

Waste Management Analysis From Economic-Environment Sustainability Perspective

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Abstract: Waste management is beneficial from an environmental, social and economic perspective. This study aims to investigate the general public and informal garbage collector's perception from social, environmental, and economic aspects. A total of 300 respondents were interviewed (125 households and 125 informal garbage collectors) from seven districts of Faisalabad. The results reported that the majority of the residents blamed themselves for poor management of solid waste which leads to different environmental issues. Lack of awareness among the general public about waste management practices is one of the key factors for environmental issues. Further, solid waste collection by informal garbage collectors would not only improve the social and environmental sustainability but would also serve as a source of income (economic value). Ordinary least square (OLS) method was also used to check the impact of different factors affecting the income level of garbage collectors. Working hours was the only variable which has a significant impact on income. The policy makers should increase the awareness among masses regarding the improvements of the environment by better management. There should also be an awareness program for garbage collectors regarding health hazards by involving NGOs and other volunteers.

Index Terms: community's perception, garbage collectors, environmental sustainability, solid waste, Faisalabad.

1. INTRODUCTION

Environmental sustainability is a worldwide problem; however, it is quite serious for developing countries. These countries are facing both economic (poverty) and environmental issues (water contamination, polluted air, and solid waste management). Municipal solid waste (MSW) management is a highly neglected factor of environmental management in all low and most middle-income countries (Murtaza and Rahman, 2000). Garbage is inferior and undesired stuff produced as a result of different human's activities which is redundant after main use or it is valueless out of order and of no utilize (Rana & Tariq, 2007). According to Suthar and Rayal (2016), informal waste management sector may help in resources recycling, generating earning and employment opportunities. Poorly managed waste streams are causing adverse environmental impacts and may result in health hazards creating further difficulties for low-income families especially (Misra et al., 2005; Sandhu, Burton, & Dedekorkut-Howes, 2016). Solid waste management (SWM) practices and informal garbage collectors may help to address both economic and environmental issues. They play an important role in waste collection and subsequent recycling. Although SWM practices would significantly improve the quality of environment and health of society thereafter people in many of the developing countries, especially in Pakistan, do not consider waste collection/management profession as a respectable profession. Garbage collectors/recyclers may face exploitation, abuses, insult, scolding, and sexual harassment (Gutberlet et al., 2008). For instance, informal garbage collectors may be paid at a nominal rate, much lesser than the intrinsic value, by waste recycling companies to increase their profits. According to Mishr et al, (2004), these informal garbage collectors would also help the town administration to lessen their burden. By the census of 2017, Faisalabad is the third most populous city of Pakistan with a population of about 3.2 million and 19.84

percent of them are living below the poverty line. Solid waste management and environmental sustainability is an important issue to address for industrial cities like Faisalabad. Despite significant efforts in the last decades, the majority of municipalities in Pakistan cannot manage the growing volume of waste produced in their cities. Although, 16,000 to 20,000 workers working under the Faisalabad Waste Management Company (FWMC) along with the informal sector. both public and private garbage collectors collect roughly about 1600 tonnes of waste from Faisalabad on daily basis. However, accurate statistics for waste collection and recycling are not available in developing countries (Miezah et al., 2015). As per the Greenpeace (2018) statistics, Faisalabad is in top 10 of world's polluted cities of the world whilst in the polluted city of Pakistan. Workers of the FWMC collect the garbage from households, markets, and shops and they trash it at dumps or landfill areas. Later informal waste collectors will segregate the useless material from the waste. The main objective of this paper is to study the economic and environmental sustainability of waste management practices and the social issues of garbage collectors

2 METHODOLOGY

Two questionnaires (one for the public's perception regarding the environment and another for the economic value of waste) were used to collect data for this research. As respondents for this research are not well-educated and cannot understand English, hence, questionnaires were initially developed in English and later translated in Urdu, national language, to improve response reliability. A sample of 250 respondents (125 residents and 125 garbage collectors) was selected and random sampling method is used to collect responses. Descriptive analysis has been performed to provide over-view of socio-economic characteristics of respondents whilst ordinary least square (OLS) method is applied to study the impact of independents variables in income level of garbage collectors. The functional form of the model is given below (i).

$$Y = \alpha + \beta_1 D_i + \beta_2 X_i + \varepsilon$$

Where

Y = income level

Di = Gender (0, 1)

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X_i = Independent variables (age, working hours, types of equipment)

3 RESULTS AND DISCUSSION

Table-1 presents the demographic characteristics of respondents, results reported that 60percent of respondents are males, the majority (36.8%) belonging to age-group of 31-42 and married (54.4%). Deliberately, the educated class was targeted for data collection to account for accurate public's perception about waste management practices

Table 1
Socio-economic characteristics of local residents
Characteristics of the local community

Characteristics of Community Members		Frequencies	Percentages
Gender	Male	75	60
	Female	50	40
Age	18-30	30	24
	31-42	46	36.8
	43-60	26	20.8
	60 & Above	23	18.4
	Marital Status	Single	57
	Married	68	54.4
Education	School	15	12
	College	60	48
	University	50	40
Occupation	Student	49	39.2
	Government Servant	45	36
	Self-Employed	20	16
	Unemployed	11	8.8
Income	Low	26	20.8
	Average	50	40
	High	49	39.2

Public's perception regarding environment awareness is given in Table 2. Results revealed that general public is well aware of health issues which may occur as a result of poor waste management as indicated by 80.8percent respondents, 87.2percent of respondents blamed the general public for environmental issues they are facing and water contamination is top of that as indicated by 48percents. Results further highlighted that informal garbage collectors are more efficient working in Faisalabad compared to FWMC. Moreover, the general public (88%) is willing to the participant if the government initiate environmental protection projects.

Table 2
Resident's perception regarding environmental issues

Perception Regarding Environment		Frequency	Percentage (%)
Solid waste brings health issues	Yes	101	80.8
	No	5	4
	Don't Know	19	15.2
	Yes	55	44
Solid waste is the main factor of environment disturbance	No	61	48.8
	Don't Know	9	7.2
	Who is responsible for environmental issues	People	109
	Government	11	8.8
	Lack of Awareness	5	4.0
Most disturbing environment issues	Air	22	17.6
	Water	60	48
	Climate Change	10	8
	Others	33	26.4
	Which sector is more efficient?	Formal	43
	Informal	82	65.6
If the government initiates a project for better environment 'would you like to participate?	Yes	110	88
	No	15	12

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Table-3 presents demographic characteristics of garbage collectors. The results show that the majority (58.4percent) of respondents were males, predominantly matured in age group (31 to 46), 69.6percent of the respondents were married and 66.4percent were uneducated. Results further reported that 68.8percent garbage collectors were earning 16,000 and higher, 72.8percent respondents were Muslims and 85.6percent collectors have their own house. Table-3 further reported the social and health issues faced by garbage collectors in the society. Tiredness followed by Asthma and skin diseases were found to be the major health issues garbage collectors are facing. 32.2percent of respondents claimed that they faced harassment and injuries (28.6percent) while collecting garbage.

Table 3

Categories of Waste Collectors	W.Cs	CSs	TPPs	SBs	DPs	Frequency	Percentage	
Gender	Male	23	9	8	18	15	73	38.4
	Female	11	9	4	19	9	52	41.6
Age	1-15	2	1	0	3	0	6	4.8
	16-30	13	1	4	10	5	33	26.4
	31-45	10	6	8	14	11	49	39.2
	46 & Above	9	10	0	10	8	37	29.6
Marital Status	Single	11	1	4	11	4	31	24.8
	Married	22	14	7	24	20	67	69.6
	Divorced	1	3	1	2	0	7	5.6
Education	Primary	15	1	3	13	2	34	27.2
	Secondary	2	1	0	1	4	8	6.4
	No Education	17	16	9	23	18	63	66.4
Income level	7000-13000	7	4	5	14	9	39	31.2
	16000-23000	16	8	6	13	8	51	40.8
	26000 & above	11	6	1	11	7	35	28.0
Housing	Owned	30	17	10	27	23	107	85.6
	Rented	4	1	2	10	1	18	14.4
Religion	Muslim	23	16	10	27	15	91	72.8
	Non-Muslim	11	2	2	20	9	34	27.2
Asthma						26	20.8	

Health Issues	Asthma	26	20.8
	Tiredness	60	48
	Skin Diseases	19	15.2
	Depression	13	10.4
	Headache	5	4
Social Issues	HIV/AIDS	2	1.6
	Harassment	19	28.6
	Injuries	22	32.2
	Bad Weather	27	15.2
	Jokes and slogans	7	5.6
	others	23	18.4

Note: *W.Cs- waste collectors, *CSs- call on scavengers, *TPPs- transfer point pickers, *SBs- street pickers, *DPs- dump site pickers

OLS model is used to investigate the relationship between gender, age, working hours, equipment, and income level of informal garbage collectors. Results revealed that only working hours is found to be a significant predictor of income for garbage collectors. Putting it another way, if a garbage collector will invest more time in the field, he will be earning a higher income. The results of this study are in-line with the findings of However, other variables such as gender, age, and equipment found to be insignificant.

Table 5
Results of OLS model

Independent Variable	Coefficient	Std. Deviation	Sign
Gender	120.24	672.82	0.858
Age	1.70	21.98	0.938
Working Hours	14.10	4.57	0.003
Equipment	146.24	239.37	0.542
Intercept	4894.40	1279.37	0.000
R ²	85.10		
F-stat	118.79		

4 CONCLUSION

Solid waste management is an important social, economic and environmental concern around the globe. This research examined the solid waste management practices from two aspects i.e. from environmental sustainability and economic perspective. Data for this research are collected through close-ended questionnaire from a total of 250 respondents from eight districts from Faisalabad, Pakistan. Results revealed that although the general public blamed themselves for the pollution, however, they were lacking stringent guidelines and policies to contribute positively to environmental sustainability. On the other hand, waste provided a livelihood to many of the informal waste collectors, however, these informal waste collectors faced exploitation, abuses, insult, scolding, and sexual harassment. Based on the general public's perception and informal waste collector's views, the following

- Awareness regarding environmental sustainability is much needed in the community for the current and future prospective.
- Government investment can be reduced if authorities make sure the involvement of residents.
- The policymakers should increase the awareness among masses regarding the improvements of the environment by better management.
- A little investment in informal garbage collectors likes, skills, education, and health can build a healthy environment.
- There should also be an awareness program for garbage collectors regarding health hazards by involving NGOs and other volunteers.
- To garbage collectors should provide a better channel to sell out their daily waste on reasonable price.
- Garbage collectors urgently needed training for safety and a healthy environment.
- To provide better equipment to informal garbage collectors could collect heavy waste over the city.
- A little attention to the informal garbage collectors can work efficiently and could reduce a load of government for environmental sustainability.
- The pricing system of waste should be authorized for garbage collectors.

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