dominates the household waste generated by the Denpasar community. This practical wrapper has a negative impact that outweighs the positive impact. The negative impact is that the chemicals produced by the plastic can damage the environment and disrupt the ecosystem and the worst impact is that the plastic waste cannot be destroyed. The types of waste in Denpasar City in 2019 are shown in Table 2.

Table 2 – Data Types of Waste in Denpasar City in 2019

City Name	Period	Household waste (%)	Office Waste (%)	Traditional Market Waste (%)	Commercial Center Garbage (%)	Public Facilities Garbage (%)	Regional Garbage (%)
Denpasar	2018-2019	70,00%	2,00%	5,00%	3,00%	10,00%	10,00%
Total		100%					

Source: <http://sipsn.menlhk.go.id>.

The Denpasar City Sanitation and Gardening Service (DKP - Dinas Kebersihan and Pertamanan) stated that the volume of waste in Denpasar continues to increase from year to year. Denpasar City produces waste production in Denpasar City per day reaching 2500m³ or close to 750 tons per day, the amount is the same as 530 times transported to the Suwung Final Disposal Site (TPA - Tempat Pembuangan Akhir). Of this amount, almost 70 percent is produced by households. Judging from the high percentage of waste generated from households, this shows a positive correlation where a high population can affect the increased volume of waste (Troschinetz et al, 2009). The high population increase will also result in massive land conversion. Even in the city of Denpasar, there are many buildings that do not have a building permit. According to Ivoni et al, the potential for environmental degradation when rice fields are turned into residential land is the increase in the volume of domestic waste. It often happens that residential complexes built on former paddy fields and surrounding areas are still paddy fields, disposing of their domestic waste (liquid and solid) directly into paddy fields or flowing through irrigation channels without prior treatment.

In Denpasar City, apart from the dense population, the waste problem is also caused by ineffective waste management. Waste management is regulated by Denpasar City Regulation Number 3 of 2015 concerning Waste Management, then further implementation is regulated through Denpasar Mayor Regulation Number 11 of 2016 concerning Procedures for Management and Disposal of Denpasar City Waste. In practice, there are still deviations in community behavior that are not in accordance with regulations regarding waste management and disposal. For example, residents are required to sort waste before it is disposed of to make it easier for Temporary Disposal (TPS - Tempat Pembuangan Sementara) to carry out further management. However, this waste sorting activity is not carried out by many residents. In the process of managing and disposing of waste, it can be seen from the management activities carried out by forming a banjar-based self-management group such as a waste bank, while waste reduction is overcome by forming self-managed groups such as depots owned by each village. Although efforts have been made to reduce waste, not all villages have formed these self-managed groups, resulting in overcrowding and waste that is not managed properly. The procedure for disposing of waste is carried out by sorting the waste first and bringing the waste independently to the garbage dump or depot owned by the village, but most of the people don't care or don't do the sorting.

In the process of supporting the implementation of waste management and disposal, the Denpasar City government provides Moci (cikar motorbikes) in each village to help transport waste. The implementation of waste management and disposal procedures is carried out by giving responsibility to the Village to reduce and handle their waste in their respective areas by forming the waste self-management group. There are still many villages in Denpasar City that do not have clear Standard Operating Procedures (SOP) in waste management regulations. The thing that is often the most difficult to fulfill is the availability of land or temporary waste disposal sites which actually must be available in each village. However, due to land limitations that are not sufficient to accommodate the volume of waste, this standard is still difficult to meet. The provision of waste management policies to village heads cannot simply reduce waste problems, without strict control or supervision from the government. This delegation of authority appears to be merely throwing responsibilities at each other, without providing an effective solution. Conditions in many areas in the city of Denpasar show that there is still a lot of garbage thrown away on the roadside by irresponsible residents. Inadequate means of transporting waste is also one of the things that makes waste management in Denpasar City not over. Many of the garbage trucks found in the waste depots in Denpasar are in a state that is no longer suitable for use (Prana, 2012). Garbage trucks, which have become obsolete, seem to continue to be forced to carry garbage until it exceeds its capacity. So it is not uncommon for garbage that has been transported in trucks to start falling on the streets and can endanger road users. This is also related to the funding for waste management which is still under-supervised in its use. Funds for waste management in the city of Denpasar are obtained from the State Revenue and Expenditure Budget (APBN - Anggaran Pendapatan and Belanja Negara) namely the Special Allocation Fund (DAK - Dana Alokasi Khusus) and the Denpasar City's Regional Revenue and Expenditure Budget (APBD - Anggaran Pendapatan and Belanja Daerah). The collection of waste disposal fees is also found in the Denpasar city area, so if you pay attention to the fact that waste management funding already has such a procedure. However, in practice it is estimated that there are still leaks in waste management funding in Denpasar City (DLHK Denpasar, 2018).

One of the waste management policies that have been carried out by the Denpasar City Government is Mayor Regulation No. 36 of 2018 regarding the reduction of plastic waste. The success of handling waste consistently by Denpasar City Government, including through, has resulted in a decrease in the number of plastic use in Denpasar City. It is known that in January 2019 there was a very significant decrease in the use of plastic bags in modern stores and shopping centers, which was 99.15% or approximately 12,903,034 pieces when compared to the data on the use of plastic waste in 2018. After re-collection of data in May 2019, there was another decline in the percentage of plastic bag use for the period from February to April 2019. The percentage of decline increased to 99.60% or around 12,981,234 pieces when compared to data on the use of plastic bags in 2018 or before Regulation of Mayor Number 36 of 2018 was enacted. In addition, the Denpasar City Government has also issued Denpasar Mayor Instruction No. 1 of 2018 concerning Waste Reduction which regulates the reduction of waste including plastic waste to the level of traditional markets and other business activities in Denpasar City.

The socialization of reducing the use of plastic bags in traditional markets is routinely carried out by the Denpasar City Government Plastic Waste Reduction Team together with the Environmental Monitoring Officer (Jumali) accompanied by the distribution of environmentally friendly bags. Through the implementation of Denpasar Mayor Regulation No. 36 of 2018 and this Denpasar Mayor's Instruction No. 1 of 2018, the volume of use of plastic bags in traditional markets and other business activities in Denpasar City has decreased with a percentage decrease of 54.26% for traditional markets and 86.27% for other businesses located on roads in Denpasar City. In addition to issuing waste management policies, the Denpasar city government has also made many movements in inviting the community to participate in waste management. Such as, the Tourism Movement Without Plastic Bags (Character). Through this character movement, it is hoped that the public and tourists visiting Bali, especially Denpasar City, can reduce the use of plastic bags

and start using reuseable shopping bags so as to create a culture of "Tourism Without Plastic Bags". Waste management by traditional villages is also supported and motivated by the Denpasar city waste management system, namely PESAN MAMA - Sistem Pengelolaan Sampah Secara Mandiri Berbasis Masyarakat (Community-Based Independent Waste Management System) with the principle of waste management, waste management, and a new paradigm in sustainable waste management which also provides space for traditional villages to participate in waste management in an even smaller scope namely family-based, with the aim that waste can be sorted according to its type from the scope of the family or home itself, so that the waste that goes downstream or at the TPA can be reduced and only leave the residue (Sudharma et al, 2019).

Policies and movements carried out by the Denpasar City government at this time should still be appreciated because at least they are starting to produce results even though they have not been able to overcome the bigger waste problem. This is thought to be because the policies and movements carried out by the Denpasar City government are mostly recommendations and invitations that do not all have clear legal rules. The problem of waste management, if studied further, actually leads to the absence of a systematic and professional waste management system planning. The solid waste sector has not yet received a priority compared to other sectors in urban development. Meanwhile, most of the people in the city are still not familiar with a good waste management system, even though community participation is also very important in the waste management system.

Waste management in Denpasar City is an agenda that is very urgent, because until now the problem of the volume of waste that continues to increase and still cannot be handled effectively, although many policies and efforts have been made, all of them must of course be deepened from the participation of all elements of development stakeholders in order to find real strategies and actions in handling waste in Denpasar City. Based on the description above, it is very necessary to have an in-depth study of the obstacles and strategies for Handling Household Waste in Denpasar City.

METHODS OF RESEARCH

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

RESULTS AND DISCUSSION

Obstacles in Handling Household Waste in Denpasar City

Denpasar City is the capital city of Bali which is the center of government, trade, tourism, education, and has the status of a metro city at this time. Based on BPS data in 2020, the population of Denpasar is 962,900 people with an area of 127.78 km². Denpasar City is divided into 4 sub-districts, namely North Denpasar, East Denpasar, South Denpasar, and West Denpasar, with a population density of 66 people/km². The waste problem in Denpasar can be called a very important problem at this time. The volume of waste produced in an area is proportional to the number of residents and the level of consumption of goods, so that the volume of waste produced every day is getting bigger, both regarding organic waste and inorganic waste (Troschinetz, 2009). Development problems that arise in the city of Denpasar include the problem of changing the function of rice fields into settlements, traffic jams, waste that causes flood disasters. It is possible for population consumption to continue to increase along with the increase in population, meaning that the volume and diversity of waste produced also increases.

Waste management in Denpasar City so far is still mostly carried out by government officials in order from the source of the waste to the TPS and finally to the TPA. TPA has been the hope of the main solution in dealing with waste. The government's main concern is

on the TPA and people just throw away their garbage. In fact, the existence of the landfill has many negative impacts such as conflicts with the community and pollution. A study conducted by McDougall (2001) proved that most of the waste in landfills that had been closed for a long time did not experience decay. Most of the waste in the TPA is household waste wrapped in plastic (a mixture of organic and inorganic).

Barriers to Community Participation and Behavior

In general, recycling activities are a strategy for sustainable municipal waste management. Several reasons are often put forward to participate in and promote recycling activities in both developed and developing countries. The general consensus among professionals and researchers is that recycling reduces the total amount of waste disposed of, and conserves natural resources (Muttamara, 1996; Noehammer et al., 1997; Van Beukering et al., 1999; White et al., 1995). According to Bolaane (2006), community participation is often an obstacle to the success of recycling schemes. Because it is still difficult to simultaneously increase community participation in recycling activities.

The main problems of waste are paradigm, behavior and awareness problems. Due to the existence of TPS and TPA, people tend to think practically by disposing of makeshift waste (without segregation). So that the mindset is embedded that the government is responsible for all the waste produced by the community. The current obstacle facing Denpasar City as a big city as a destination for urbanites is that there are many violations of waste disposal schedules. In fact, there are still many people who often throw garbage into rivers and empty places.

Encouraging public awareness to manage or create a healthy and free environment from dumping garbage into rivers is indeed quite difficult. Public awareness on the riverbanks of the importance of preserving the environment is still quite low. In general, people in Bali have a tradition after the traditional ceremony at the temple, namely the process of removing the rest of the ceremony into the river (ngelebar banten). Many series of offerings that are delivered and washed into the river become garbage and are left to pile up just like that. In this case, it appears that the community's appreciation is still very low in terms of caring for clean living and processing waste resulting from religious ceremonies. It is getting worse because the results of the waste from the ceremony are mixed with plastic waste that cannot be decomposed quickly by microorganisms because it takes a very long time. The main cause is how the behavior of littering includes: lack of facilities or landfills, TPA which is very far from residential areas, lack of community knowledge (Arimbawa et al, 2019).

The problem of garbage on the banks of the Tukad Badung river as an example, shows that the community still doesn't care about the environment. Many of them do not really understand how to protect the environment and the impact it will have. Some people believe that after the traditional ceremony is completed by melting the banten into the river, the ceremony will run well in accordance with what was previously desired (labda kerja). In fact, the danger posed by the disposal of ceremonial garbage into the river will continuously cause flooding. The issue of economic problems is still often heard in the community where in order to avoid expensive waste fees every month, residents prefer to throw garbage secretly into the river, the self-management system implemented by the Denpasar City Government is considered too expensive. This is the main factor why there is still frequent accumulation of garbage on the banks of the Tukad Taman Pancing river because the level of public awareness of the cleanliness of the river is still very low with many reasons as if the waste fee from self-management is too high (Arimbawa et al, 2019).

According to (Bolaane, 2006) in terms of community participation, it can be concluded that although in general they know about recycling, the form of understanding does not always translate into practicing recycling activities. This could indicate that there are indeed other factors hindering public participation in recycling, such as the absence of a 'visible' recycling center or a lack of incentives to do so. In addition, it is generally stated (Bolaane, 2006) that people will be more inclined to practice recycling if they can benefit financially. Economic benefits are very important for community participation in recycling activities. So to increase public participation must have financial incentives built into it. As in the Waste Bank

activities, the community can earn money by "Saving Garbage", the value of which is adjusted to the weight and type of waste.

The role of NGOs is also important to implement public education programs to support community interest in recycling activities. Educational aspects important for increasing public awareness and participation in education recycling should be complemented by direct incentives targeted to the participating communities. To this end, a multi-stakeholder approach should be taken to increase community participation in recycling activities by involving NGOs, households, and the private and public sectors (Bolaane, 2006).

Barriers to Regulation and the Rule of Law

Public policy is a government management tool for implementing work plans. Therefore, the government's role is very large in the policy process. Public policies are usually known as constitutions, regulations, laws, legislative acts, principles, or directives (Schuster, 2009). In waste management policies involve laws on environmental protection, and regulations on the separation, collection, treatment or disposal of waste. Stakeholders in public policy include: government, NGOs, companies, and civil society organizations and communities. The field of waste management also involves environmental regulators, environmental NGOs, waste collection groups, waste processing companies, and residential communities (Jones, 2020).

The main barriers to waste management also include problems within local authorities such as lack of planning, strategic direction and management (including lack of training) and poor communication between government and communities (Yukalang et al, 2017). Policies taken in dealing with waste problems often have good goals, but in practice what happens is a bad strategy to solve waste problems in the area (Duc et al, 2013). This can hinder the community and those who care about the environment to understand how to participate or follow waste management policies (Anantanatorn, 2015).

The Denpasar City Government has begun to hand over waste management authority to their respective village officials. However, this is not going well in reality because there is a lot of bad communication between the city government and the perpetrators in the field. The lack of direction regarding technical plans and ineffective strategies also adds to the poor regulation of waste management. For example, there is an SOP regarding the obligation of village/kelurahan officials in Denpasar City to provide temporary garbage collection sites, which in fact not all sub-districts are able to provide such a place, due to land limitations. In addition, the condition of the scattered TPS is also quite worrying because as a result of too much waste and the rapid accumulation of waste, many TPS are found that do not sort or separate waste. So that the collected waste is immediately transported to the TPA. Each stakeholder and responsible party throws responsibility at each other, without being able to provide concrete solutions, especially in terms of policies and regulations for handling waste that are still not effective and efficient.

According to Taelman (2018) conditions in each region can also affect compliance in waste management. Regions that have a high population level often find it difficult to regulate local waste management regulations. Because there are still many people who do not care about the environment. This shows that the implementation of the law is needed. Legal tightening can encourage waste segregation, and local governments should establish their own rules to support their systems and encourage communities to participate in waste management systems.

The provisions contained in the Denpasar City Regulation Number 3 of 2015 concerning Waste Management, which in Article 53 is punishable by a maximum imprisonment of 3 (three) months and a maximum fine of Rp. 50,000,000 (Fifty Million Rupiah). When compared to the threat of fines in the Denpasar City Regulation for violations of waste disposal, it appears that the sanctions are too light, because the reality is that in giving fines to perpetrators, they are only given approximately Rp. 100,000 (One Hundred Thousand Rupiah) - Rp. 1,000,000 (One Million Rupiah). This shows that there is still a lack of strict implementation of the law, so that there are still many violations of waste disposal outside the schedule. Bruce & Storey (2010) found that 70 percent of households in

Denpasar City did not receive regular waste collection services, as they were only collected from main roads. As a result, 90 percent of respondents burned their plastic or threw it into the river, a practice that can happen a lot due to lack of punishment and social stigma.

The political context of local government can also influence waste management in many ways. Since the leader of each municipality is elected by the public, there is pressure on local leaders to make popular decisions that will help them maintain their role as long as possible. This makes implementing changes that will affect people's lives a big challenge. So there is a great need for regulations and rules that must prioritize long-term impacts and full focus from policy makers (Shao et al, 2016).

Barriers to Waste Transportation Facility Factors

According to Pasang, et al (2007), the cycle of waste management through collection, transportation and final disposal is an activity that is often considered complicated in many places (Moghadam et al, 2009). This problem is mostly caused by inadequate mechanical facilities and manual collection is still more often used for waste collection. The problem of waste collection can be caused by limited transfer station facilities or adequate temporary disposal facilities (Jiang et al, 2009). The phenomenon in many developing countries is that collection services are still carried out door to door (Pasang, 2007).

Garbage transportation facilities are a problem that also contributes to the inefficient waste management. Kardono (2007) states that environmental issues must also involve limited application of appropriate methods. Kardono (2007) states that environmental issues must also involve limited application of appropriate methods. Another difficulty in transporting waste transportation facilities is the large number of garbage trucks that are old and unfit for use (Vidanaarachchi et al, 2006). Like the garbage trucks at TPS in several areas of Denpasar City, many of which look outdated and unfit for use, but they are still forced to operate and even have to load the pile of garbage beyond its capacity. This results in a lot of garbage falling on the road and can endanger other road users. According to Tin, et al (1995) this is caused by weaknesses in the organizational structure so that parties who have an obligation to maintain waste transportation facilities and control the situation do not carry out their obligations properly.

In the current state of the COVID-19 pandemic, it is increasingly difficult to transport waste. Everyone is required to wear a mask when going out of the house. One of these PPE (Personal Protective Equipment) after being unused, will be discarded by the community. According to the Denpasar DLHK, medical waste during this pandemic reached 3 tons per day. Medical waste requires special management because it is a type of hazardous and infectious waste. Health care waste, especially COVID-19 waste, needs to be treated following guidelines and regulations with international standards, most of which include thermal treatment (Damanhuri, 2020; Manomaivibool, 2020; Modak, 2020; Oelofse, 2020; Pariatamby, 2020; Waina, 2020). Currently there are several technologies that are commonly used for the destruction of medical waste, but because it has a high infectious risk, this technology still reaps many pros and cons. Until now, in the province of Bali there is no special disposal site for medical waste so that piles of medical waste in Bali must be sent to West Java. This shows the lack of facilities and waste management in Denpasar City.

The waste management system in Denpasar City still uses the open dumping or Land Fill method, where this should start looking for a new solution considering the condition of one of the largest landfills in the province of Bali, which is now managed by the City of Denpasar, which is declared to be overloaded. According to the DLHK of Denpasar City, Suwung TPA receives 1200 to 1300 tons of waste per day that enters regionally from the Denpasar area. Meanwhile, the Suwung landfill is designed to handle 800 tons per day (Arif, 2016). However, due to the lack of alternatives, waste disposal continues (Herder et al, 2012). Suwung TPA is not a sanitary waste disposal site, that is, a landfill that has not been processed in a sustainable manner. Thus, since 2007 the mangrove forest and surrounding bays have been found to be polluted (Eden, 2007).

Suwung landfill has received attention in the media and academic circles because it is the first proposed Clean Development Mechanism (CDM) project in Indonesia (Tang J.,

2014). CDM is an initiative designed to mitigate greenhouse gas emissions (Mari, 2009). In 2003, four regional waste management authorities at Suwung TPA entered into a 20-year agreement with the private company Navigat Organic Energy Indonesia (NOEI) to generate energy from organic waste (MacRae, 2012). The main mission of this Agreement is the Suwung Integrated Waste Treatment Plant (IPST) to produce electricity using waste raw materials. The electricity is obtained from the waste decomposition process with integrated waste processing technology known as GALFAD, namely gasification, landfill gas, and anaerobic digestion, to become a viable source of commercial income in an environmentally friendly manner (Eden, 2007).

MacRae (2012) found in 2010, after three years of approval, that neither of the three plants had started producing electricity. The GALFAD project never produced the promised amount of energy or processed the promised amount of waste and it is estimated that the entire operation cost around 30 million. However, to officially terminate the contract until 2023, NOEI will ask for compensation of €1.5 million (Arif, 2016). The GALFAD project has proven to be a costly failure due to the project's shortcomings such as inappropriate technology which is too expensive, unsuitable for waste streams and difficult to repair, high operating and transportation costs and dependence on CDM funding (MacRae, 2012), (MacRae, 2012), (Herder et al, 2012).

The Communication Forum stated that the current waste is very large, reaching 5,000-10,000 tons/day, of which 60-70% is organic, 20-30% is non-organic that deserves to be recycled, and 10% is residue. 90% of the total waste should not end up in the TPA. Garbage scattered on the road, the smell produced by the landfill, burning of waste, social conflicts and other problems that arise due to waste management are believed to have a negative impact on the Balinese economy, including the Bali tourism industry. Changes in management patterns must be carried out quickly, massively and structured (Suriyani, 2019).

Barriers to Funding for Waste Management

The financing aspect is a driving resource so that the wheels of the waste management system in the city can move smoothly (Trinh, 2021). Various issues arise as obstacles to good and sustainable waste management, one of the main problems is poor and unstable financial conditions (Moh et al, 2014). A good waste management system requires good technical expertise, good resources, good planning, and coordination with other stakeholders such as those dealing with roads, drainage, transportation, telecommunications, and electricity. All of this is possible only if good financial resources are available (Seuring et al, 2008).

Indonesia's solid waste management system aims to be 'self-financing', including here with the formation of local companies. This financing sector involves several aspects, such as: The proportion of APBN/APBD for waste management, between user fees and waste management costs. The proportion of these cost components is for salaries, transportation, maintenance, education and development as well as administration. The proportion between user fees and community income. – The structure and withdrawal of applicable levies (Yulia, 2016).

Another factor that causes funding problems is the lack of proper government budget management and unsystematic financial records (Nguyen et al, 2015). Funds for waste management in the city of Denpasar are obtained from the APBN, namely the Special Allocation Fund (DAK) and the Denpasar City APBD. The collection of waste disposal fees is also found in the Denpasar city area, so if you pay attention to the fact that waste management funding already has such a procedure. However, there is still a lack of budget management and supervision of the use of the budget.

Waste management in Denpasar City still seems to be a low priority because the city government is still struggling to meet the basic needs of the community. This weak financial base provides obstacles in the development of waste management (Bruce & Storey, 2010). The condition of the service provided is related to waste management, where service users cannot pay or refuse to pay for the service. This will affect the waste tax and retribution system that is not developed adequately. Most people who have middle to lower economic

conditions, choose to avoid paying waste disposal fees (USEPA, 2002). Many people in Denpasar City are still secretly throwing garbage on the roadside and riverbanks. They do this to avoid paying taxes and waste management fees which are considered expensive. This condition needs to find a way out, especially incentives that can be given in handling waste.

Household Waste Management Strategy in Denpasar City Increasing Community Participation and Behavior

The literature on waste management contains many case studies of failed behavior change in such a way that there is general agreement that models that depend on changing people's behavior such as separating waste from the source will fail. There is an assumption that it is too difficult to encourage people to care enough about sorting their waste (Zurbrugg, 2002). However, with different steps, behavior change can be detailed, studied, and implemented by anyone to get consistent results in dealing with waste problems. Based on several case studies conducted by Ocean Plastics Asia (2015), from 18 organizations in five countries, focused on India, Brazil, Indonesia, and Chile, it shows that changing people's behavior is the most important point in dealing with household waste. Efforts to change people's behavior can be started from the formation of beliefs and habits.

Changing beliefs and habits is a gradual process and is often carried out through campaigns in collaboration, both with city governments and independently, to change beliefs by introducing one campaign at a time (Ocean Plastics Asia, 2015). In order to achieve the goal, which is to properly sort the waste in the community, first focus on training from the household environment because they are the first point of contact in the household and they must agree with the program before going any further. Second, team members train workers and household staff who manage household waste on a daily basis. Next, they engage the children at home who are recyclers by tapping the moral heart of their parents and usually happy to imitate the habit of everyone in the house in taking out the garbage. Children influence parents to value what they value and fight for their future, thereby helping to strengthen true parenting training. After new beliefs and actions become habits, which is a time-consuming process, the next belief structure and campaign is to discover the concept of "why", is a person's reason for doing a business (Ocean Plastics Asia, 2015).

The province of Bali, especially Denpasar City, which is predominantly Hindu, has the concept of Tri Hita Karana as The Way of Life for Hindus. With a strong belief that all life is related to God. Their "why" factor is that we must hold on to God, others, and the holy Earth. Good waste management practices can go much deeper into reducing waste piles. On the other hand, waste management is a reflection of our identity as human beings. It's about taking care of each other by taking care of the Earth. Every element of their behavior change program supports the basic idea of the "why" factor.

Once they believe that change is important enough, people will be ready to try new behaviors. Of course, they need clear instructions not just what to do, but when to do it. For example, using a combination of training approaches to teach waste separation techniques. The approach usually begins with a simple, high-level message (eg stickers, magnets, trash can colors, and pictures) before moving deeper with personal training such as community consultations and door-to-door delivery of information. It is necessary to convey a clear and consistent message over and over again in various formats and contexts until the message sticks in the mind and eventually becomes the new norm. The best way to do this is to use a communication format that is preferred by the community you are trying to reach. In addition, it can use community leaders, such as artists or respected ones, to attract public interest.

Changing one's habits ideally, should not only believe in the importance of doing something new, but must also believe that the change will be easy to do and will make his life easier in the long run. In addition, the supporting infrastructure for the waste management system must exist, otherwise the changes will not last long. There are too many campaigns to raise public awareness, but there is no supporting infrastructure so that people don't even know what to do with their separated waste, and eventually quickly return to their old habits.

The key is to provide affordable garbage collection services that can even pick up the ball to their homes so that there is no longer any reason to litter.

Furthermore, what needs to be done to increase participation and change people's behavior is to adjust incentives to strengthen change. Incentive is something that motivates or encourages someone to do something (source). For example, in the Waste Bank activity in Denpasar City, where customers get financial incentives for collecting and sorting waste as much as possible. Although there are still many customers who have not received direct economic benefits, due to the fluctuating price regulation of recycled waste and adjusted to the needs of collectors. The role of the government is needed in this case in order to facilitate regulation and provide incentives for the Waste Bank business in Denpasar City, in order to attract public interest to join as customers.

The application of "punishment and reward" can also be carried out in a fair and controlled manner to "force" the community to participate in waste management. Thus, legal regulations that have been issued can be relaxed for people who violate them and provide financial compensation incentives for the sale of sorted recycled waste. The behavioral change lever regarding waste management is to find strong "why" factors for change, teach how to make changes, simplify the change process structurally and adjust incentives to strengthen change. If these factors can be carried out properly and consistently by all levels of society, the government and the private sector who agree to make a commitment to behavior change, it is hoped that the handling of household waste problems in Denpasar City can start to top.

Regulations and Legal Rules for Household Waste Management in Denpasar City

Regulations and legal rules regarding waste management in Denpasar City are quite weak, because there are still many violations and non-technical technical difficulties found in the field. The Denpasar City Government must start to improve internally and externally in an effort to increase business in handling household waste. This waste problem should have become a priority agenda considering that a very bad impact await in the future. Improvement of regulations and the rule of law can be started from the internal side of the government organizational structure. Where, in policy making is no longer overshadowed by political interests, so the policies taken are not only populist policies but policies that are right on target and include a high commitment to honest and strict control and evaluation. So, in the end, it is hoped that the right solution will be found and in accordance with the conditions of the household waste problem in Denpasar City.

Cleanliness and effectiveness of household waste management in urban areas demonstrate the strength of overall governance. To run an effective waste management system, many parts are interdependent, from effective city planning to meeting costs through effective tax collection and/or cost systems, diligent and reliable activities, changes in community behavior, procurement of transportation for transporting waste and spare parts (Sarkar, 2013).

Denpasar City Government can encourage recycling business incubation activities, one of them is by collaborating with the private sector to help entrepreneurs in the waste sector to develop financed and sustainable businesses and gain access to interested investors, by establishing uncomplicated and transparent regulations and investment policies. These incubation programs can serve as a bridge between organizations and investors. They can also help organizations think bigger and amplify their impact in areas where it is most needed.

Denpasar City Government is also expected to be able to develop and provide additional support for the development of a better recycling system. These include focusing on design issues to improve efficiency across the waste stream chain, developing incentives that create greater economic demand for recycled raw materials, and ways to support new and growing businesses in the household waste management sector. The government and private foundations recognize the need to support and expand recycling in dealing with the problem of household waste.

Provision of Household Waste Disposal Facilities in Denpasar City

At the simplest level, garbage collection means moving waste material from one location to another, but it is the foundation of the entire waste management system, and the single most important thing to tackle waste accumulation. Changes in behavior or programs and policies will not stem the waste problem, unless basic waste collection infrastructure is in place for residents, who have little choice but to burn or dispose of their waste into nature. In fact, uncollected waste accounts for 75% of land-based leakage (McKinsey Center, 2015).

Waste collection facilities in Denpasar City are still not evenly distributed in each sub-district, due to the conditions and limited land available in their respective areas. This causes a lot of garbage to accumulate every day. Not to mention that a lot of transportation is not feasible to use anymore because it is too old. To overcome this problem, the first thing to do is to provide a budget for the maintenance of transportation transportation and check the transportation fleet on a regular basis. If the vehicle is not properly maintained, service delivery may stop. This is a problem that has plagued many communities and has stopped or significantly reduced the level of collection services. The vehicle or equipment breaks down, and repairs are made difficult because of inaccessible parts or inadequate local repair services or insufficient funds for repairs. In some cases, damaged equipment sits for months sometimes years waiting for repairs. However, if carefully planned, maintenance problems can be avoided.

Another strategy that can be done is to switch from a linear disposal model by collecting waste and bringing it directly to the landfill, therefore, a Material Recovery Facilities (MRF) is needed to separate the waste. The goal is to divert as much of the valuable material as possible into the recycling market. This facility can reduce materials going to landfill by 80 percent or more. Another transfer point is a depot, which may also be needed when serving congested, and hard-to-reach areas or when people prefer to do their own house-to-house collection (Raurer, 2015).

Optimization of waste transport routes can also be done by mapping out the most efficient way to travel between a set of collection points. For example, the Swachha Eco Solutions Organization in India uses a hub and spoke model to ensure that their collection route is never more than 15 kilometers from any of the dry waste collection centers. They have also invested in recycling collection centers in two strategic locations, which reduces travel time and reduces overall carbon footprint. Organic waste is processed into compost in one of 24 places. Each truck is equipped with a GPS system and routes are optimized to save fuel and save time with optimization techniques (Ocean Plastics Asia, 2015).

Funding for Handling Household Waste

Problems in the funding of waste management in Denpasar City are caused because they still depend a lot on sources of funding from the APBD and the Village Allocation Fund. Thus, it is difficult to make breakthroughs and innovations, especially in the field of technology to overcome the waste problem. One strategy that can be done to overcome this problem is to integrate the CSR Scheme which is an activity of the private sector as a form of social responsibility to the community and the surrounding environment. In this case, the form of the government's role still needs to be developed in increasing the effectiveness of CSR implementation so that it is in line with the regional development agenda without too much intervention on the company's internal problems. The CSR scheme is expected to be an alternative for the provision of waste management infrastructure, which has been hampered by development due to limited funding (Senen, 2015).

Cooperation with the private sector also needs to be done as an example of sharing the burden of waste collection costs with, as implemented by the Brazilian city of Dois Irmãos, with the scavenger cooperative Dois Irmãos (which consists of 38 members). They signed a contract with the city government to collect 100 percent of the city's solid waste, although the city government cannot pay for this service directly. On the other hand, contributions in kind are negotiable. The city government bears most of the cost of collection, including the five trucks, driver, fuel, facility rental, and the total cost of removing organic and residual waste. Dois Irmãos stores all recycled materials that are washed, crushed and

pelletized before being sold. This can cover the shortfall in waste collection costs (Fuss, 2018).

When building a solid waste management system, several management design options are available. The options may vary depending on population density and geographic characteristics. The Denpasar City Government should start by testing the selected process with a small number of households and improving it until the system works well slowly and consistently, because only then can the waste management system develop more widely. Some of these design choices are recognized as key to operational efficiency which can also streamline operational funding.

IMPLICATIONS

The theoretical implication in this research is that it can support the theory of regional economic development and growth where in the results of this literature study it is proven that the regional (regional) development of Denpasar City, especially in dealing with the problem of household waste, also shows the importance of elaborating the function of the potential of natural resources, human resources. work and human resources, capital investment, development infrastructure and facilities, transportation and communication, technology, economic situation, funding and financing capacity for regional development, entrepreneurship (entrepreneurship), regional institutions and the development environment. Broadly, as an activity related to social problems and always dynamic, the success or failure of regional development planning programs is always influenced by various factors. The factors that can influence this in particular can be different depending on the situation and conditions that are prevailing in the planning area. The practical implications of this research are that it can be used as input for the government, society and all stakeholders in Denpasar City to focus more on overcoming obstacles or obstacles in dealing with household waste in Denpasar City, by taking preventive actions and developing effective strategies in overcoming household waste problem in Denpasar City

CONCLUSION

Denpasar City obstacles in tackling the problem of household waste, namely the lack of community participation and community behavior patterns that still do not do much waste sorting and recycling activities, Obstacles to regulations and legal rules that are less strict, obstacles to the lack of transportation facilities and transportation facilities and obstacles to the funding aspect of household waste management. Strategies that can be carried out in Denpasar City in dealing with household waste are to increase community participation and behavior by conducting campaigns and making systematic and consistent environmental awareness programs, making regulations that are not complicated and on target and reinforce the rule of law in terms of waste management, provide facilities and facilities and routinely carry out maintenance on waste disposal transportation, create a targeted and transparent funding system, and maximize CSR schemes to increase funding sources in handling household waste in the city of Denpasar.

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