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Drivers of customer satisfaction with waste-disposal-services: A PLS-SEM approach

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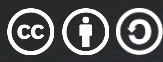
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Drivers of Customer Satisfaction with Waste-Disposal-Services - A PLS-SEM Approach

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Purpose: *Prior studies on customer satisfaction research have focused on the private sector. However, few studies have looked at services of general interest.*

Methodology: *Using a PLS-SEM methodology, we establish and adapt a theoretical model based on the well-known ECSI to the waste disposal service context and use a sample of 2062 responses to assess our results.*

Findings: *Our results show that disposal performance is most important in explaining customer satisfaction, followed by price-performance-ratio and service hotline performance.*

Originality: *For this study, we adapted a well-established model and extended it with the construct “waste disposal performance”. We conducted expert interviews and tested the extended model in pretests before final data collection. We show that this construct is the most important driver for customer satisfaction in the context of waste disposal services.*

Research limitations: *The data have been collected using self-reported questionnaires in Germany. Future studies should collect longitudinal data and test the model in other countries.*

Managerial implications: *The most important implication of our study is that managers of waste disposal services should focus on the logistical aspects behind their services, such as timely disposal of waste to ensure customer satisfaction.*

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1 Introduction

Services of general interest are defined as “a comprehensive state task to provide the goods and services deemed necessary for human existence” (Maurer, 2004, p. 6 ff.). In the course of the last few decades, the concept of services of general interest has changed in content. Some services seem to have lost their relevance for the state today, while others are moving back into the state’s focus due to various causes. One cause is the supposed decreasing service quality of private companies evoked in the profit orientation (Seckelmann, 2008, p. 273 ff.). Schmidt demonstrated in 2011 that the telecommunications, post and rail sectors are services of general interest that no longer are the focus of direct state provision (p. 209 ff.), as they have been partially or fully privatized over the past few decades. In addition to the services already mentioned, the household waste disposal service is also part of the provision of general interest.

Two very decisive factors in the political communication of the decision to privatize or nationalize the provision of services are, on the one hand, the increase in efficiency, which is reflected in the market price (Reeves & Barrows, 2000; Dijkgraaf & Gradus, 2003), and, on the other hand, the quality of the provision of services (Opphard et al., 2010). However, Bataille & Steinmetz (2014) concluded that local political interests leave little room “to establish a competitive exception area and entrepreneurial activity for the local authorities. The implementation of communal goals such as securing jobs or local value creation usually means an inefficient use of resources and thus unnecessarily high costs for citizens” (p. 9). In addition, Mühlenkamp (2007) argues that the public sector, as part of the privatization of services of general interest, tries to guarantee allocative efficient prices through the usual regulatory procedures, e.g. through incentive regulation, the efficiency limit or frontier concept. However, these processes contribute to the fact that price-regulated companies with the intention of making a profit are inclined to reduce quality (p. 709 f.).

2 Research Objective

This paper discusses the research question:

What drives customer satisfaction with waste disposal services in Germany?

On the one hand, the quality of disposal in Germany is determined by the Circular Economy Act, which states that the disposal of waste has the highest possible degree of recyclability. Put simply, the higher the quality of disposal, the higher the percentage of recyclable waste in terms of a circular economy. However, this only relates to the recycling of the disposed waste, not to the service provided. Here, the service quality is defined as the "ability of a provider to provide a service based on customer expectations at a certain level of requirements" (Bruhn, 1997, p. 27). The quality of waste disposal is therefore measured from the customer's point of view and depends on their expectations, i.e. if they are satisfied with the waste disposal quality. Conversely, the degree of customer satisfaction indicates how high the waste disposal quality is.

As early as in the 1980ies, Churchill & Surprenant (1982) took up the "Confirmation/Disconfirmation-Paradigm" from psychology on the development of satisfaction in general and customer satisfaction in particular. A user/customer/consumer compares the perceived performance of a service with his expectations and is satisfied when these are met (Cardozo, 1964; Pfaff, 1972; Olshavsky & Miller, 1972; Anderson, 1973; Olson & Dover, 1976; Oliver, 1977, 1979; Swan & Trawick, 1980). Various models have been developed to measure customer satisfaction, such as the European Customer Satisfaction Index (ECSI, 1999). This study is based on the ECSI and aims to identify the main drivers of satisfaction with waste disposal services in Germany. In the following, we adapt a well-known model to the German waste disposal context and assess it with partial least squares structural equation modeling (PLS-SEM).

3 Methodology

We apply PLS-SEM, a variance-based statistical analysis method, that allows for analyzing the strength of the explanatory constructs' influence on the target construct in a path model (Hair, Hult, Ringle, & Sarstedt, 2021), in order to test the relationships in our model. Since one of this research method's main objectives is to establish, explain and predict a target construct, the constructs in the path model are arranged in causal-predictive relationships (Chin et al., 2020) and prior studies on customer satisfaction (e.g. Damberg, 2021). This type of research methodology supports the extension of existing theories and the development of new ones (Richter, Sinkovics, Ringle, & Schlägel, 2016). Researchers are advised to apply PLS-SEM when a theoretical framework is being tested from a prediction perspective, and the structural model is rather complex (Hair, Risher, Sarstedt, & Ringle, 2019). The PLS-SEM method has been successfully applied and become popular in social sciences disciplines, such as human resource management (Ringle, Sarstedt, Mitchell, & Gudergan, 2020) and information systems research (Chin et al., 2020). We used the SmartPLS 3 software (Ringle, Wende, & Becker, 2015) to assess our structural path model.

We base our theoretical model on expert interviews conducted in 2020/1 (Mischel, 2022) to identify which items influence the customer satisfaction with waste disposal services. We measured the satisfaction of German households with waste disposal services as part of the field of public services in an online survey in six Northern German Districts. Our total data set comprised 2860 responses. After missing value treatment, we are left with 2062 complete responses for further analysis. Our online survey included 28 items (Tab. 1), which were measured on a Likert scale from 1 to 5 (do not agree to fully agree). The survey was conducted in German and items were translated into English for the purpose of this paper.

Table 1: Items of Survey Constructs 1 - 3

Construct	Image	PPR	Expectations
Item 1	I know the company	The waste disposal quality is reasonable in relation to the fees	My expectations for the waste disposal are always met
Item 2	The company is reliable	The service hotline quality is reasonable in relation to the fees	My expectations for the service hotline are always met
Item 3	The company is customer oriented	The overall quality is reasonable in relation to the fees	My overall expectations are always met
Item 4	The company creates value for the society		
Item 5	The company is innovative		
Item 6	The company is responsible for the environment		
Item 7	The external appearance is appealing		

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Table 2: Items of Survey Constructs 4 - 6

Construct	Disposal Performance	Service Performance	Satisfaction
Item 1	The waste is always picked up on the right day	The service hotline is always friendly	Overall I am satisfied with the waste disposal
Item 2	The several waste is always picked up to nearly the same time	The service hotline always reacts to my complaints in a solution-oriented manner	Overall I am satisfied with the service hotline
Item 3	The company that collects my waste always reacts flexibly	The service hotline can always answer my questions in an understandable way	The waste disposal company corresponds to my ideal overall
Item 4	The company that collects my waste works cleanly	The waste fee billing is easy to understand	Overall I am satisfied with the waste disposal and the service
Item 5	The company that collects my waste always deals with various special cases in the same way		
Item 6	The employees who pick up my waste are always friendly		
Item 7	The employees who pick up my waste can always answer my questions in an understandable way		

For our model development, we used the original ECSI model (ECSI, 1999; Kristensen, Martensen & Gronholdt, 2000) and adapted the constructs to fit the waste disposal context, especially by adapting the construct “Disposal Performance” with the new items “IMA_2”, “IMA_3” and “PER_2” to “PER_7” (Fig. 1). PLS-SEM is a suitable approach for the assessment of structural path models (Hair et al. 2017) and is well established in marketing and management research (Hair et al., 2012; Ringle et al., 2012).

The construct “Price Performance Ratio” is built of three items which rated the disposal (PLV_1), the service hotline (PLV_2) and the overall performance (PLV_3). The construct “Disposal Performance” is built of eight items which rated the several aspects of picking up the garbage directly at the households. And the construct “Service-Hotline Performance” is built of four items including complaints management (SER_2), customer questions (SER_3), friendliness (SER_1) and understandable billing (SER_4). The goal of this study is to identify the constructs which mainly influence the satisfaction with public waste disposal services.

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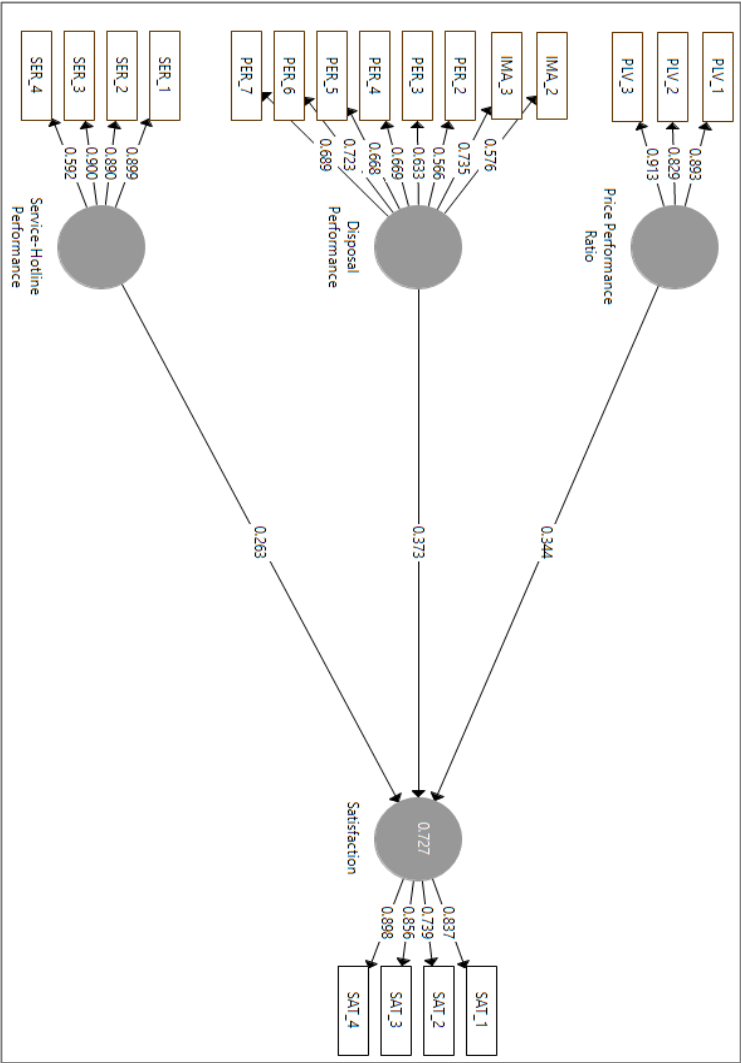


Figure 1: Theoretical Model

4 Data Description

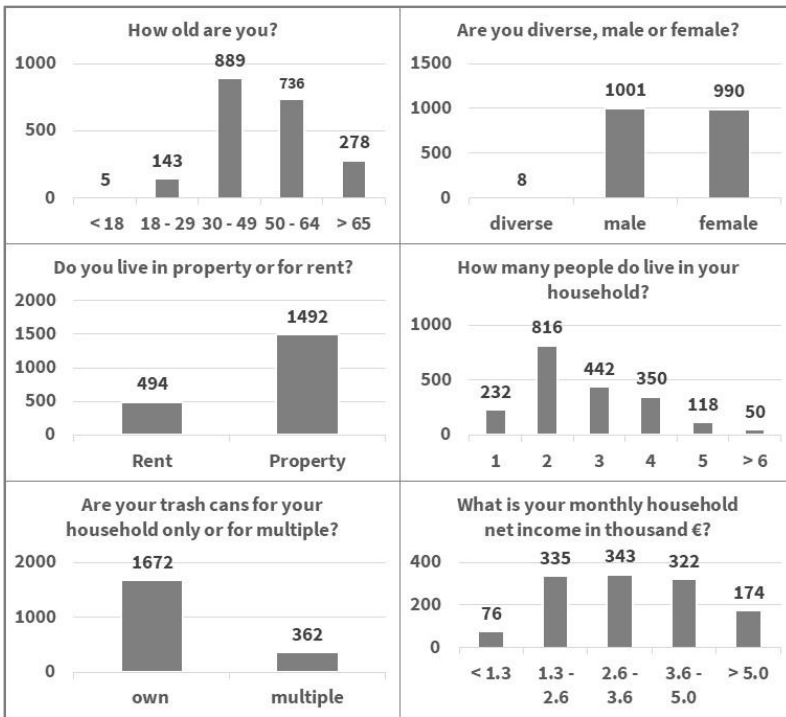


Figure 2: Demographic Data

Our demographic data show that the majority (79.2 %) of the respondents in our sample are between the age of 30 and 65 years. Compared with the German population with only 54 % of the age of 30 to 65 years (Destatis, 2021a, online), we cannot state that our sample reflects the German overall demography in this regard. One reason might be that we only conducted a single online survey.

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51 % of the respondents in our sample are male, while 49 % are female. Compared with the German population, where 49.3 % male and 50.7 % female (Destatis, 2021b, online), there are only slight differences. In that point the survey reflects the German overall demography.

In Germany 55 % of the people live with 2 to 4 people in one household, while 42.3 % are single households (Destatis, 2021c, online). 75 % of the respondents in our sample live in their own property, while 25 % live for rent. In Germany 46.5 % of the households live in their own property (Destatis, 2021d, online).

In our sample 82 % of respondents have their own garbage cans, while 18 % use collection bins for several households. That nearly covers the proportion of own property and for rent. The net income is almost equal distributed (Fig. 2).

However, it is clear that people only participated in this survey when they had an issue with our topic and felt comfortable with using a digital device. That explains the age distribution and the own property rate of the respondents. One conclusion of the survey for Germany is that the waste disposal service quality is much more important for people when they live in their own property and use their own garbage cans.

5 Analysis

The assessment of the measurement and structural model follows Hair et al. (2021). We use the bootstrapping function with 10,000 samples and assess convergent, composite and discriminant validity. The item loadings of all our reflective constructs are satisfactory, i.e. above the recommended threshold of 0.7.

Afterwards, we assess the Cronbach`s Alpha (α), the composite reliability (ρ) and the average variance extracted (AVE). All values are satisfactory and above the recommended thresholds.

From our results (Table 3), we can see that all our reflective constructs meet the thresholds for Cronbach's alpha, composite reliability and the average variance extracted (AVE). The ACE for the construct "Waste Disposal Performance" is slightly below the threshold, but we kept the construct, as all other criteria were met.

Furthermore, we checked the variance inflation factor (VIF) of each item. With all values less than 5 and many of them less than 3, all values are satisfactory.

Next we check the Heterotrait-Monotrait Ratio (HTMT). Values higher than 0.9 indicate a lack of discriminant validity (Henseler et al., 2015; Hair et al. 2021). All our constructs have a HTMT less than 0.9 and we therefore do not assume any issues with discriminant validity.

Table 3: Construct Reliability

Latent Variable	Item	Internal Consistency Reliability	
		Composite Reliability	Cronbach`s Alpha
		> 0.7	0.6 - 0.9
Price Performance Ratio	PPR_1	0.911	0.852
	PPR_2		
	PPR_3		
Waste Disposal Performance	IMA_2	0.860	0.814
	IMA_3		
	PER_2		
	PER_3		
	PER_4		
	PER_5		
	PER_6		
	PER_7		

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Latent Variable	Item	Internal Consistency Reliability	
Service Hotline Performance	SER_1	0.897	0.840
	SER_2		
	SER_3		
	SER_4		
Satisfaction	SAT_1	0.901	0.853
	SAT_2		
	SAT_3		
	SAT_4		

Table 4: Construct Validity

Latent Variable	Item	Convergence Validity		Discriminant Validity	
Price Performance Ratio		OLoadings	VIF	AVE	HTMT Value = 1
		> 0.7	< 5 ; < 3	> 0.5	
	PPR_1	0.893	2.777		
	PPR_2	0.829	1.644	0.773	NO
	PPR_3	0.913	3.019		
	IMA_2	0.576	1.339	0.436	NO
	IMA_3	0.735	1.581		

Latent Variable	Item	Convergence Validity		Discriminant Validity	
Waste Disposal Performance	PER_2	0.566	1.254	0.690	NO
	PER_3	0.633	1.529		
	PER_4	0.669	1.601		
	PER_5	0.668	1.533		
	PER_6	0.723	1.680		
	PER_7	0.689	1.696		
Service Hotline Performance	SER_1	0.899	2.956	0.697	NO
	SER_2	0.890	2.884		
	SER_3	0.900	3.071		
	SER_4	0.592	1.198		
Satisfaction	SAT_1	0.837	2.651	0.697	NO
	SAT_2	0.739	1.405		
	SAT_3	0.856	2.244		
	SAT_4	0.898	3.433		

Next, we evaluate the structural model by looking at the significance and size of the path coefficients. Our model explains 72.7 % of the variance in customer satisfaction (Fig. 1) and the construct “Waste Disposal Performance” has the highest importance in explaining the satisfaction with total effects of 0.373 and performance value of 77.040 (Fig. 3).

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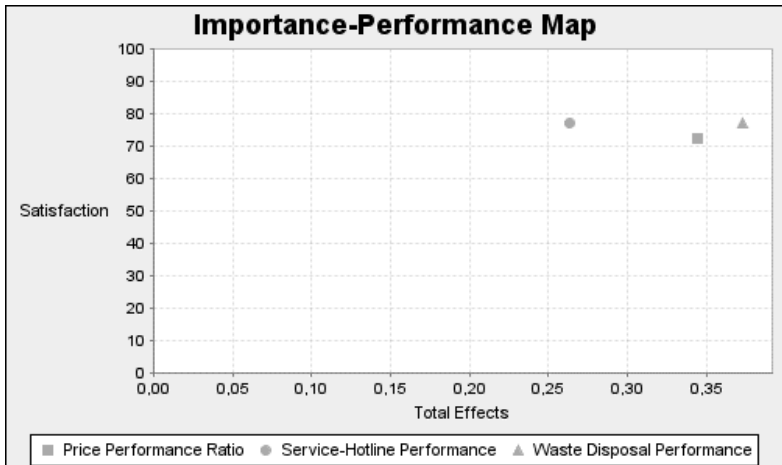


Figure 3: Importance - Performance Analysis

6 Discussion and Conclusion

Our results show that the newly developed construct – that had previously been developed in a pre-study with the help of expert interviews – is the most important driver in our model of waste disposal service satisfaction. This is an interesting result, as research within the public sector is generally scarce to the authors' best knowledge. This results further shows the relevance of applying and adapting well-known models from the marketing literature to researching the services of general interest.

Altogether, with our model, we show that the construct "Waste Disposal Performance" is the most important driver of satisfaction with waste disposal services in our sample. This means that especially the perceived reliability of the waste disposal service is the most important element. Reliability is here meant as the security that the waste will always be picked up at the announced day and that the company will work clean. That is shown in the most important item IMA_2 with a total effect of 0.102 and an item performance of

95.005. The most important item can be explained by the fact that companies can only reach the expectations of the households with great logistic planning.

Our results show that we can confirm our expectations gained from the expert interviews. Only in the case that garbage will not be picked up as mentioned, consumers/households are likely to become unsatisfied. On a similar note, the garbage will not be picked up, when the waste disposal logistic is faulty. The fact that the most important driver for satisfaction is the reliability of the company, further confirms this assumption.

7 Implications for Research and Policy

With our study, we found new proven knowledge for political and scientific discussions of privatization or municipalisation of services of general interest. The results show, that it is not only the price that should play a role in the decision making process in public announcements. Our outcomes can help public institutions in defining the conditions of announcements more precisely. Last but not least, management decisions in the waste disposal companies can be made under better information. Management can figure out now what process changes and structural investments will have the highest impact on the customer's satisfaction in combination with changing costs instead of only being concerned about the costs and hoping for any impact. Future research is needed in order to further validate the results of this study. It would be interesting to see the satisfaction levels of households in various European countries, for example in order to substantiate the findings and allow for the development of European-wide policies that also address recyclable waste policies in terms of the circular economy.

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