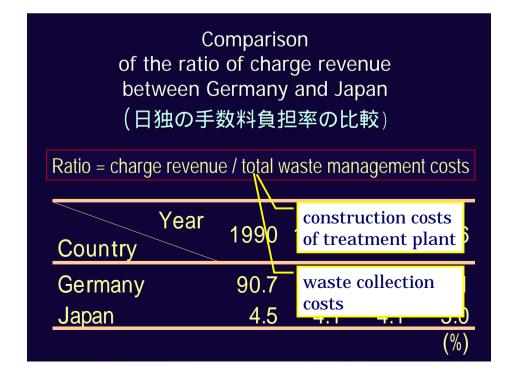
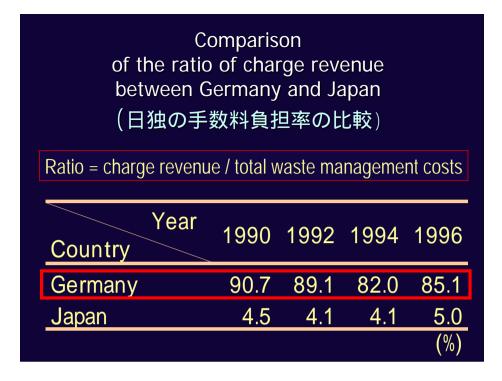


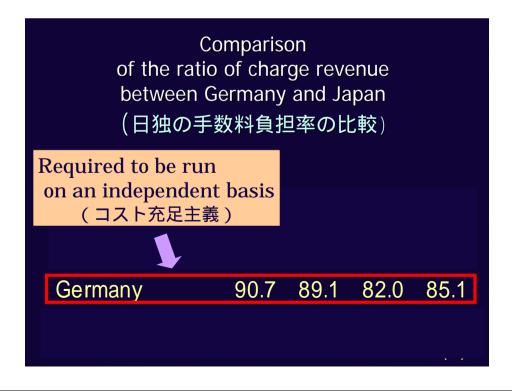
Background
of the charging systems
in Germany and Japan
(日独の有料化の背景にあるもの)

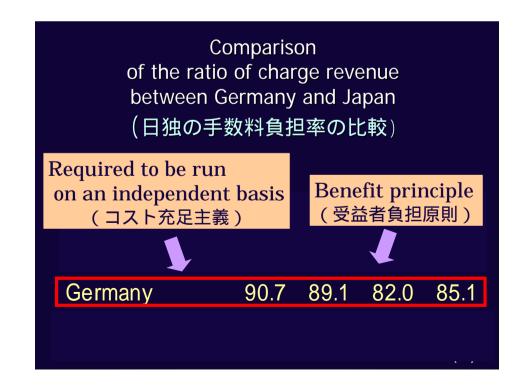


Comparison of the ratio of charge revenue between Germany and Japan (日独の手数料負担率の比較) Ratio = charge revenue / total waste management costs Year 1990 1992 1994 1996 Country Germany 90.7 89.1 82.0 85.1 4.5 5.0 Japan

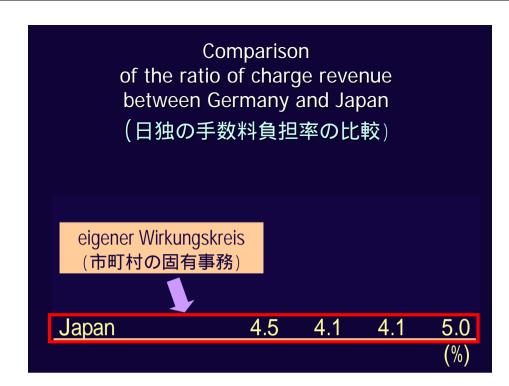
Comparison of the ratio of charge revenue between Germany and Japan (日独の手数料負担率の比較) Ratio = charge revenue / total waste management costs Year 1990 1992 1994 1996 Country 82.0 Germany 89.1 85.1 Japan 5.0 4.5 (%)

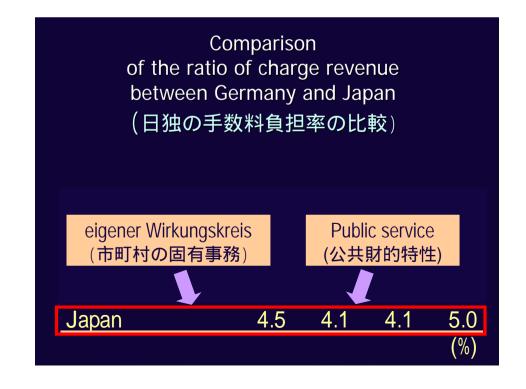


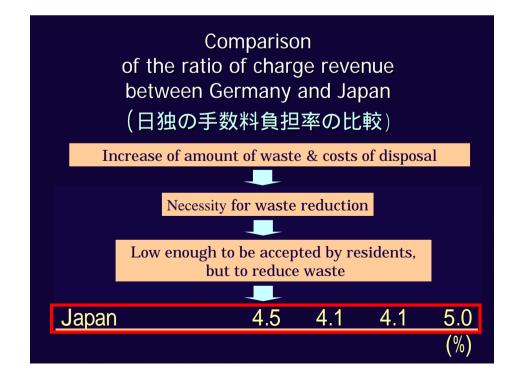












Illegal dumping in municipalities due to introduction of variable charging: factors influencing illegal dumping problems

(有料化導入自治体における 不法投棄の実態とその影響要因)

Survey Outline

Objectives

To collect data about the situation of illegal dumping and features of waste collection systems

Population

All cities, including the Metropolis of Tokyo that have introduced variable charging on residential combustible waste

Method

Requests made by phone and questionnaires sent by mail

Survey period

From Dec. 6th, 1999 to Feb. 29th, 2000

Respondent rate

219 / 327 municipalities (67.0%)

Background

In the 1990s, many municipalities introduced variable charging in Japan.



Waste reduction

Illegal dumping problems?

- Japanese Environment Agency (1993) Illegal dumping: 34% (Japan)
- Skumatz et al. (1997) Illegal dumping: 27% (U.S.)



- 1 . To reveal the actual situation of illegal dumping in municipalities with variable charging
- 2 . To demonstrate factors influencing illegal dumping in municipalities with variable charging

Survey Outline

Population

All cities, including the Metropolis of Tokyo that have introduced variable charging on residential combustible waste

- 1)Systems to impose a charge for waste disposal on trash bags or stickers (手数料制)
- 2)Systems where the municipality designates the use of certain types of trash bags with obligation from residents to purchase the designated bags (指定袋制)

Method

Requests made by phone and questionnaires sent by mail

Survey period

From Dec. 6th, 1999 to Feb. 29th, 2000

Response rate

219 / 327 municipalities (67.0%)

Illegal dumping problems in the first year of introducing variable charging

	1)Very serious	2)Moderately serious	3)Not very serious	4)Other	N.A.	Total
No.	5	48	89	5	11	158
Percentage of 1) ~ 3)	4%	34%	63%			

38%

Present situation of illegal dumping

	1) Continuously a problem	2)Improved, but still a problem	3) Not a problem	4)Other	N.A.	Total
No.	29	16	4	3	1	53
Percentage of 1) ~ 3)	59%	33%	8%			

Note: Only municipalities reporting illegal dumping problems after introduction of variable charging are analyzed

Characteristics of illegally dumped sites

Site	Rate
Rivers and a dry riverbeds	70%
Roadsides	70%
Woods and forests	87%
Farmlands	28%
Vacant lots	74%
Garbage collection stations in other communities	25%
Garbage stations within the city	57%
Parks	38%
Dumpsters at offices and train stations	11%
Others	9%
Total number of responses	53

Note: Only municipalities reporting illegal dumping problems after introduction of variable charging are analyzed

Characteristics of illegally dumped sites

	Site	Rate
	Rivers and a dry riverbeds	70%
	Roadsides	70%
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Γ	Farmlands	28%
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Note: Only municipalities reporting illegal dumping problems after introduction of variable charging are analyzed

Types of illegally dumped garbage

	Garbage type	Ratio	
l	Garbage in bags	77%	l
	Vegetables	21%	l
	Bottles and cans	81%	ľ
	Remains of lunch	72%	
	Plastic bags	53%	
	Paper waste	36%	
	Others	60%	
	Bulky waste	55%	
	Total number of	53	
	responses	55	

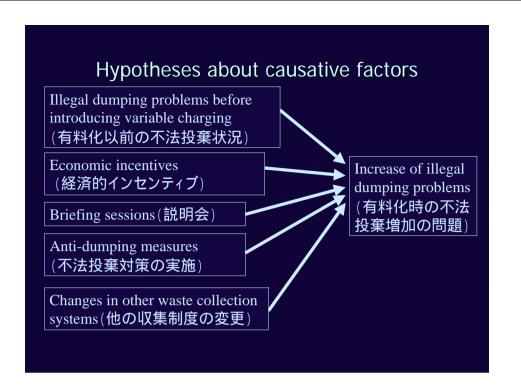
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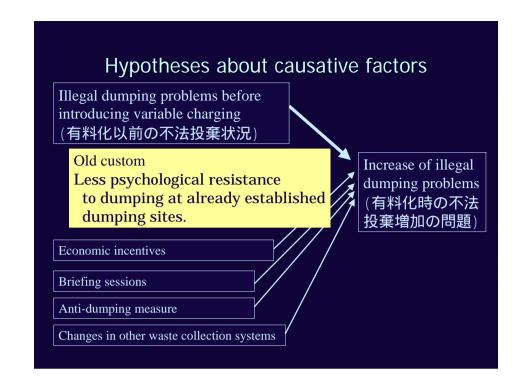
Factors influencing illegal dumping Literature

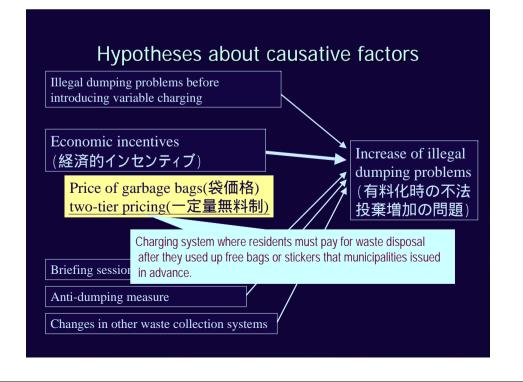
Blume (1992) analyzed factors with data from 14 cities

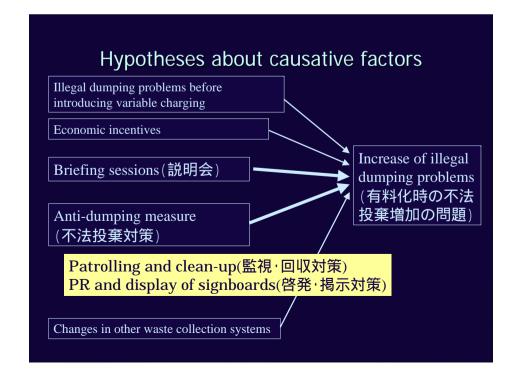
- Socioeconomic characteristics: not related to illegal dumping
- Location: a possible factor
- Alternative disposal mechanisms: may be important in minimizing dumping

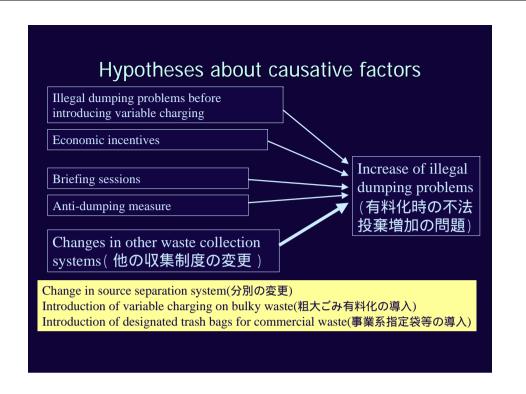
Some other important relations such as to prices etc. were not analyzed











Relationship between the degree of seriousness before and after the introduction of variable charging

Problem before	Problei	Problem after variable rates			
introduction	1) Yes	2) No	Other & N.A.	Total	
1)Very serious	9	4	5	18	
	69%	31%			
2)Moderately	31	38	5	74	
serious	45%	55%			
3)Not very	2	44	6	52	
serious	4%	96%			
Other & N.A.	0	3	11	14	
	0%	100%			
Total	42	89	27	158	
	32%	68%			

 $(df=2, ^2 = 29.321, p<0.001, excluding 0ther & N.A.)$

Relationship between the degree of seriousness before and after the introduction of variable charging

Problem before	Problei	m after v	ariable rates	
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Total	42	89	27	158
	32%	68%		

Relationship between the degree of seriousness before and after the introduction of variable charging

Problem before introduction				Total
1)Very serious		/i	<u>r</u>	10
" \	ery serio	ous"+"M	loderately s	eriou
2)Moderately	, ,,	JU	J	, , ,
serious	45%	55%		
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Other & N.A.	0	3	11	14	
	0%	100%			
Total	42	89	27	158	
	32%	68%			

Relationship between price of trash bags and illegal dumping problem

 $(df=2, ^2 = 29.321, p<0.001, excluding 0ther & N.A.)$

Rate	Problem after variable rates				
(Yen/45L)	1) Yes	2) No	Other & N.A.	Total	
0 ~ 20	8	13	3	24	
	38%	62%			
20 ~ 40	3	7	2	12	
	30%	70%			
40 ~ 60	6	3	2	11	
	67%	33%			
60 ~	6	6	0	12	
	50%	50%			
N.A.	17	13	3	33	
	57%	43%			
Total	40	42	10	92	
	49%	51%			
$f=3$, $^2=3$.	140,n.s.	excl	uding Other	& N.A.	

Only municipalities that answered "Very serious" or "Moderately serious" about illegal dumping before variable charging were analyzed

Relationship between the degree of seriousness before and after the introduction of variable charging

Problem before	Proble	m after v	ariable rate	es			
introduction	1) Yes	2) No	Other & N	I.A.	Total		
1)Very serious	9	4		5	18)	
	69%	31%				L	92
2)Moderately	31	38		5	74		32
serious	45%	55%	_			J	
3)Not very	2	44		6	52		
serious	4%	96%					
Other & N.A.	0	3	1	11	14		
	0%	100%					
Total	42	89	2	27	158		
	32%	68%					
$df=2$, $^{2}=29.321$	1, p<0.0	001, exc	luding 0	the	r & N	.A.)	

Relationship between price of trash bags and illegal dumping problem

Rate	Proble	em after v	ariable rates	
(Yen/45L)			Other & N.A.	Total
0 ~ 20	8	13	3	24
	38%	62%		
20 ~ 40	3	7	2	12
	30%	70%		
40 ~ 60	6	3	2	11
	67%	33%		
60 ~	6	6	0	12
	50%	50%		
N.A.	17	13	3	33
	57%	43%		
Total	40	42	10	92
	49%	51%		
$df = 3$, $^{2} = 3$.	140,n.s	. excl	uding Other	& N.A

Only municipalities that answered "Very serious" or "Moderately serious" about illegal dumping before variable charging were analyzed

Relationship between price of trash bags and illegal dumping problem

Rate	Proble	em after v	ariable rates	
(Yen/45L)	1) Yes	2) No	Other & N.A.	Total
0 ~ 20	8	13	3	24
	38%	62%		
20 ~ 40	3	7	2	12
	30%	70%		
40 ~ 60	6	3	2	11
	67%	33%		
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N.A.	17	13	3	33
	57%	43%		
Total	40	42	10	92
	49%	51%		

Only municipalities that answered "Very serious" or "Moderately serious" about illegal dumping before variable charging were analyzed

Relationship between price of trash bags and illegal dumping problem

8 38% 3	13	Other & N.A.	24
38%	-	_	24
	62%		
3	7		I
	1	2	12
30%	70%		
6	3	2	11
67%	33%		
6	6	0	12
50%	50%		
17	13	3	33
57%	43%		
40	42	10	92
49%	51%		
	6 67% 6 50% 17 57% 40 49%	6 3 67% 33% 6 6 6 50% 50% 17 13 57% 43% 40 42 49% 51%	6 3 2 67% 33% 6 0 50% 50% 7 13 3 57% 43% 7 10

Only municipalities that answered
"Very serious" or
"Moderately serious" about illegal dumping before variable charging were analyzed

Relationship between two-tier pricing and illegal dumping problems

	Probl	Problem after variable rates				
Type of program	1) Yes	2) No	Other & N.A.	Total		
Two-tier pricing	10	6	3	19		
	63%	38%				
Single pricing	30	36	7	73		
	45%	55%				
Total	40	42	10	92		
	49%	51%				

(df=1, 2=1.498,n.s. excluding Other & N.A.)

Relationship to briefing sessions

Briefing sessions held	Proble	em after	variable rates	
J			Other & N.A.	Total
For residents	30	31	9	70
	49%	51%		
For representatives	5	5	1	11
of residents	50%	50%		
No sessions held	1	4	0	5
	20%	80%		
N.A.	4	2	0	6
	67%	33%		
Total	40	42	10	92
	49%	51%		

(df=2, 2=1.135, n.s. excluding Other & N.A.)

Relationship between anti-dumping measures and illegal dumping problems

Anti-dumping		Problem after variable rates				
measure	1) Yes	2) No	Other & N.A.	Total		
Patrolling and	10	4	1	15		
Clean-up activities	71%	29%				
Public relations and	10	3	3	16		
signboards display	77%	23%				
No measures	19	33	6	58		
implemented	37%	63%				
N.A.	1	2	0	3		
	33%	67%				
Total	40	42	10	92		
	49%	51%				

 $(df=2, ^2=10.099, p<0.01, excluding 0ther & N.A.)$

Relationship between charging on bulky waste collection and illegal dumping problems

Charging bulky	Proble	Problem after variable rates				
waste collection	1) Yes	2) No	Other & N.A.	Total		
Rates introduced before	5	6	2	13		
combustible waste	45%	55%				
Rates introduced	11	11	2	24		
simultaneously	50%	50%				
No charging of	20	23	5	48		
bulky waste	47%	53%				
N.A.	4	2	1	7		
	67%	33%				
Total	40	42	10	92		
	49%	51%				

(df=2, 2 =0.090,n.s., excluding Other & N.A.)

Relationship between change in the separation system and illegal dumping problems

Change in	Proble	Problem after variable rates				
separation	1) Yes	2) No	Other & N.A.	Total		
Yes	25	15	2	42		
	63%	38%				
No	14	26	8	48		
	35%	65%				
N.A.	1	1	0	2		
	50%	50%				
Total	40	42	10	92		
	49%	51%				

 $(df=1, ^2= 6.054, p<0.05, excluding Other & N.A.)$

Relationship between designated bag system for commercial waste and illegal dumping problems

Designated has a vistam	Dualda		مملمه ملطماسم	
Designated bag system for commercial waste			/ariable rates Other & N.A.	Total
System introduced before	0	0	0	0
charging combustible waste			_	
System introduced	7	7	4	18
simultaneously	50%	50%		
No bag system for	29	33	6	68
commercial waste	47%	53%		
N.A.	4	2	0	6
	67%	33%		
Total	40	42	10	92
	49%	51%		

(df=1, 2 =0.048,n.s., excluding Other & N.A.)

Conclusion

- About 40% of such cities experienced an increase in illegal dumping and about 90% of these cities had this as an ongoing problem. But cities encountering serious dumping problems represented only 4 %.
- We further found <u>the presence of illegal dumping before introducing variable charging was a significant factor</u> affecting illegal dumping at the time of introduction of variable charging.
- In addition, among municipalities that experienced an illegal dumping problems prior to introduction of variable rates, those that introduced separate collection systems at the same time tended to see a rise in illegal dumping.
- The incidence of illegal dumping was also higher in municipalities where the price of waste bags was higher. However, this factor was not statistically significant.