

GOVERNMENTAL BASIS FOR HOUSEHOLD WASTE SORTING BEHAVIOR: EXTENDING THE THEORY OF PLANNED BEHAVIOR

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ABSTRACT

Early introduction of household waste sorting behavior (WSB) can demote common environmental pollution and its effects. Source of waste in Indonesia is households which specifically come from food scraps, yard waste, wrapping materials, even hazardous and non-hazardous materials, recyclable and nonrecyclable waste, organic and non-organic. In Indonesia, household waste was sorted only 23,83%. This study investigated factors correlated with household waste sorting behavior in Indonesia by applying the theory of planned behavior (TPB). This is a cross-sectional research uses a unique dataset collected by the Indonesian government, including the Village Potential Statistics (VPS) Year 2011 and Environmental Care Behavior Survey (ECBS) Year 2013. Factors related to household WSB were determined by exercising a multivariable logistic regression model working manual backward stepwise regression. All of model, almost all factors of the planned behavior theory and its extension were significantly associated with household WSB except perceived behavioral control (precise enough: OR = 1.02, 95% CI: 0.88, 1.19), not build affect an educational environmental infrastructure (OR = 1.01, 95% CI: 0.99, 1.03) and not build affect a production skill (OR = 1.01, 95% CI: 0.98, 1.04). This study resulted intention, attitude, and subjective norm as a determinant of household waste sorting behavior after considering the share of several government-based variables. The existence of community empowerment programs such as environmental infrastructure improvement, economic capacity building and community social capacity initiative contribute and could be part of productive design to implement household waste sorting behavior.

Keywords: Governmental basis, household, waste sorting behaviour, extending the theory of planned behaviour, Indonesia

INTRODUCTION

The presence of waste is a troubling issue for most cities in the world. According to Ocean Conservancy (2015), Indonesia is one of the region in the earth that has a big contribution to the problem of plastic waste as well as China, Philippines, Thailand, and Vietnam. These five countries pollute the ocean nearly 60 percent of plastic waste around the world. Under this condition, it is estimated by 2025 there will be a ratio of plastic waste and fish of 1: 3. That is, every 3 tons of fish will have 1 ton of plastic waste. This phenomenon of waste is a behavioral prodigy. The existence of waste is the result of human behavior which is refutable. The economic progress indicated by the increase of purchasing power and consumption in various countries. Ironically, economic improvement, purchasing power and consumption are not followed by awareness of managing waste properly. Fan Fei (2015) in a survey shown that the reusing rate in Suzhou urban zone was around 22% in 2013. Prior to the work of Xu et al. (2016), that of 400 million mobile phones waste in quarter of the world come from Xudari, China. Meanwhile, Binxian Gu et al. (2014) in a comprehensive review concluded

that substantial waste categories of full household hazardous waste (HHW) were home cleaning production (21.33%), pharmaceutical (17.67%) and personal care products (15.19%).

In Indonesia, the waste problem is like an iceberg phenomenon. Indonesian people have a tendency not to question the sorting of garbage and do not care about where the trash goes. As a result, household waste mixes with the waste from other thousand households which forms the pile of garbage that is not necessarily in landfills. According to (Unicef 2012), solid waste management in urban areas in Indonesia is conducted partially and not well regulated. Responsible agencies officially agree to sign contracts with small private entrepreneurs who collect and carry household waste to temporary storage facilities for subsequent transport to final landfill. Households pay for service to local garbage collectors.

As an iceberg phenomenon, the waste problem can be identified one by one. The habit of Indonesian people who argue that waste is no economic value can be questioned and discarded. The next issues are how to dispose, who is responsible, and where to dispose it. For instance, in Suzhou, Fan Fei et al (2015) shared stories about experience of waste management simultaneously in formal and informal way. In a different form, (Dhokhikah et al. 2015) provides a narrative on neighborhood participation in household solid waste (HSW) reduction in Surabaya. The HSW invention was contributed by food waste (64.19%), plastics (10.79%), paper (9.24%) and disposable diapers (6.97%). Dhokhikah (2015) argued to strengthen the HSW reduction tutoring schemes and to deepen the information broadcast up media and battle plan. This study aimed to develop a better understanding of governmental basis for household solid waste separation in Indonesia with extending the theory of planned behavior.

METHODS

This research uses the Environmental Care Behavior Survey Year 2013 and Village Potential Census Year 2011 which both were surveyed by the Indonesian Central Bureau of Statistics. The coverage of the 2013 Environmental Care Behavior Survey is all regencies/cities in Indonesia with sample of 75,000 households with 271,019 household members. The types of data collection include: i) information on household members, ii) housing conditions, iii) habits of energy use, iv) behavior of collecting, managing and utilizing waste, v) habit in using and treating water. On the other hand, village potential census data has so far been the only thematic spatial data source to show the possibility of village-level areas across Indonesia. Village potential census was designed based on the condition of December 2009 which consisted of 77,126 village-level spread over 6,651 sub-districts in 497 districts.

The main result of this research is household waste separation behavior which defined as having no separation waste behavior. Based on a logical framework (Figure 1), 19 possible predictors of household WSB composed in the ECBS 2013 and VPS 2011 were identified: intention, attitude, subjective norm, perceived behavioral control, administration status, village representative board, village's own revenue, education of the village head, education of village secretary; environmental infrastructure development transport, education, residential, and economy; community social capacity building for production skill, marketing skill, and social organizational. Factors that were differentially issued in household who did and did not have separated waste ($p < 0.05$ in the design-adjusted Chi-squared) were maintained for model structuring. Collinearity was evaluated, and for

covariates that were distinguished to be robustly collinear ($r \geq 0.8$, using Pearson's correlation test) the variable more robustly connected with household WSB was possessed. Manual backward stepwise regression was operated to expand a logistic regression model of prediction of household WSB in Indonesia. Unmatched determinants significant at the $\alpha = 0.05$ level were secured in the definitive model. Odds ratio (ORs) and 95% confidence interval are communicated.

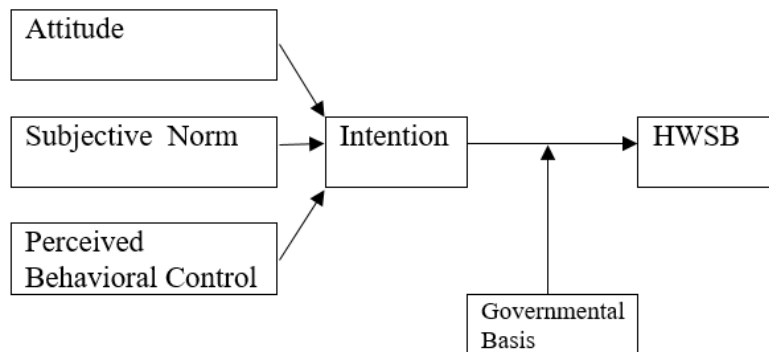


Figure 1 Conceptual framework.

RESULTS

Of the 271,019 household that had a waste at the time of the survey, 64,579 of them do waste sorting. Among the 64,579 households who ordered, 13,636 households (69.2%, 95% CI: 74.3, 75.1) are in *kelurahan* (urban) area (Table 1). In bivariate inquiry, all of variables were significantly correlated with household WSB ($p < 0.001$). Table 2 accommodates products of the complete and decreased (only counting variables analyzed as significant applying the backwards stepwise regression) models. In full model, all variables that make up the Theory of Planned Behavior were associated with household WSB except variable of perceived behavioral control: less precise (OR = 0.85, 95% CI: 0.72, 0.99) or precise enough (OR = 1.02, 95% CI: 0.88, 1.19) or precise (OR = 1.18, 95% CI: 1.02, 1.37) or very precise (OR = 0.83, 95% CI: 0.71, 0.98) contrast not precise.

Table 1 Bivariate correlated amid attribute household waste sorting in Indonesia

Characeristics	N	%	[95% CI]	P-Value
Intention				<0.001
Not sincere	701	74.2	[72.5, 75.8]	
Less sincere	348	93.4	[92.7, 94.1]	
Sincere enough	3,822	88.5	[88.1, 88.8]	
Sincere	41,280	76.5	[76.3, 76.7]	
Very sincere	18,428	65.9	[65.5, 66.3]	
Attitude				<0.001
Not mature	9,439	62.1	[61.5, 62.7]	
Less mature	28,012	70.8	[70.3, 70.9]	
Mature enough	16,331	78.0	[77.7, 78.3]	
Mature	9,132	84.2	[83.9, 84.5]	
Very mature	1,665	91.1	[90.7, 91.5]	
Subjective Norm				<0.001
Not diverse	1,999	60.6	[59.3, 62.0]	

Less diverse	3,329	67.3	[66.3, 68.2]	
Diverse enough	10,577	69.7	[69.2, 70.2]	
Diverse	11,913	72.6	[72.2, 73.0]	
Very diverse	36,761	79.3	[79.1, 79.5]	
Perceived Behavioral Control				<0.001
Not precise	270	70.8	[67.9, 73.8]	
Less precise	1,243	69.8	[68.6, 71.2]	
Precise enough	35,997	74.1	[73.9, 74.4]	
Precise	25,975	78.9	[78.7, 79.2]	
Very precise	1,094	69.2	[67.6, 70.7]	
The administration status				<0.001
Kelurahan	13,636	74.7	[74.3, 75.1]	
Desa	50,943	76.5	[76.4, 76.7]	
Village Representative Board				<0.001
No	8,965	75.4	[74.9, 75.8]	
Yes	55,614	76.3	[76.1, 76.5]	
Education of the village head				<0.001
≤ High school	47,490	76.6	[76.4, 76.8]	
College+	17,089	74.9	[74.6, 75.2]	
Education of Village secretary				<0.001
≤ High school	44,253	76.6	[76.5, 76.7]	
College+	20,326	75.1	[74.8, 75.4]	
Village's Own Revenue				<0.001
No	17,187	78.4	[78.1, 78.7]	
Yes	47,392	75.3	[75.1, 75.5]	
Environmental infrastructure development: Transport				<0.001
No	11,928	78.5	[78.2, 78.9]	
Yes	52,651	75.6	[75.4, 75.7]	
Environmental infrastructure development: Education				<0.001
No	37,457	76.8	[76.6, 77.0]	
Yes	27,122	75.3	[75.0, 75.5]	
Environmental infrastructure development: Residential				<0.001
No	32,036	77.3	[77.1, 77.5]	
Yes	32,453	74.9	[74.7, 75.2]	
Environmental infrastructure development: Economy				<0.001
No	51,312	75.9	[75.8, 76.1]	
Yes	13,267	77.0	[76.7, 77.4]	
Economic capacity building: Loans for farming				<0.001
No	40,785	76.8	[76.7, 77.0]	
Yes	23,794	74.9	[74.6, 75.2]	
Economic capacity building: Loans for non-farming				<0.001
No	30,185	76.6	[76.4, 76.8]	
Yes	30,185	75.8	[75.5, 76.0]	
Economic capacity building: Financial grant				<0.001
No	56,340	76.7	[76.5, 76.9]	
Yes	8,239	71.7	[71.2, 72.2]	
Community social capacity building: Production skill				<0.001
No	52,177	76.7	[76.5, 76.8]	
Yes	12,402	73.8	[73.4, 74.2]	
Community social capacity building:				<0.001

Marketing skill				
No	60,221	76.4	[76.3, 76.6]	
Yes	4,358	71.6	[70.9, 72.4]	
Community social capacity building: Social organizational				<0.001
No	56,579	76.3	[76.2, 76.5]	
Yes	7,934	74.9	[74.4, 75.4]	

Different factors from all governmental basis were connected with household WSB omit no development of education infrastructure (OR = 1.01, 95% CI: 0.99, 1.03), and no capacity building of production skill (OR = 1.06, 95% CI: 0.01, 1.11). Otherwise, in the diminished model, all variables were corresponded with household WSB.

Table 2 Logistic regression model with odds ratios, P-value and confidence intervals for Household's Waste Sorting in Indonesia

Characteristic	Full				Reduced			
	OR	p	95% CI		OR	p	95% CI	
Intention								
Not sincere	1.00				1.00			
Less sincere	3.26	<0.001	2.83	3.75	3.34	<0.001	2.90	3.84
Sincere enough	2.15	<0.001	1.96	2.36	2.19	<0.001	1.99	2.41
Sincere	1.14	0.003	1.05	1.25	1.15	0.006	1.06	1.26
Very sincere	0.82	<0.001	0.75	0.90	0.82	<0.001	0.75	0.89
Attitude								
Not mature	1.00				1.00			
Less mature	1.36	<0.001	1.32	1.40	1.37	<0.001	1.33	1.41
Mature enough	1.85	<0.001	1.79	1.91	1.86	<0.001	1.80	1.91
Mature	2.50	<0.001	2.41	2.59	2.52	<0.001	2.43	2.61
Very mature	4.04	<0.001	3.81	4.28	4.11	<0.001	3.87	4.36
Subjective Norm								
Not diverse	1.00				1.00			
Less diverse	1.21	<0.001	1.13	1.30	1.22	<0.001	1.14	1.31
Diverse enough	1.25	<0.001	1.17	1.33	1.27	<0.001	1.19	1.34
Diverse	1.35	<0.001	1.27	1.44	1.38	<0.001	1.29	1.46
Very diverse	1.66	<0.001	1.56	1.76	1.69	<0.001	1.59	1.79
Perceived Behavioral Control					Not in Model			
Not precise	1.00							
Less precise	0.85	0.043	0.72	0.99				
Precise enough	1.02	0.760	0.88	1.19				
Precise	1.18	0.029	1.02	1.37				
Very precise	0.83	0.031	0.71	0.98				
The administration status								
Kelurahan (uban)	1.00				1.00			
Desa (rural)	0.83	<0.001	0.80	0.86	0.82	<0.001	0.79	0.85
Village Representative Board								
No	1.00				1.00			
Yes	1.10	<0.001	1.06	1.15	1.01	<0.001	1.06	1.14
Village's Own Revenue								
No	1.00				1.00			
Yes	0.95	<0.001	0.92	0.97	0.93	<0.001	0.92	0.96
Education of the village head								
<= Senior High School	1.00				1.00			
>= Under Graduate	1.04	0.001	1.02	1.07	1.04	0.004	1.01	1.06

Education of Village secretary								
<= Senior High School	1.00				1.00			
>= Under Graduate	0.96	<0.001	.94	.98	0.96	<0.001	0.94	0.98
Environmental infrastructure development: Transport								
Yes	1.00				1.00			
No	1.16	<0.001	1.14	1.19	1.16	<0.001	1.13	1.19
Environmental infrastructure development: Education					Not in Model			
Yes	1.00							
No	1.01	0.345	0.99	1.03				
Environmental infrastructure development: Residential								
Yes	1.00				1.00			
No	1.21	<0.001	1.10	1.14	1.13	<0.001	1.11	1.15
Environmental infrastructure development: Economy								
Yes	1.00				1.00			
No	0.84	<0.001	0.82	0.86	0.84	<0.001	0.82	0.86
Economic capacity building: Loans for farming								
Yes	1.00				1.00			
No	1.08	<0.001	1.06	1.10	1.08	<0.001	1.06	1.10
Economic capacity building: Loans for non-farming								
Yes	1.00				1.00			
No	0.95	<0.001	0.94	0.97	0.96	<0.001	0.94	0.98
Economic capacity building: Financial grant								
Yes	1.00				1.00			
No	1.18	<0.001	1.15	1.22	1.19	<0.001	0.94	1.23
Community social capacity building: Production skill					Not in Model			
Yes	1.00							
No	1.01	0.703	0.98	1.04				
Community social capacity building: Marketing skill								
Yes	1.00							
No	1.06	0.011	1.01	1.11	0.08	<0.001	1.04	1.13
Community social capacity building: Social organizational								
Yes	1.00				1.00			
No	0.94	<0.001	0.91	0.97	0.94	<0.001	0.92	0.97

DISCUSSION

On the authority of the theory of planned behavior (TPB), the fundamental precursor of an individual's act; and in turn an individual's observable intention is settled by attitude, subjective norm and perceived behavioral control (Greaves et al. 2013). In this advance study of the 2011 VPS an 2013 ECBS, we organize that more than one-fifths of the household do waste sorting. Intention, attitude and subjective norm were associated with the probability of the household WSB. Meanwhile, perceived behavioral control was not connected with the probability of the household WSB.

The significance of TPB for environmental phenomenon analysis has been studied in other countries. It is now well established from a variety of studies that TPB moderates the association among environmental concern and green products gain intention in India (Paul et al. 2016). In other studies, Oztekin et al. (2017) provided advocacy for the utility of the TPB as a model of behavioral prediction and agree with other studies examining the utility of the TPB in the context of recycling. In 2013, Mei and Pei explored social and behavioral factors for establishing a continued Theory of Planned Behavior model to forecast consumers' intention to stay in green hotels. The outcomes acquired from this practical analysis verify that the expanded TPB model has a pleasant analytical control. In this study, some variables such as perceived behavioral control, environmental infrastructure development for education and community social capacity building for production skill were not significant ($p > 0.05$) in full model.

In our analysis, intention, attitude, and subjective norm were significantly associated with household HSW. Meanwhile, for the governmental basis such as the existence of the administration status, village representative board, village's own revenue, education of the village head and secretary, environmental infrastructure development for transport, education, residential and economy; economic capacity building for loans for farming, non-farming and financial grant; community social capacity building for production skill, marketing skill and social organizational were significantly associated with the household HSW. The majority of household in this study: 76,5% located in rural, 76.3% have village representative board, 78.5% have not village own revenue, and 77.3% did not know about their environmental infrastructure development for residential a data that is consist with other research. Promoting alertness of governmental basis is exposed to advance household waste separation utilization.

Remarkably, our multivariable examination did not contain perceived behavioral control, environmental infrastructure development for education and community social capacity building for production skill as risk factors for household HSW. This situation matches with current analysis noting that negligible relationship amid pro-environmental behavior (such as household HSW) and perceived behavioral control. Prior to the work of Halder et al. (2016), in which distinguished behavioral control had a insignificant effect on intention to use bioenergy. Surveys conducted by Yazdanpanah, M., & Forouzani, M. (2015) have shown that perceived behavioural control is not significant predictors to intention in gaining organic food in Iran.

We expect that household waste separation behavior will be lower because in Indonesia. It is because separation of waste is a futile job. Waste is goods with no economic value. This issue reflects such misperception which must be addressed immediately. The government can take an active role in this issue. Governments can play a role through policies such as community empowerment in infrastructure and economic development. Lavergne's et al. (2010) in a comprehensive review concluded that the direct and indirect effects attribute to recognized government style and reason toward the environment clarified 21% of the variance in self-reported frequency of pro-environmental behavior.

One potential reason that environmental infrastructure development for education and community social capacity building for production skill are not associated with household HWS is that they are not yet contextual. It is because environmental infrastructure and production skill have not been a priority of choice in everyday life. Formally, government role in increase the popularity of household waste separation need to be

concerned e.g.: village autonomy such as internal budget and activities of community empowerment; this idea is promoted by outcomes from other researches. A research by Mongkolnchaiarunya (2005) offers the most comprehensive empirical analysis of supporting a community-based solid-waste management driven by local government.

Overall, there seems to be some evidence indicating that when the social capacity of community has been raised, the dependency linkage to the local government can be decreased. Empowerment in the fields of human resources, economy and infrastructure will inspire various stakeholders. Establishment of waste bank is an indicator of empowerment successfulness. A waste bank is a place which used to collect disaggregated waste. The result of the collection of sorted garbage will be deposited to the crafting site from the garbage or to the garbage collector. Waste banks are managed by banking system which conducted by volunteers. The depositor is resident who lives around the bank location and gets saving book to save money in the bank. These studies clearly indicate that there is relationship among civil commitment with government scheme by positioning people as colleague and wheelman of government's development program (Wijayanti, D.R., & Suryani, S, 2015).

Indonesia is one of the Southeast Asia countries that advertises sustainable waste management with the increase of waste turnover in landfill, in spite of renewable energy production is secondary objective. Nevertheless, waste banks have narrowed scalability, performing in scattered management, deficiency of profit orientation and lack of capital. This might have caused some problems in popularity waste separation. Further research are required to explain the effect of this approach to change their behavior. There have to be a proactive campaign strategy to gain support from local government.

There are numerous limitations of this research. First, since this was a consequent study of the 2011 VPS and 2013 ECBS, we did not have all the changeable factors presented in our theoretical framework. We could not in-depth analyze association between the quality of waste sorted at the household with several government-based variables. In annex, recall bias, especially about perceived behavioral control, environmental infrastructure development for education and community social capacity building for production skill, may have pretended our derivative study. In addition, the study included the basic forecastors of the inquiry outcome. Accordingly, scientist in this discipline should examine whether or not the consequence of these risk factors alternates by distinguishable society strata. Likewise, the ECBS has defined data on perceptiveness and serviceable of household waste sorting services, which is a meaningful contribution for further studies. The ECBS did not include question on consumption of food, yet, the largest household waste comes from food consumption.

CONCLUSION

The study valuated predictors of household WSB in Indonesia. We initiate that several factors of governmental basis and theory of planned behavior were associated with the household WSB, so we suggest concrete interventions to demote these barriers. The increase of village own revenue and programs/activities in community empowerment suggests a potential for strategic solution in increase sustainable waste sorting. Overall, the study highlights the need for investigation of forcefulness in existing society overreach programs such as community-based waste separating and create value added for them, the feasibility of electricity production enhancement and combination within other community-based mediation.

Various community in Indonesia have introduced promotion of sustainable waste management with activity in the International Solid Waste Association (International Solid Waste Association, 2015). Indonesia has also innovated waste bank in some regions with action movement in neighborhood organized by volunteers. We believe that these great efforts can elevate better waste sorting behavior and collaboration with government program which could accelerate speed and minimize costs in waste management. However, this needs further inquiries are challenged to basic step in the synergetic learning.

The contemporary exertion need to be delivered all-around coverage to unofficial waste caretaker, low awareness in sorting organic and unorganic waste, as well as to production waste management which is even more difficult. In extension to the those programs, even so, these suggest a demand for more infrastructure enabling geographical burden in services. Additionally, waste sorting creation movement in neighborhood with an accentuation on prove business-society affiliation assort economic advantage from waste sorting. Conventional or ad hoc drill and manufactory should be enforced in neighborhood to demonstrate basic knowledge about waste sorting and the importance of the anorganic waste. This will be recovered to create diversity of plastic pellets and sold to different national and international businesses.

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