

Indicators of community participation in waste management; A study in Liliba Village, Kupang City

By Lidia Br Tarigan

Indicators of Community Participation in Waste Management; A Study in Liliba Village, Kupang City

Lidia Br Tarigan¹

¹Sanitation Study Program, Kupang Health Polytechnic, Ministry of Health

Article Info

Article history:

Keywords:

Community participation
Population characteristics
Waste production

ABSTRACT (10 PT)

Improper management of waste can be a source of health and environmental problems. Community participation contributes to effective waste management. The study was aimed at analyzing community participation in waste management at Liliba village in Kupang city.

This research is an analytic study with cross sectional study approach. The population was the entire population of Liliba village in Kupang City. The samples were 133 respondents. The data were analyzed using the Structural Equation Model Test.

Education and occupation had strong correlation and significant influence to community participation. Community participation had strong relation and significant effect on waste production. Population had weak correlation and insignificant effect on waste production. It is recommended that interventions should be done for invalid indicator such as of waste utilization in the form of counseling or training on waste recycling.

Copyright © 2019 Institute of Advanced Engineering and Science.
All rights reserved.

Corresponding Author:

Lidia Br Tarigan,
Sanitation Study Program,
Kupang Health Polytechnic Ministry of Health,
Jl. Piet A. Tallo Liliba Kota Kupang Nusa Tenggara Timur.
Email: lidia.tarigan@gmail.com

1. INTRODUCTION

Waste is unusable, unwanted, or worthless materials that are discarded and it is derived from human activities not from its own nature^[1]. Waste management is a shared responsibility. It is stated in government rule, PP no 81 of 2012 article 10 Paragraph 2 that "everyone is required to reduce and manage waste"^[2]. Unmanaged waste can be a threat to public health^[3]. Community participation is absolutely essential in implementing community-based waste management^[4]. Community participation in waste management can be implemented through active involvement in the process of disposal, transportation, and waste management, with a sense of awareness and responsibility to create a clean and healthy environment^[5]. Factors that can affect waste management are population characteristics (income, age of assets)^[6], community participation, volume of waste and waste characteristics.

Liliba Village still has waste management problems. People are still disposing waste in empty land and drivers, and burning garbage in the yard of their houses. Based on data from the Department of Environmental and Sanitation in Kupang city, Liliba village has three temporary landfills with a volume of 8 to 10 cubic meters. Landfills also need to be monitored regularly^[7]. Not all people dispose their waste into temporary landfills because the locations cannot be reached by them. The problem of waste in Liliba village can be overcome by involving the community as a waste producer and with an integrated approach that combines a participatory approach in waste management^[8].

2. RESEARCH METHOD

This is an analytic research and the data collection techniques were done through a cross sectional approach. The population was the whole population of Liliba Village in Kupang city. The total sample was 133 people. They were selected according to the minimum sample in SEM analysis where the number of sample should be 5-10 times the analyzed indicators^[9]. This study analyzed 11 indicators that are grouped into 3 factors such as population characteristics (level of education, occupation and income), community participation (providing bins, sorting waste, utilizing waste, disposing waste into temporary landfills and paying waste bill) and waste production (waste volume, organic and inorganic waste).⁴

Questionnaire was used to collect data. Measurement of waste production refers to SNI 19-3964-1994 about the method of taking and measuring examples of the generation and composition of urban waste^[10]. Data were analyzed using the Structural Equation Model (SEM) test^[11].

3. RESULTS AND DISCUSSIONS

The study was conducted in Liliba Village, Oebobo Sub-district, Kupang City. The total area of the village is 1,300 hectares. Liliba Village has a population of 17,350 people with 2,771 households.

3.1. Characteristics of respondents

Table 1 shows the characteristics of respondents where 39.1% of them are high school graduates (education level), and 28.6% of them are housewives/husbands (Occupation).

Table 1. Education level and occupation of the respondents

Education	Total	%
Elementary School (SD)	22	16.5
Junior High School (SMP)	17	12.8
Senior High School (SMA)	52	39.1
Higher Education (University)	42	31.6
Occupation		
Unemployed	21	15.8
House Wife/Husband	38	28.6
Civil Servant/Retirement/Military Forces	33	24.8
Merchant/Farmer/Fisherman	16	12.0
Entrepreneur	25	18.8

The average income is Rp. 1,975,790 where the lowest income is Rp. 100,000 and the highest one is Rp. 5,000,000.

3.2. Community Participation

3.2.1. Community participation in providing bins

Community participation in providing bins is seen through the types of bins, numbers of bins and location of bins. Most types of bins are made of cardboard boxes, plastic bags and impermeable plastic baskets (81.2%). The maximum number of bins owned by the respondents was 2 bins (45.9%). Most respondents placed bins in two locations/spots (47.4%).

Table 2. Community participation in providing bins at their houses

Types of bins	Total	%
Not waterproof	108	81.2
Waterproof without a lid	19	14.3
Waterproof with a lid	3	2.3
Waterproof with a lid and easily moved	3	2.3

Total of bins		
1 bin	53	39.8
2 bins	61	45.9
3 bins	15	11.3
More than 3 bins	4	3.0
Location of bins		
One spot	50	37.6
Two spots	63	47.4
Three spots	15	11.3
Four spots	5	3.8

3.2.2 Community participation in sorting waste

Table 3 shows that 89.5% of the respondents did not sorting their waste.

Table3. Community participation in sorting waste

Sorting waste	Total	%
Sortingwaste in one bin	119	89.5
Sortingwaste in two bins	13	9.8
Sortingwaste in three bins	1	0.8
Sortingwaste in four bins	0	0.0

3.2.3 Community participation in utilizing waste

Table 4 shows that 66.2% of respondents did not utilize their waste.

Table4. Utilizing waste

Processing Waste	Total	%
Not utilizing waste	88	66.2
Reusing plastic bags,etc.	44	33.1
Reusingplastic bags and others or making compost	1	0.8
Reusing plastic bags and others, making compost, recycling	0	0.0
Reusing plastic bags and others, making compost, recycling and selling the recycled products	0	0.0

3.2.4 Community participation in disposing waste to transfer station

57.1% of respondents did not dispose their waste to transfer station

Table 5. Disposing waste to transfer station

Disposing waste to landfills	Total	%
Not disposing to transfer station	76	57.1
Disposing to transfer station if it is nearby	49	36.8
Disposing to a nearby transfer station	4	3.0
Disposing to a transfer station, although it is far	4	3.0

3.2.5. Participation in paying waste bill

48.1% of respondents did not want to pay waste bill

Table 6. Waste bill payment

Waste bill payment	Total	%
Not paying waste bill	64	48.1
Paying waste bill according to ability to pay	34	25.6
Paying waste bill as required	35	26.3
Total	133	100.0

3.3. Waste Production

3.3.1. Waste Volume

The average volume of waste was 1.8 liters/person/day

3.3.2. Waste Characteristics

Table 8. Waste characteristics

Types of Waste	Total (kg)	%
Organic	150.2	41.5
Inorganic	212.1	58.5
Total	362.3	100.0

3.4. Validity test and reliability indicator

Confirmatory factor analysis was used to assess indicators that can be used to measure latent variables (valid and reliable). The parameter that can be used to assess the validity of the indicators is the value of the loading factor. The parameter used to assess the reliability indicator is the value of R² which is displayed in each measurement equation ^[12].

Table 9. The results of the confirmatory factor analysis of population characteristics

Latent Variable	Indicator	Validity		Reliability		R ²	Result
		loading factor	t - value	Error variance	t - value		
Population Characteristics	Education	1,00	16,25	0,01	0,00	1,00	Valid – Reliable
	Occupation	0,09	1,08	0,99	8,12	0,01	Invalid – Reliable
	Income	0,49	5,95	0,76	8,12	0,24	Valid – Reliable
Community Participation	Providing bins	0,68	6,32	0,54	4,37	0,46	Valid – Reliable
	Sorting waste	0,52	4,96	0,73	6,49	0,27	Valid – Reliable
	Utilizing waste	0,19	1,75	0,97	7,97	0,04	Invalid – Reliable
	Disposing waste to temporary landfills	0,39	3,76	0,84	7,33	0,16	Valid – Reliable

	Paying waste bill	0,41	3,91	0,83	7,25	0,17	Valid – Reliable
Waste Production	Waste volume	0,062	0,48	1,00	8,09	0,04	Invalid – Reliable
	Organic waste	0,33	2,10	0,89	6,42	0,11	Valid – Reliable
	Inorganic waste	0,60	2,39	0,64	2,16	0,36	Valid – Reliable

From the lisrel output in table 9, valid and reliable indicators shown by a loading factor value and an error variance which were higher than 0.5 with t value higher than 1.96 [12]. Indicators used to measure population characteristics were education and income. Indicators used to measure the role of the community in waste management were providing bins, sorting out organic and inorganic waste, disposing waste to temporary landfills, and paying waste bill. Indicators used to measure waste production were organic waste and inorganic waste.

In conclusion, the results of the validity and reliability test indicated that occupation, utilizing waste, and waste volume were variables that should be excluded from the measurement model because the values were insignificant (t-value was smaller than 1.96). So, they are invalid indicators to measure the latent variables. Of the five indicators used to measure the role of the community in waste management, providing bins was the best indicator because it had the highest loading factor value (0.68).

3.5. Analysis of influence between research variables

The pattern of relationships between latent variables in the model can be assessed using the structural equation model. The parameter that can be used to assess the strength of relationship between latent variables is the structural coefficient, and the relationship is significant if the t value is higher than 1.96 ($\alpha = 0.05$).

Table 17. Results of analysis of structural equation models

Correlation between	Estimated Structural Coefficient	t-value	Result
Population characteristics and community participation	0,49	3,42	Strong correlation – Significant influence
Community participation and waste production	0,52	1,98	Fairly strong correlation – Insignificant influence
Population characteristics and waste production	-0,24	-0,92	Weak correlation – Insignificant influence

The result of Lisrel output in the table above shows that population characteristics significantly influenced the role of community variables in waste management (0.49 with t-value > 1.96). The role of community in waste management had a significant effect on waste production (0.52 with t-value < 1.96). The population characteristic did not significantly influence waste production (0.24 with t-value < 1.96), so they were excluded from the structural equation model.

Therefore, the final model of waste management is as follows:

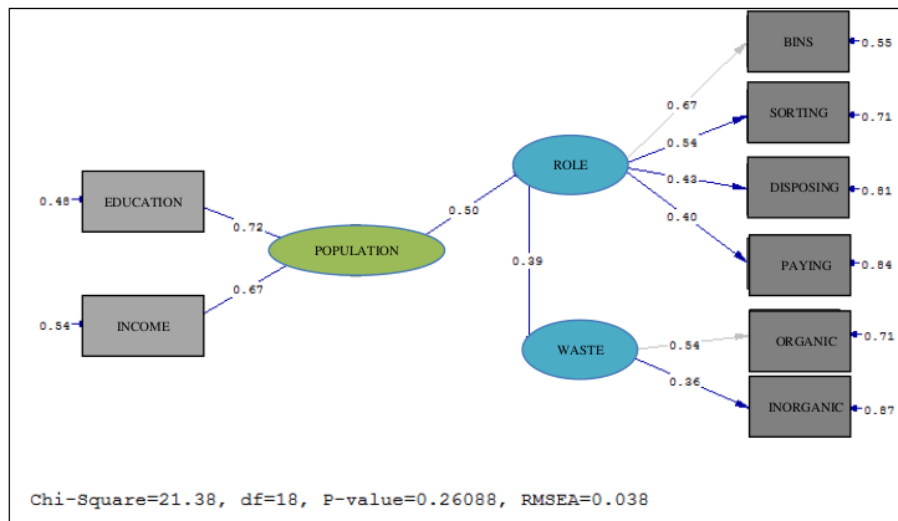


Figure 3. Path diagram of final model of structural equation

The output of path diagram indicates that the final model of the community's role in waste management has a p-chi-square value of 0.26088 ($p > 0.05$) and an RMSEA value of 0.038 (< 0.08), which means that this model fits (good).

The population characteristics had significant direct effect on the community role variable in waste management (0.50). This means that if the population characteristic score is changed by one unit, it will increase the community's role by 0.50. Likewise, the community roles in waste management had a significant direct effect on the waste production variable (0.39). This means that if community role score is changed by one unit, it will increase waste production by 0.39.

2 In addition, the population characteristic also had an indirect influence on waste production through the role of the community in waste management. This means that if population characteristic score is changed by one unit, it will increase waste production by 0.2.

3.4. Discussion

Population characteristics affect the role of community in waste management. Population characteristics that influence the role of the community are education level, occupation and income. These results are consistent with claims made by A.R.. Darban Astane and M. Hajilo who stated that income could affect waste production [6]. In contrast with the result of this study, Abrauw stated that the correlation of income with behavior in the management of inorganic waste is negative [13]. Education level is positively related to community participation in waste management [14].

The dimension of community's role in this model is valid as measured by the indicators of providing bins, sorting out waste, reusing it, disposing it to temporary landfills and paying waste bill. A study recommends that waste sorting should be done before further treatment [15]. Support from the government and educational institutions can provide opportunities to improve participation in sorting waste [16]. Waste management can also involve young people because youth with positive mind have good intentions in managing waste [17].

The indicators of utilizing waste became invalid and reliable, then, it cannot be used to measure the role of the community. This is because 90% of respondents did not utilizing waste. Organic and inorganic waste has the potential to be recycled, reprocessed and reduced as much as 35% of the volume of waste [18]. Awareness of reducing waste is increasing but the implementation of utilizing waste is still low due to lack of [17] reness [19]. Initiating waste collection services and building a system of sorting waste from sources can reduce the volume of waste discharged to landfills [20].

The results showed that the role of the community directly affected the waste production which means that the higher the role of the community, the higher waste production will. This happens because the indicator of utilizing waste in the dimension of community participation was invalid. If this indicator is valid, waste production can be reduced. If the variable of utilizing waste valid, the volume of inorganic waste can be reduced by 20% through the waste bank^[21]. The results of the study by Surjandari et al., indicated that making compost using organic waste was effective to reduce waste by 62.5% of total waste (the amount of inorganic and organic waste). Combustion or incinerator can reduce 84% of the total waste, and the ashes of the combustion can be used for making bricks^[22]. Utilizing waste into compost and selling it may reduce the volume of waste^[23]. Arifianto claimed that the maximum utilization of waste at the source would reduce 60.94% of the waste transported to final disposal and the total reduction in greenhouse gas emissions by 203.83 tons of equivalent carbon dioxide/year^[24]. Composting is one of the easiest methods to reduce the volume of organic waste^[25]. This shows that good community participation must include utilizing waste. Utilizing waste can be promoted by improving knowledge and practices in household waste management^[26]. Waste management training may increase knowledge, skills and motivation of citizens about independent waste management^[27].

3. CONCLUSION

Waste management in Liliba Village requires community participation. Based on the results and discussion of waste management in Liliba Village, the characteristics of the population had a strong correlation and significant effect on the community participation. Community participation had a strong correlation and significant effect on waste production. Population characteristics had weak correlation and insignificant effect on waste production. Population characteristics significantly influenced community participation and community participation significantly influenced waste production. Participation in utilizing waste can be enhanced by some interventions such as sharing information and training.

ACKNOWLEDGEMENTS(10 PT)

This research was funded by Kupang Health Polutechnic, Ministry of Health. Thanks to Yuanita Rogaleli, the enumerator who helped carry out this research.


REFERENCES

1. Chandra.Budiman, Pengantar Kesehatan Lingkungan, EGC, Jakarta, 2012.
2. Peraturan Pemerintah Republik Indonesia Nomor 81 Tahun 2012 Tentang Pengelolaan Sampah Rumah Tangga Dan Sampah Sejenis Sampah Rumah Tangga.
3. McKenzie.JF, Pinger.RR, Kotecki.JE, Kesehatan Masyarakat suatu Pengantar, Edisi 4, EGC, Jakarta, 2014.
4. Affandy N A, Isnaini E, Yulianti C H, Peran Serta Masyarakat dalam Pengelolaan Sampah Komprehensif Menuju Zero Waste. In:Seminar Nasional Sains dan Teknologi Terapan III. Institut Teknologi Adhi Tama Surabaya : 803–14, 2015.
5. Nur Rahmawati Sulistiyorini, Rudi Saprudin Darwis, Arie Surya Gutama, Partisipasi Masyarakat Dalam Pengelolaan Sampah Di Lingkungan Margaluyu Kelurahan Cicurug, Share Social Work Jurnal, Volume 5 Nomor 1: 71- 80, 2015
6. Darban A.R. Astane, Hajilo. M, Factors Affecting The Rural Domestic Waste Generation, Global Journal Of Environmental Science Management: 417-426, 2017.
7. Akhtar. S,Ahmad A.S, Qureshi M.I, Shahrz. S, Households Willingness To Pay ForImproved Solid Waste Management, Global Journal Of Environmental Science Management : 143-152, 2017

8. Chapungu. L, Zinhiva. H, Marange N.E, Assessment Of Domestic Solid Waste Management Systemsin Rural District Service Centres: The Case Of Ngangu Residential Area In Chimanimani District, Zimbabwe, The Journal Solid Waste Technology And Management, Volume 41: 96-105, 2014
9. Widarjono. Agus, Analisis Statistika Multivariat Terapan, UPP STIM YKPN, Yogyakarta, 2010
10. Badan Standarisasi Nasional, Metode Pengambilan dan Pengukuran Contoh Timbulan dan Komposisi sampah perkotaan , <http://sisni.bsn.go.id>
11. Widhiarso Wahyu, Jumlah Sampel dalam Pemodelan Persamaan Struktural (SEM), <https://widhiarso.staff.ugm.ac.id>
12. Gozhali I, Fuad, Structural Equantum Modeling, Teori Konsep dan Aplikasi Program Lisrel 8,80, Edisi III, Badan Penerbit Universitas Diponegoro, Semarang, 2012
13. Abrauw Albert E. S., Perilaku Masyarakat Dalam Pengelolaan Sampah Anorganik Di Kecamatan Abepura Kota Jayapura. Majalah Geografi Indonesia Volume 25, No. 1 : 1-14, 2011
14. Suffian M.Yusoff, Anuar M. Kamaruddin, Abdul H. Aziz,Nordin M. Adlan, Qamaruz N. Zaman, Zalina N Mahmood, 2018, Municipal Solid Waste Composition, Characterization And Recyclables Potential: A Case Study Evaluation In Malaysia,The Journal Solid Waste Technology and Management, Volume 44: 330-343, 2018
15. Seng.B, Fujiwara. T, Seng. B, Suitability Assessment For Handling Methods Of Municipal Solid Waste, Global Journal Of Environmental Science Management Volume 4:113-126, 2018
16. Yukalang Nachalida, ClarkeBeverley, Ross Kirstin, Barriers to Effective Municipal Solid Waste Management in a Rapidly Urbanizing Area in Thailand, International Journal of Environmental Research and Public Health; 14(9): 1013, 2017
17. Lin Shen ,Hongyun Si ,Lei Yu andHaolun Si, Factors Influencing Young People's Intention toward Municipal Solid Waste Sorting, International Journal of Environmental Research and Public Health 16(10), 1708; 2019
18. Hayana, Hubungan Sosial Ekonomi Dan Budaya Terhadap Partisipasi Ibu Rumah Tangga Dalam Pengelolaan Sampah Di Kecamatan Bangkinang, Jurnal Kesehatan Komunitas, Volume 2, No 6: 294-300, 2015.
19. Chikere O. Aja, Dalton S. Oseghale, H.H.Al-Kayiem, 2014, Review And Evaluation Of Municipal Solid Waste Management Practices In Malaysia, Journal Solid Waste Technology and Management, Volume 40:215-232, 2014
20. Puspawati Catur, Besral , Pengelolaan Sampah Berbasis Masyarakat di Kampung Rawajati Jakarta Selatan, Kesmas National Public Health Journal, Volume 3:9-15, 2008
21. Yukalang Nachalida, ClarkeBeverley, Ross Kirstin, Solid Waste Management Solutions for a Rapidly Urbanizing Area in Thailand: Recommendations Based on Stakeholder Input, International Journal of Environmental Research and Public Health;15(7), 1302, 2018.
22. Diana Paramita,Kukuh MurtiLaksono, Manuwoto, Study of Solid Waste Management Based on Carrying Capacity and Storage Capacityof Waste Infrastructures in Depok City, Journal of Regional and Rural Development Planning : 104-117, 2018
23. Surjandari. I, Hidayatno. A, Supriatna. A, Model Dinamis Pengelolaan Sampah Untuk Mengurangi Beban Penumpukan, Jurnal Teknik Industri, Vol. 11, No. 2: 134-147, 2009

24. Sasanto.R, Purwanti.R, Peran Serta Masyarakat Dalam Pengelolaan Sampah Di Lingkungan Perumahan Studi Kasus : Kampung Banjar Sari Kelurahan Cilandak Barat, Jakarta Selatan, Jurnal Planesa Volume 2, Nomor 1: 80-88, 2011
25. Arifianto, D. D. Analisis Potensi Reduksi Sampah pada TPS Tlogomas Kota Malang Sebagai Upaya Mengurangi Pemanasan Global, Prosiding Seminar Nasional Pengelolaan Sumberdaya Alam dan Lingkungan : 107-115, 2013
26. Fitria Agnes W, Suratman, AlifahNisrina, MurniatiTri, Catur Oktafiani Pratiwi, Knowledge and Practice in Household Waste Management, Kesmas National Public Health Journal Volume 13: 12-16, 2019
27. Kurnia Y. Herliani, HumaediSahadi, AdharaniYulinda, Pengetahuan, Keterampilan Dan Motivasi Warga Desa Jatiroke Dalam Pengelolaan Sampah Secara Mandiri, Jurnal Pengabdian Kepada Masyarakat ISSN: 1410 - 5675 / E-ISSN: 2620-8431 Vol. 2, No. 1: 23 – 26, 2018

BIOGRAPHIES OF AUTHORS

	Name	: Lidia Br Tarigan
	Place and date of birth	: Kabanjahe, January 6 th , 1972
	Address	: Jl. Fatudela 3 RT 03/06 Kelurahan Liliba Kota Kupang
	Occupation	: Lecturer
	Institution	: Sanitation Department, Poltekkes Kemenkes Kupang Jl. Piet A. Tallo Liliba Kota Kupang
	Mobile Phone	: 081339262700
	Email	: lidia.tarigan@gmail.com

Title of manuscript is short and clear, implies research results (First Author)

Indicators of community participation in waste management; A study in Liliba Village, Kupang City

ORIGINALITY REPORT

9%

SIMILARITY INDEX

PRIMARY SOURCES

- 1** [mafiadoc.com](#)
Internet 43 words — 2%
- 2** Feng Ming Tsai, Tat-Dat Bui, Ming-Lang Tseng, Kuo-Jui Wu. "A causal municipal solid waste management model for sustainable cities in Vietnam under uncertainty: A comparison", *Resources, Conservation and Recycling*, 2020
Crossref 35 words — 1%
- 3** Rosmauli Jerimia Fitriani, Ari Probandari, Budiyanti Wiboworini. "Body mass index, sleep quality, stress conditions determine menstrual cycles among female adolescents", *International Journal of Public Health Science (IJPHS)*, 2019
Crossref 24 words — 1%
- 4** Candrianto, Radna Ningsih, Seprimon. "The Study of Waste Generation and Composition in Lubuk Alung Market in Padang Pariaman Regency", *IOP Conference Series: Earth and Environmental Science*, 2019
Crossref 18 words — 1%
- 5** [eprints.uny.ac.id](#)
Internet 13 words — < 1%
- 6** Alessandra Bitto, Vincenzo Arcoraci, Angela Alibrandi, Rosario D'Anna et al. "Visfatin correlates with hot flashes in postmenopausal women with metabolic syndrome: effects of genistein", *Endocrine*, 2016
Crossref 12 words — < 1%

- 7 Santosh Kumar, Haroon Ali, Amit Kumar Singh, Abhishek Raj. "Morbidity Pattern among Out-Patients Attending Urban Health Training Centre in Srinagar", International Journal of Public Health Science (IJPHS), 2018
Crossref 11 words — < 1%
-
- 8 worldwidescience.org
Internet 11 words — < 1%
-
- 9 www.academypublisher.com
Internet 10 words — < 1%
-
- 10 Scott M. Lynch. "Using Statistics in Social Research", Springer Science and Business Media LLC, 2013
Crossref 10 words — < 1%
-
- 11 Fadillah Putra. "Examining the link between democracy, social policy, and inclusive development in South-East Asia", Asian Social Work and Policy Review, 2019
Crossref 10 words — < 1%
-
- 12 Hariza Adnani, AA Subiyanto, Diffah Hanim, Endang Sutisna Sulaeman. "Perception Factors, Intentions and Attitudes with Market Community Participation to Prevent Occupational Diseases", International Journal of Public Health Science (IJPHS), 2018
Crossref 10 words — < 1%
-
- 13 www.tropeninstitut.ch
Internet 8 words — < 1%
-
- 14 "Proceeding of the 1st International Conference on Tropical Agriculture", Springer Science and Business Media LLC, 2017
Crossref 8 words — < 1%
-
- 15 Sitti Hutari Mulyani, Billy Hendrik, Rio Andhika Putra, Mardhiah Masril. "Pattern of Cleanliness with Technology Intervention for Innovation Life", IOP Conference Series: Earth and Environmental Science, 2017 8 words — < 1%

16 Nuraini ., Wiwik Eko Pertiwi. "Behavior Factors in Waste Management in Mangunreja Village", KnE Life Sciences, 2019 7 words — < 1%

Crossref

17 "Municipal Solid Waste Management in Asia and the Pacific Islands", Springer Science and Business Media LLC, 2014 7 words — < 1%

Crossref

EXCLUDE QUOTES OFF
EXCLUDE BIBLIOGRAPHY ON

EXCLUDE MATCHES OFF