**Sustainable Solid Waste Management in Jambi: Challenges and Practices Against Culture**

Hasbi Ashshidiqi¹, Khairun Najib¹, Syukrya Ningsih²*

¹Faculty of Syariah Sultan Thaha Saifuddin State Islamic University (UIN), Jambi, Indonesia
²Department of Chemistry Sultan Thaha Saifuddin State Islamic University (UIN), Jambi, Indonesia

*E-mail: syukryaningsih@uinjambi.ac.id

**Abstract.** The aim of this study is to explore the relationship between culture and waste recycling, in order to provide a possible estimation of the impact of cultural participation upon households behavior within the meta-issue of sustainability. We look at the cognitive and social determinants of pro-environmental behavior. Percentage of wastewater management methods by Regency / City in Jambi Province is known that waste management is still dominated by burning 60.5%, transported by officers as much as 18.4%, dumped into trenches / rivers / sea as much as 11.2%, buried in soil 6%, discarded 3.7% and composted only 0.3%. We used data on household behaviors to highlight the determinants of waste recycling by moving from a cultural - ecological standpoint. The analysis highlights a strong positive relation between the propensity to take part in some cultural activities and the propensity to abide by waste recycling guidelines and prescriptions. Our empirical results indicate that policies aiming at influencing sustainable development by fostering pro-environmental behavior may be more effective when considering the cultural participation dimension as a complementary factor. Therefore, the hierarchy of solid waste management has given the highest priority to reducing resources through 3R, intermediate treatment (waste bank) and final disposal.

1. **Introduction**

The right to a good and healthy environment, as stipulated in article 28 H (1) of the 1945 Constitution, the results of the changes explained that getting a good environment is everyone's right [1]. Considering that Indonesia is a state of law, the implementation of the guarantee of human rights becomes the responsibility answered the state. Based on this opinion, the Government of the Jambi Province as part of the Republic of Indonesia is obliged to play an active role in providing facilities, conditions and if necessary to force the carrying capacity and existing resources to be optimized for the realization of these rights.

According to the terminology of environmental law, waste is objects that are not re-functioning and if accumulated in a certain amount will have a negative impact on the community and potentially damage the environment. Article 1 number 20 of Law No. 32 of 2009 confirms that waste is the residue of a business and / or activity [2]. Theoretically waste consists of liquid and gas solid waste [3,4]. The existence of waste will become a problem and cause an imbalance of the ecosystem if it is not managed wisely. Perda No. 8 of 2013 concerning Waste Management is intended to be used as
social control, as well as intended as a tool to provide understanding and teaching for the community in order to create a refrigerated and desired environment (healthy and clean). In this sense, waste recycling represents a prominent indicator of environmental sustainability. [5,6]

The number of people continues to grow, activities and lifestyles are instantly and the level of consumption of the community that increases significantly resulting in an increasing amount of waste generated, especially in Indonesia. Solid waste is generally considered a ‘urban’ problem. The level of waste production tends to be much lower in rural areas because the average rural person is not consumptive, resulting in less packaging waste, and has higher rates of reuse and recycling [7]. Today, more than 50 percent of the world's population lives in cities, and the pace of urbanization is increasing rapidly. This will add to the challenges of waste management both for the community itself and the government.

Protecting the environment is a stimulus or response to fellow human beings. Lack of community participation in processing waste is the most important obstacle in dealing with waste problems. The low level of awareness in the problem of waste problems and poor waste management in various landfills, as well as legal norms that are not yet on target and effectively make problems related to waste management are often considered as unsolved problems [8]. Changes in values and behavior due to socio-cultural transformation also indirectly contribute to environmental change, which causes various problems in society. In particular, we emphasize the importance of cultural consumption on the decision to recycle individuals who regularly carry out the collection and disposal of waste carefully. Departing from this explanation, this study seeks to find a connection point between the waste recycling practice and culture in the management of solid waste management in the province of Jambi.

2. Solid waste management

2.1 Background information

Jambi City, the capital city of Jambi Province, has an area of 205.38 km², with a total population of 591,340 inhabitants [9]. The city comprises of 11 districts, with the density ranging between 772 person/km² at the lowest, in Danau Teluk District, to 8,055 person/km² at the highest in Jelutung District. Jambi City is also known as a riverfront city, which has its own uniqueness. The uniqueness arises because of the existence of Batanghari River which divides the city of Jambi into two parts of the city, namely: a developing city and the opposite region which is a enclave of the Jambi Malay people. These conditions make the city of Jambi like two sides of a coin; between the development of civilization and preservation of local culture with the Batanghari river as the limit. This happens because the city of Jambi was formed by material and spiritual cultures of various ethnic, social, economic and governmental systems in the past, which we can see in the forms of buildings with atmosphere, color, and residential spatial structure that adapts to the periphery environment river [10].

The waste generation of Jambi City is 461.25 tons of waste per day. Generally, the waste management system applies a conventional method which relies on the collection, transportation and disposal of waste. A summary of the main characteristics of the city is provided in the table below:

| Table 1. City Profile | Table 2. Composition of waste |
|-----------------------|-------------------------------|
| **Information**       | **Data**                      | **Sources** | **Percentage (%)** |
| Population            | 591,340 inhabitants           | Food/organic | 35             |
| Area                  | 205.38 km²                    | Wood/Leaf    | 26.9           |
| Daily waste generation| 461.25 tons/day               | Paper        | 7.2            |
| Waste collection rate (waste transported to the landfill) | 60.67%                        | Rubber/leather | 0.6       |
| Final disposal site   | Talang Gulo                   | Plastic      | 12.3           |
|                       |                               | Textile      | 2.1            |
|                       |                               | Glass        | 1.2            |
|                       |                               | Other inorganic | 0.3    |
2.2 Waste treatment facilities

Waste management has a complex and long process, not only considered as a technical problem, but also as a management paradigm. The solution is not limited to end-of-pipe systems, but management systems such as reducing waste from the source, sorting waste, to the recycling process. Thus, an effective environmental management system is needed, which is discussed in this paper, by involving the public as community-based environmental management.

Public participation must be taken with the assumption that people already have awareness and knowledge in waste management in their smallest environmental community. Human and social resources become important issues in waste management, in how to support the public as a responsible resource and as a main actor in waste management. Garbage collection usually begins with moving rubbish from the rubbish bin in each house, or public rubbish bin, to a conventional temporary collection site (TPS), along with street waste. Collection from trash bins and transfers to polling stations is usually made with hand carts or motorized carts.

The city collection method in Jambi is based on waste sources, and this consists of (1) settlements, (2) commercial areas, and (3) public facility collection systems. All data on methods for collecting municipal waste are taken from the Sanitation, Landscape and Funeral Agency. The efficiency of waste collection services in Jambi - calculated from comparing waste transported to landfill with daily waste generation in cities is about 60.67 percent. However, this does not reflect the level of direct collection, because not all waste collected is transported to landfill.

In Jambi City, several composting plants can be found at the Reduce, Reuse and Recycle (3R) and waste banks facilities. Based on the Environmental Agency there are seven composting plant at 3R facilities, with the average capacity of one ton per day. The typical method of composting found at 3R facilities in Jambi City the windrow composting method.

Talang Gulo waste processing final site, which has been used since 1999 is openly open dumping. The amount of waste that enters the Talang Gulo landfill is 1565m³/day. The composition of waste disposed in the Talang Gulo landfill consists of 60% of the waste disposed from residential areas (households), 12% from the market and 28% from shops, restaurants, hotels, public facilities and industrial activities.

Figure 1. Location of waste treatment facilities
2.3 Solid waste management regulations
The main regulation governing waste management in Indonesia is the Waste Management Law No. 18, which came into effect by the Government of Indonesia in 2008. The management of waste is conducted based on the principle of responsibility, sustainability, profitability, justice, awareness, togetherness, safety, security, and economic value [11]. The pattern of waste management is prevention and mitigation. Preventive actions in this law are directed at waste reduction schemes, which are directed at activities to limit waste generation, waste recycling, and reuse of waste [12]. While mitigation efforts are directed at the pattern of sorting, collecting, and transporting from its source - Temporary / Integrated Waste Disposal Sites (TPS / TPST) - Final Disposal Sites [13].

The national level waste management regulations are supported and implemented at the local level in the city of Jambi through several city regulations. The main regional regulation governing the implementation of waste management in the City of Jambi is Local Regulation Number 8/2013. This regulation consists of general provisions for managing municipal waste, which emphasizes waste minimization and proper handling of waste. In addition, this regulation also sets the scope and strategy for waste management in cities, including financing for waste management, among other provisions. Regional Regulation No. 8/2013 also establishes roles (duties, responsibilities, rights, obligations, etc.) for waste management actors, including local governments, communities and businesses.

3. Cultural challenges to sustainability
Before canvassing the concepts of cultural sustainability, we need to straighten out the basic concepts of culture. Social relations, social structure, value, norms, customs, rules, the conceptions of equity, and lifestyle are either affected by or part and parcel of a culture [14]. In unpacking the concept of "culture", Rapoport (2001) has distinguished two dimensions of elements that determine culture: the social dimension including kinship, family structure, social network, identity, status and so forth; and the ideological dimension encompassing values, ideals, images, norms, standards, expectations, rules, and so forth [15, 16].

Discerning the cultural logic of sustainability demands that we attend seriously to critical changes in three overlapping areas. The first has to do with our changing confidence in inherited terms and concepts that once defined modern progress; the second, with changes in our answers to the question of what it means and takes to thrive; and the third, with changes to our understanding of the relationship between humans and nature. By making a clear semantic connection between 'culture' and 'sustainability', a path has been laid to understand sustainable development through a cultural lens.

The big challenge facing the city of Jambi in implementing waste recycling is the local government does not encourage the community to conduct waste separation at the source or the facility, which results in the generation of mixed waste. The main challenge of such facilities is how to encourage the community to make use and extract concrete benefits from the facility. On the other hand percentage of wastewater management methods according to Jambicity is known that waste management is still dominated by burning 60.5%, transported by officers as much as 18.4%, discharged into the ditch / river / sea as much as 11.2%, buried in the ground 6%, 3.7% removed and only 0.3% compost.

4. Conclusion
This paper addresses questions about the impact of cultural consumption on household recycling behavior, specifically asking whether cultural access serves as an effective predictor of recycling activities. We look at the cognitive and social determinants of pro-environment behavior. We use data on household behavior to highlight the determinants of waste recycling by moving from a cultural-ecological perspective. This analysis highlights a strong positive relationship between the tendency to take part in several cultural activities and the tendency to adhere to guidelines and recipes for waste recycling. Our empirical results suggest that policies aimed at influencing sustainable development by encouraging pro-environment behavior may be more effective when considering dimensions of cultural participation as complementary factors.
Acknowledgments
The program supported by Centre of community engagement, LP2M UIN SuthanThahaSifuddin Jambi using BOPTN DIPA 2019. We also thanks to Mr. Syafruddin and Mr. FirmanAriyantofrom Environmental Services (DLH) for their interactive discussions.

References
[1] Undang-Undang Dasar Negara Republik Indonesia Tahun (1945), Pasal 28H ayat (1)
[2] Undang-Undang No. 32 Tahun(2009), Pasal 1 angka 20
[3] Gunamantha M. Sarto. (2012). Life Cycle Assessment of Municipal solid waste treatment to energy options: case study of Kartamantul region, Yogyakarta, Renew. Energy. 41:277-284
[4] A. Allesch, P.H. Brunner. (2014). Assessment methods for solid waste management: a literature review, Waste Manag. Res. 32 (6):461-473
[5] Kumar, S., Dhar, H., Vijay, V., Bhattacharyya, J.K., Vaidya, A.N. and Akolkar, A.B. (2016) Characterization of municipal solid waste in high altitude sub-tropical regions, Journal of Environmental Technology, DOI: 10.1080/09593330.2016.1158322
[6] Tania, F. (2014) Solid waste management of Dhaka city: a socio-economic analysis, Banglavision, Vol. 13, No. 1, pp.91–100.
[7] Guerrero, L. A., Maas, G., &Hogland, W. (2013). Solid waste management challenges for cities in developing countries. Waste management, 33(1), 220-232.
[8] Nguyen, X., & Le, H. (2011). Solid waste management in Mekong Delta. Journal of Vietnamese Environment, 1(1), 27-33. doi:10.13141/jve.vol1.no1.pp27-33
[9] Badan Pusat Statistik Kota Jambi(2019)
[10] Muslim, F. (2015). Proceedings of the National Seminar: 789-796
[11] D. Mursito, T. Prima Sari. S. E. Bramono (2013).Managing Municipal Solid Waste in Indonesia: a Government Perspective, Journal of the Indonesia Infrastructure Initiative, Prakarsa, Issue 15 October, SMEC, Australian AID
[12] U.S. Sidik (2015).Waste-to-Resource: Challenges and Opportunities in Indonesia, Ministry of Environment and Forestry
[13] MPWH (2014b).Profil Book of TPS-3R in West Sector in Indonesia (in Indonesian language).SubDirectorate of Solid Waste Management, Ministry of Public Works
[14] Hylland-Eriksen, T., (2001). Small Places – Large Issues. Pluto Press, London
[15] Rapoport, A. (2001) Theory, culture and housing, Housing, Theory and Society 17: 145–165
[16] Thaman, K. H. (2002) Shifting sights: the cultural challenge of sustainability, Higher Education Policy 15 (2): 133–142