Opportunities For Entrepreneursin Household Solid Waste Management In Smart City Dharamshala, Himachal Pradesh

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Abstract

The research paper examines the role of entrepreneurs in solid waste management sector at developing smart city Dharamshala of Himachal Pradesh. The day to day human activities produce household wastes i.e. solid and liquid, among which solid waste is the one which needs to be managed very carefully. The research was conducted at Dharamshala, Himachal Pradesh which is a renowned tourist place. The survey was based on stratified systematic random sampling as the data was collected from every ward of Dharamshala city. The primary data was collected by circulating a questionnaire to the households and secondary data was collected from secondary data resources available both online and offline. The findings revealed that people dispose their household waste by themselves and there are no garbage collection services initiated by municipal corporation Dharamshala. The study explores the opportunities for new entrepreneurs in the field of household solid waste management, since Door to Door (D2D) services are not provided for garbage collection. These entrepreneurs can earn by garbage collection as most of people find no time in disposing their household waste to government authorized dumping sites or government run electric dustbins. The earnings by D2D services can vary between Rs. 2,57,970to Rs.10,97,800. The study reveals that most of the people dispose their household waste at open dumping sites or in plastic bins provided by government instead of government run electric dustbins. The reason behind is lack of awareness in using government run electric dustbins, choked underground dustbins and not following the practice of waste separation. If, municipality Dharamshala would start disposal plants, problem of poor waste management can be solved better.

Keywords: Household, solid waste, management, disposal, D2D, Dharamshala

1. Introduction And Background Of Study

The problem of littering waste has become a culture in India. We can find the city places in India littered with household garbage. The cause of this problem is poor management of waste and its disposal across the country. There is a need of smart solutions for solid waste management and developing cities as smart citiesis a better idea. The reason is smart city project includes sanitation and solid waste management as one of their key service areas (Pani, Novmber 25, 2016).Well-organized waste collection, transportation and disposal are important functions of Urban Local Bodies, which needs a staff for these activities. But, there are no such facilities provided to the residents of Dharamshala.

Dharamshala is a small municipality area of Himachal Pradesh, India with more than 50,000

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population. Dharamshala is famous for its tourist spots like Macleodganj, Naddi, Indrunag temple, St. John church, Triund (famous trekking place) and annual international film festival. The place is situated at a latitude and longitude of coordinates 32.219044, 76.323402 respectively (Towns, n.d.). Dharamshala is the first city in India where sensor based underground dustbins are installed across 140 public locations of city (Karelia, June 27, 2018).

Consumers, especially in younger demographics now demand more and more *provices* (products + services) for what they watch, read or listen. (Singh Bhagwan, 2015). Dharamshala has received Rs.2,986,250 Crore for year 2010-11, Rs.45,33,000 Crorefor year 2011-12 and Rs.67,05,100 Crorefor year 2012-13 as an amount and grant released by government of India, under the 13[th]Finance Commission. This total amount released for three years is 8.15% of the total grant released to all the cities and districts in Himachal Pradesh. The grant released for Dharamshala is also the highest among other cities, Kangra, Nurpur, Palampur, Nagrota (Solid waste management in urban Himachal).

1.1: Emergence of Householdwaste as a problem

In Himachal Pradesh, where highest waste per individual is generated in capital city Shimla, followed by Mandi and Dharamshala, draw the attention towards emergence of this problem. The household waste has emerged as a problem in Dharamshala, Himachal Pradesh due to the following reasons:

· Lack of Door to Door (D2D)collection services
· No private players in garbage collection
· Lack of environmental awareness
· Less coordination from residents side
· Lack of coordination among state and center government
· No/ negligence in Public Private Partnership (PPP) in Solid waste management
· Inadequate waste transportation facilities

1.2: End results of Solid waste

The solid waste collected by the municipalities consists of organics items, plastic products and dry waste. The organic items can further be utilized in the biogas plants for producing renewable energy. The plastic waste help in cement factories and dry waste can be recycled after sorting and the remaining's can be dumped at the landfills.

2. Review of Literature

Figure 1: End results of solid waste

Source:*http://ud-hp.in/pdf/Feasibility%20study%20-Waste-free%20Himachal%20Pradesh.pdf*
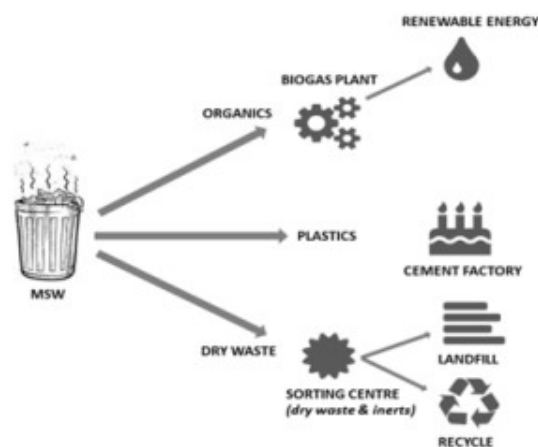
2.1: Household waste management practices in developing countries

In order to ensure the health and safety of households, the waste of any kind should be removed from house but the practice is avoided by developing countries (Doan, 1998). This makes "solid waste management" a big challenge for municipalities of the developing countries (Guerrero, Maas, &Hogland, 2013) and (Al-Khatib et. al. 2010) and (Marshall, &Farahbakhsh, 2013) and (Zurbrugg2002).SWM (Solid waste management) increases the expenditure and annual budget of municipalities due to higher costs of waste management, poor handling of waste and less awareness (Guerrero, Maas, &Hogland, 2013).Waste management requires a proper and stable transportation, but no/less availability of dustbins is responsible for poor waste transportation (Hazra, &Goel, 2009). If, no/less dustbins available, dumping waste at own landfills become the only option for people. Then who cares about the waste segregation, whichhampers the recycling process (Gupta, et. al. 1998). Thus a focus on people awareness, arrangements of proper funds, equipment's and facilities can solve the problem of waste management (Al-Khatib et. al. 2010).

2.2: Household waste and entrepreneurs opportunities

People usually dispose their household waste at landfills leading to shortfalls of landfills sites (Narayana, 2009). This provides an opportunity for entrepreneurs in the area of waste management. Waste is a significant area for informal leadership in developing urban area of a country (Rogerson, 2001) because entrepreneur's opportunity in waste management can provide a sustainable livelihood to the citizens (Thieme, 2010). There are plenty of opportunities in recycling industry, but all it needs is a cheap labour and supply of waste (van Beukering, 1994). There are many countries in world where people are not ready to spend an amount less than 10 Euros. Keeping in view the waste management programs must be developed as per the regions (Brunner, &Fellner, 2007). But, few countries offer social entrepreneurship program in waste management sector. Entrepreneurship in waste products is a moral task because it converts the evil into good (Fuller, 2013).No society exists without human being and no culture is developed without society (Singh Bhagwan, 2017). The entrepreneurship opportunities in waste sector are also governed by class factor. As the women from lower class can earn their livelihood as well as can meet their household requirements by joining the garbage collection team(Huysman, 1994).

3. CONCEPTUAL FRAMEWORK OF STUDY

Household solid waste management is a serious concern. Many state cities are littered with household solid waste i.e. garbage and is giving unpleasant looks to these cities(Action Plan ForHousehold Solid Waste Management Himachal Pradesh, February 2017). Dharamshala is the only smart city where underground dustbins are placed at a distance of every 100 meters. Purchasing and installing these dustbins cost more but expensive technologies cannot solve the waste problems in India (Asher, 2018). No other cities of Himachal Pradesh have underground dustbins not even at Shimla and Mandiwhich stands at top in the list for waste generation. This gives the framework for concentrating this present study to city Dharamshala of Himachal Pradesh.

Table 1: Per Day waste generation in Urban Local Bodies (ULB) in Himachal Pradesh

Sr. No.	Name of ULB	Est. Waste generation (TPD)
1	M.Corp.Shimla	90.00
2	MC Mandi	23.00
3	M Corp. Dharamshala	18.00

Source: (Action Plan for Municipal Solid Waste Management Himachal Pradesh, February 2017)

4. RESEARCH METHODOLOGY

4.1: About city

Dharamshala, Himachal Pradesh, India is located at 1320 meters height with GPS coordinates of 32° 13' 8.5584" N and 76° 19' 24.2472" E(Towns, n.d.).It has 17wards (Wards, n.d.). Mid July to September is the time for rainfall in Dharamshala. It is the district headquarters of District Kangra and winter capital of Himachal Pradesh, where second VidhanSabha of Himachal Pradesh is situated.

4.2:Objectives:

· To understand the situation of disposing household solid waste.
· To study the potential of households regarding paying for D2D services.
· To explore opportunities in D2D garbage collection for entrepreneurs.

4.3:Data Collection Sources

The data has been collected by both primary and secondary sources. The primary data source was questionnaire and secondary data was collected from various published documents of government and non-government organizations and research journals.

4.4: Sampling technique

The study employedprobability sampling which was a stratified systematic random sampling. Total 67 questionnaires were circulated and only 60 questionnaires were found feasible for further analysis. As of all the 17 wards of Dharamshala (Wards, n.d.)were divided into 17 strata's and among these strata's every third strata/ward was selected for primary data collection. This reduced the total strata'sfor primary data collection to 6. From these 6 strata's 10 households were selected randomly for data collection. This framed the total sample size to 60 (6*10=60) respondents.

5. RESULTS AND

Table 2: General Household Information

1. Gender			1. Income			1. Education		
Type	Freq.	Percent	Type	Freq.	Percent	Type	Freq.	Percent
Male	43	71.7	Above 50,000	19	31.7	Above PG	10	16.7
Female	17	28.3	Less than RS. 10,000	6	10.0	PG	26	43.3
Total	60	100	RS. 10,001-20,000	12	20.0	Graduation	19	31.7
			RS. 20,001-50,000	23	38.3	Other	5	8.5
			Total	60	100.0	Total	60	100.0

1. Total members of Household

a) Male above 18 Years			a) Female above 18 Years			a) Children below 18 years			a) Infants below 1 year		
No.	Freq.	Percent	No.	Freq.	Percent	No.	Freq.	Percent	No.	Freq.	Percent.
0	2	3.3	0	7	11.7	0	44	73.3	0	57	95.0
1	9	15.0	1	15	25.0	1	9	15.0	1	2	3.3
2	34	56.7	2	29	48.3	2	3	5.0	2	0	0
3	11	18.3	3	8	13.3	3	4	6.7	3	1	1.7
4	2	3.3	4	1	1.7	4	0	0	4	0	0
5	1	1.7	5	0	0	5	0	0	5	0	0
6	1	1.7	6	0	0	6	0	0	6	0	0
Total	60	100.0	Total	60	100.0	Total	60	100.0	Total	60	100.0

Source: Based on primary data collected by authors

The data shows that male members comprised 71.7% and female members comprised 28.3% of the sample population. As far as the monthly income of the household concerned, the data reveals that the majority of the sample population earns more than Rs. 20,000. The family size of most of the population stands between 2-3 number of household members (as male above 18 years, female above 18 years, children below 18 years and infants below 1 year). Out of 60 respondents the highest numbers of people i.e. 43.3% were Post Graduates, followed by 31.7% graduates and 16.7% studied above PG level. Only 8.5% of respondents were less educated.

Table 3: Information about solid waste Management

			Frequency	Percent
1.	Do you Dispose your Household Waste	No	4	6.7
		Yes	56	93.3
		Total	**60**	**100.0**
2.	Do you think that separation of the different wastes at home before throwing waste is good	No	28	46.7
		Yes	32	53.3
		Total	**60**	**100.0**
3.	Your opinion: if government starts garbage carrying services in your locality	Not Appreciable	2	3.3
		Slightly Appreciable	1	1.7
		Moderately Appreciable	9	15.0
		Very Appreciable	13	21.7
		Appreciable	35	58.3
		Total	**60**	**100.0**
4.	Do you put your waste in underground high -tech dustbins	**Yes**	37	61.66
		No	23	38.33
		Total	**60**	**100.0**
5.	why don't you put your household waste in High tech Underground electric decomposing dustbins	Lack of awareness in operating High Tech dustbins	6	16.2
		Stray animals around dustbins	8	21.6
		No free time	4	10.8
		Overflow High tech dustbins	3	8.1
		Dustbins far away from home	16	43.2
		Total	**37**	**100.0**
6.	Are you willing to pay for garbage collection services	No	13	21.7
		Yes	47	78.3
		Total	**60**	**100.0**
7.	How much amount you can pay per month for garbage collection facility	Rs. 50-100	24	40
		Free of Cost	15	25.0
		Less than Rs. 50	21	35.0
		Total	**60**	**100.0**
8.	How often do you want garbage collection service at your home	Daily	27	45.0
		Thrice a week	11	18.3
		Twice a week	15	25.0
		Weekly	7	11.7
		Total	**60**	**100.0**

Source: *Based on primary data collected by authors*

The above table 3 shows that 93.3% of the population selected for data collection was actually disposing their household waste. But the separation/segregation of waste products at home is not practiced by good number of people. Since, government has installed underground high-tech dustbins at Dharamshala, still 38.33% of people avoid to use high tech dustbins. The people face a problem with far away location of these dustbins, stray animals around dustbins and a lack of awareness in operating the high tech dustbins. Almost 95% of people said that they will highly appreciate, if government provides a garbage carrying services in the locality. Total 78.3% of the people are willing to pay for garbage collection and 75% among them are ready to spend uptoRs.100for this service. About 45% of people also wish to avail the benefits of garbage collection service at your home on daily basis.

Table 4: Gender * Why don't you put your household waste in High tech Underground electric decomposing dustbins (Chi Square)

| | | Whydon't usehightech Dustbins | | | | | Tota l | Chi Square | |
		Dustbins far away from home	Lack of awareness in operating High Tech dustbins	No free time	Overflow High tech dustbins	Stray animals around dustbins		Value	Asymp. Sig. (2-sided)
Gender	Male	17	13	4	2	7	43	1.620	0.805
	Female	8	4	1	2	2	17		
Total		**25**	**17**	**5**	**4**	**9**	**60**		
Education	Middle	0	0	0	0	1	1	13.795	0.841
	Matric	0	0	0	0	1	1		
	Plus Two	0	0	0	0	1	1		
	Graduati on	4	2	0	1	5	12		
	PG	1	3	3	2	7	16		
	Above PG	1	3	1	0	1	6		
Total		**6**	**8**	**4**	**3**	**16**	**37**		

Source: Based on primary data collected by authors

The table 4 shows that 41.66% of respondents do not put their waste in underground dustbins as these are far away from their house. Moreover, 28.33% people are not aware of operating high tech dustbins and putting their waste inside.Some people have no free time and some avoid using underground dustbins due to presence of stray animals like monkeys and dogs near underground dustbins. The stray animals appear due to habit of keeping waste outside the dustbins. The chi square test for gender reveals that chi square $X^2(4)=1.620$ at p=0.805. Since the p-value is greater than our chosen significance level ($\alpha = 0.05$), No association was found between gender and putting

household waste in High tech Underground electric decomposing dustbins. The chi square test for education reveals that chi square $X^2(4)=17.795$ at p=0.841. Since the p-value is greater than our chosen significance level ($\alpha = 0.05$), No association was found between Education and

putting household waste in High tech Underground electric decomposing dustbins. This highlights that even the highly educated people don't practice of putting their waste in underground dustbins. This reflects a need for D2D garbage collection services.

5.4: Composition of Household waste

Table 5: Composition of household wastes at Dharamshala

	Kitchen		Plastic		Paper		Solid Metals	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
0-10 %	15	25.0	28	46.7	26	43.3	45	75.0
11-20%	10	16.7	19	31.7	20	33.3	8	13.3
21-30%	15	25.0	5	8.3	8	13.3	3	5.0
31-40%	3	5.0	3	5.0	1	1.7	0	0
41-50%	4	6.7	1	1.7	1	1.7	1	1.7
51-60%	3	5.0	1	1.7	0	0	0	0
61-70%	5	8.3	1	1.7	0	0	2	3.3
71-80%	3	5.0	2	3.3	2	3.3	0	0
91-100%	2	3.3	0	0	2	3.3	1	1.7
Total	**60**	**100.0**	**60**	**100.0**	**60**	**100.0**	**60**	**100.0**

Source: Based on primary data collected by authors

The above table 5 shows that the kitchen, plastic, paper and solid metal composition of household waste material in all the households of Dharamshala lies between 0% - 30%. This can be taken as an opportunity for entrepreneurs in the field of household solid waste management. Few households produce waste elements above 30%. Although the number of households which falls in this category is less but can be an opportunity which can a source of income.

6. OPPORTUNITIES FOR ENTREPRENEURS

Figure 2: Amount in Rupees People can pay for garbage collection service at door step

Source: Based on primary data collected by authors

Since people from Dharamshala are ready to pay for garbage collection services, opportunity positions are available for new entrepreneurs where 75% of people are ready to spend between Rs.10-100.

6.1: Hypothetical Mathematical calculation of income from D2D garbage collection based on data received

Total Number of Houses in Dharamshala= 10978 (According to website of Dharamshala Municipal Corporation)

Table 6:Income opportunities for Entrepreneurs

Income opportunities for Entrepreneurs by taking 100% Households Per Month		Income opportunities for Entrepreneurs by taking 40% Households Per Month who are ready to spend between Rs50-100. 40% of 10978=4391 (I)		Income opportunities for Entrepreneurs by taking 35% Households Per Month who are ready to spend less than Rs.50 35% of 10978= 3842 (II)		Grand Total Amount (I+II) Minimum income accepted
Households*amount in Rs. /month	Total Income in Rs. /month	Households*amount in Rs. /month	Total Income in Rs /month	Households*amount in Rs. /month	Total Incomein Rs /month	Income in Rs./month
10978*10	1,09,780	4391*50	2,19,550	3842*10	3,8420	2,57,970
10978*20	2,19,560	4391*60	2,63,460	3842*20	76,840	3,40,300
10978 *30	3,29,340	4391*70	3,07,370	3842*30	1,15,260	4,22,630
10978 *40	4,39,120	4391*80	3,51,280	3842*40	1,53,680	5,04,960
10978*50	5,48,900	4391*90	3,95,190	3842*50	1,92,100	5,87,290
10978*60	6,58,680	4391*100	4,39,100			
10978*70	7,68,460					
10978*80	8,78,240					
10978*90	9,88,020					
10978*100	10,97,800					

Source: Based on primary data collected by authors

The above table 6 shows that entrepreneurs can earn maximum of Rs.10,97,800 if all the households will pay Rs.100 per month for D2D garbage collection services. The primary data shows that 75% of people are willing to pay for D2D services(as per the data received), thenthe entrepreneurs can foresee the minimum revenue of Rs.2,57,970 and maximum of Rs.5,87,290 on per month basis which may beexpected as high income.

The following will be the costs/expenditures for the entrepreneurs:

I.   Mini trucks
II. Employees salary
III. Employees Uniform, shoes, mask and gloves etc.
IV. Plastic bags

7. CONCLUSION

It can be concluded from the research that higher expenditures on expensive technologies can only reduce the problem but cannot eradicate it completely. Instead of these expenditures, if segregation of waste and disposal is done properly by drawing and building attention of the city residents as well as employing trained manpower can better solve the problem. The introduction of underground high tech dustbins can pave the way towards a cleaner environment and can start new job opportunities to labour class and also the business opportunities to many entrepreneurs.We estimate that D2D garbage collection business can earn maximum of Rs.10,97,800at Dharamshala and minimum Rs.2,57,970.If taking all the cities of Himachal Pradesh, the earned income can be raised to Billions.The figures will be more enhanced in terms of income when apart from household waste, wastes from hotels, restaurants, hospitals, educational institutions, footpath peddlers, vendors and the like are considered.

The disposal of household wastes will not only put a halt to the environmental pollution, but also put a ban on the entry of stray animals at the disposal place. Somepopulation does not use the high tech dustbins at Dharamshala reason being far away location of dustbin or lack of awareness in usage. These people are ready to pay for the garbage collection facility at their door step. This can introduce an opportunity to the new entrepreneurs in the field of household waste management. The D2D process of garbage collection will put a ban on illegal dumping and will also help the state of Himachal Pradesh in achieving zero waste.

8. RECOMMENDATIONS

·   Waste should be treated as resource and disposal plants should be developed for its disposal
·   Residents must coordinate to municipality as well as PPP (Public Private Partnership) for underground sensor based dustbins and D2D garbage picking services
·   Municipality should start the awareness generation programs in using underground sensor based dustbins and its benefits
·   Adoption of good housekeeping activities at home.
·   The entrepreneurs must provide the regular and daily service for garbage collection, as it will not only help to keep the houses clean but also helps in achieving "Sawach Bharat Mission".
·   The entrepreneurs must maintain the moral aesthetics and health standards for public by regular garbage collection services.
·   The staff should be trained for dealing with hazardous waste materials.
·   Specially designed vehicles will be used so that waste must not litter here and there during transportation.
·   Appointing Staff persons at the site of high tech dustbins by municipality can also attract people to dispose waste properly.

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