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Building trust: the importance of democratic legitimacy in the formation of consumer attitudes toward drinking water

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Abstract

This study aimed to explore the role of democratic decision legitimacy in the formation of consumer attitudes toward drinking water. Using consumer-level data on the decision to change the drinking water sources in two Swedish cities, three core sets of variables were constructed: (1) the overall democratic decision legitimacy, defined as the citizens' support for the decision; (2) the input, throughput and output dimensions of decision legitimacy, representing the citizens' perceived opportunity to provide input, their ability to oversee, as well as their level of satisfaction with the outcome of the decision-making process; and (3) consumer attitudes toward drinking water, comprising trust, risk perception and acceptance. The results of the study provide support for the proposed mechanism that consumers that perceive a decision-making process more positively also tend to support the ultimate decision more, which in turn helps to establish more positive consumer attitudes towards their drinking water. Consequently, democratic legitimacy is an important precursor for building trust. This is particularly important if a waterborne outbreak has negatively impacted consumers' trust in their water, and when political and engineering decisions must be made.

Keywords: Consumer attitudes; Decision-making process; Drinking water; Legitimacy; Risk perception; Trust

Introduction

The legitimacy of a government and its decisions is a core concept in understanding the relation between government and the governed (i.e., the citizens). In broad terms, democratic legitimacy can be separated into three dimensions: input, throughput and output legitimacy, which are attached to

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different stages in the decision-making and policy implementation process (Bekkers & Edwards, 2007). From a citizens' perspective, input legitimacy in decision-making processes refers to the opportunity for citizens to influence the process (Bekkers & Edwards, 2007; Schmidt, 2013). Throughput legitimacy concerns the use of procedures in the decision-making and policy implementation process, to move the process from input to output. In terms of political accountability, it relies heavily on the transparency of these procedures, thus on the quality and quantity of information about the decision-making process available to the citizens. Once the decision is taken (and/or the policy is implemented), the outcomes of the process become relevant, in particular whether or not the affected citizens are satisfied. Hence, output legitimacy is a measure of how the outcome of a process is received by citizens and can be viewed as the degree of citizen satisfaction with the results of a decision-making process.

Increasing demands from society, the 'mediatisation' of politics, and the rapid development and increasing popularity of new social media have arguably increased the need for support for individual governmental decisions, rather than merely for the government in its entirety (Mazzoleni & Schulz, 2001; Saward, 2010). Government entities have tried to increase their legitimacy and the legitimacy of their practices by increasing citizen participation in governmental decisions, for instance by introducing and encouraging platforms for discussion between the government and its citizens (Carpini *et al.*, 2004) and by organising referenda (Michels, 2011).

The level of citizen trust in local government institutions, as well as in their decisions and the outcomes of those decisions, is a key aspect of political science (Levi & Stoker, 2000; Grimmelikhuijsen, 2010). Although trust in local institutions is heavily intertwined with general political trust (which seems to be more based on national politics than on local politics), the outcomes of local policy can be important for building trust in local policy outcomes and local government institutions (Heise, 1985; Fjeldstad, 2004). Similarly, the democratic legitimacy of local governments and their decisions has been studied in various contexts (Bekkers *et al.*, 2007), including in the waste water sector (Lieberherr, 2016). Most of these studies have an institutional rather than citizen focus and – in terms of the production, distribution and provision of drinking water – the democratic legitimacy of local government entities (and particularly their decisions) has not been well studied or understood. Related research in the drinking water sector has focused on determining which factors establish trust in drinking water and its producers among its consumers, and the relation between trust levels and the perception of drinking water related risks among consumers (De França Doria, 2010; Bratanova *et al.*, 2013). While many factors have been tested, with varied results in different settings (Dolnicar *et al.*, 2011), the democratic legitimacy of decisions made by local governments and water producers concerning drinking water has so far not been considered, though Delli Priscoli (1976, 2004) has studied and argued for the importance of civic participation in decision-making in the water sector for decades.

Domenech & Sauri (2010) found that improvement of consumer knowledge about the technological aspects of drinking water provision reduces the risk of social refusal of new technology; additionally, they concluded that public authorities and implementers of new technology need to build trust among residents in a new governance network in the case of decentralisation and/or implementation of new, alternative water supply systems. Hartley (2006) described five themes that are found to be essential to building public confidence in water resources management and decision making: managing information for all involved stakeholders; maintaining individual motivation and demonstrating organisational commitment; promoting communication and public dialogue; ensuring a fair and sound decision-making process and outcome; and building and maintaining trust. The findings of Hartley (2006) and Domenech & Sauri (2010) show that stimulating communication and an open, public

dialogue, ensuring fair and sound decision-making, as well as improving consumer knowledge, helps to build consumer trust. These concepts are strongly related to the establishment of democratic legitimacy.

As in many other high income countries, the supply of drinking water to consumers in Sweden is a co-production of public and semi-public or private institutions (Seppälä *et al.*, 2001). Decisions about water production and distribution are taken by municipalities, while production and delivery to consumers is carried out by local water utilities (Seppälä *et al.*, 2001). In the discourse on democratic legitimacy and citizen trust, a higher level of policy legitimacy is usually believed to help build citizen trust (Føllesdal, 2006; Font & Blanco, 2007), as well as institutional legitimacy for the authorities responsible for the practices concerned (Mondak, 1992). Higher levels of citizen trust, by contrast, are believed to contribute to the establishment of institutional legitimacy, i.e. the belief among citizens that institutions or officials have the right to govern them (Goldsmith & Harris, 2012).

So far, studies on legitimacy conducted in the field of drinking water have focused on higher governance levels, usually choosing topics from supranational or intergovernmental policies or institutions (e.g. Dellas, 2011) and/or institutional legitimacy rather than policy legitimacy (Wang & Ching, 2013). Unlike in certain other fields, policy legitimacy at a local level, especially in combination with its alleged impact on trust, has not been studied.

This study aims to answer the question of whether the perceived levels of democratic legitimacy for the change of water source used for drinking water supply among citizens in two neighbouring cities affect their trust in drinking water quality and in related institutions in these cities. It is hypothesised that not just the overall perceived levels of democratic legitimacy of the decision as such, but also the perceptions of the various separate aspects (input, throughput and output legitimacy) influence trust levels among citizens. More specifically, the expectation is that higher levels of perceived democratic legitimacy – be it overall, input, throughput or output legitimacy – help build trust among citizens in drinking water quality, drinking water producers and decision-makers. Although a case study, the outcomes of this study can be generalised to provide water producers and decision-makers with valuable insights into how the perceived legitimacy of their practices might affect trust levels among citizens, and possibly how improving legitimacy can help build higher levels of trust.

Material and methods

The main premise of this study was to assess the influence of the democratic legitimacy of important decisions related to drinking water, with the aim of improving consumer perceptions of drinking water. Overall democratic legitimacy, in terms of citizen support for the decision to change the drinking water sources in the cities of Falun and Borlänge in Sweden, was investigated. A representative selection of citizens were interviewed by telephone during 2014. Details of the study are described below.

Falun and Borlänge

The supply of drinking water to consumers in Sweden is mostly a co-production of public and semi-public institutions. Decisions about water production and distribution are taken by municipalities, while production and delivery to consumers is carried out by local water utilities.

Falun and Borlänge are two similarly sized and neighbouring municipalities in central Sweden. The number of inhabitants in the municipalities is almost 57,000 in Falun and about 50,000 in Borlänge. In

2008 a decision was made to change the raw water sources for Falun and Borlänge. Increased risk of contamination of the raw water source, old water treatment plants and the lack of reserve water in case of a contamination event led to the decision.

In August 2013, consumers in Borlänge received new drinking water from a newly built ground water treatment plant. Previously, Borlänge received drinking water from an older ground water treatment plant in the city. At the time of this survey, Falun was still using their surface water source. It should be mentioned that in 2010 the water in Falun was awarded a prize for the best tasting water in Sweden, in competition with 130 municipalities.

Variable definitions and survey

Three core sets of variables are included in this analysis:

- the overall democratic legitimacy;
- the set of input, throughput and output legitimacies;
- consumer perceptions of trust, risk perception and acceptance.

Overall democratic legitimacy was defined as the level of citizen support for the decision to change the drinking water sources in Falun and Borlänge. This citizen support was measured and validated. Firstly, consumers were asked whether they supported the decision to change their water source. Secondly, consumers were asked whether they felt that the decision served both the wishes and interests of the majority of the citizens/consumers in their city (as a more sociotropic assessment/perception of the overall support in the region). At the same time, more specific citizen perceptions of the decision-making process were measured, divided into input, throughput and output legitimacy. Input legitimacy was defined as the citizens' perceptions of their opportunities to provide input into the decision-making process. Throughput legitimacy was defined as the citizens' perceptions of their opportunities to influence the design of the decision-making process (including their opportunities for an active role in this process, as well as their ability to acquire insight in the process). Finally, output legitimacy concerned the level of citizen satisfaction with the outcomes of the decision-making process as a whole.

The dependent variables were consumer attitudes to drinking water, namely: trust in drinking water; risk perception; and acceptance. The trust variable deals with the respondents' faith in the intentions of the involved institutions. Having faith in the intentions of others is often marked as 'social trust' or 'inter-personal trust'. However, as we are dealing with institutions here, we therefore stay close to the term 'consumer trust', as we are not directly interested in generalised trust levels but rather the more specific levels of trust existing in consumers with regard to their drinking water institutions. The indicator risk perception is limited to the mere assessment made by consumers about the risks involved with drinking their drinking water (cf. Sjöberg, 2000). Consumer acceptance deals with the acceptance of changes, risks and risk measures connected to drinking water.

A survey was established to measure the three core sets of variables (see Supplementary Material for further details, available with the online version of this paper). A representative selection was made of inhabitants receiving municipal drinking water and these individuals were interviewed via telephone by professional interviewers during the spring of 2014. The age range of consumers was 18 to 80 years. The survey was conducted by a survey company and resulted in 2,872 completed interviews of consumers in Falun and Borlänge. The average non-response rate for the relevant questions for the premise of this study was 11.6%, ranging from 0.1–21.7% per question.

Hypotheses

The main aim of the study was to assess the role of the democratic legitimacy of important drinking water related decisions in the formation of consumer perceptions of drinking water. The idea was that more positive citizen perceptions of an important decision-making process should contribute to the overall citizen support for the decision, which in turn was expected to contribute to building trust in drinking water and improving other consumer perceptions of drinking water. The study hypotheses were as follows:

1. Higher levels of perceived democratic legitimacy of the decision to change the source water in Falun and Borlänge among affected citizens are associated with higher trust among these citizens in their drinking water quality, as well as in the producers and the authorities responsible for drinking water production and distribution.
2. Higher levels of perceived input, throughput and output legitimacy of the decision to change the source water in Falun and Borlänge among the affected citizens are associated with higher social trust among these citizens in their drinking water quality, as well as in the producers and the authorities responsible for drinking water production and distribution.

Statistics

We argued that the three core sets of variables are strongly correlated. Ordinary Least Squares (OLS) regression analysis was used to test the strength of the correlations, their direction and their significance. This was done both for separate indicators and for the constructed variables. For a more thorough examination of the correlations between our core variables, zero-order and partial correlations were analysed.

The linearity of the correlations and the distribution of variables and indicators were examined visually using scatter plots and histograms, respectively. When more than one independent variable was concerned, the variables were tested for the presence of multicollinearity. No apparent multicollinearity issues were observed for any of the indicators and variables included in the analyses of this study. The homoscedasticity of the error terms was controlled using the Breusch-Pagan/Cook-Weisberg test. No heteroscedasticity problems were detected.

Most of the variables included in this study are Likert-scales, composed of self-reported survey responses, and ordinal in nature. Despite the high number of responses, and the fact that it is not uncommon for social science studies to use parametric statistical tests of Likert-scale variables, the data technically violate the assumptions of most parametric tests. Therefore, the results of the used parametric analyses were verified with non-parametric equivalents wherever possible, i.e., ordinal logistic regression for OLS regression analyses, Spearman's Rho/Kendall's Tau for the Pearson correlation analyses, and Mann-Whitney U tests for the unpaired t-tests. Since no meaningful differences arose from these verifications, the parametric results are reported for the sake of interpretation.

Results

In general, the consumer perceptions of drinking water appear positive in both Falun and Borlänge as shown in Table 1. In Borlänge, where the water source had already been changed at the time of the

Table 1. Descriptive statistics for the core sets of variables.

Indicator		Mean	Std Dev.	N	Difference	SE	p
Trust	Total	4.24	0.669	2,463	0.21	0.03	≤0.001
	Borlänge	4.34	0.623	1,254			
	Falun	4.13	0.697	1,209			
Risk perception	Total	1.42	0.684	2,783	−0.21	0.03	≤0.001
	Borlänge	1.32	0.583	1,408			
	Falun	1.53	0.760	1,375			
Acceptance	Total	4.26	0.653	2,828	0.33	0.02	≤0.001
	Borlänge	4.43	0.561	1,428			
	Falun	4.10	0.698	1,400			
Legitimacy	Total	3.54	0.969	2,155	0.08	0.04	0.063
	Borlänge	3.58	0.986	1,057			
	Falun	3.50	0.951	1,098			
Input legitimacy	Total	2.72	1.150	2,394	0.12	0.05	0.009
	Borlänge	2.78	1.171	1,177			
	Falun	2.66	1.126	1,217			
Throughput legitimacy	Total	2.86	1.050	2,302	0.09	0.04	0.037
	Borlänge	2.91	1.075	1,137			
	Falun	2.82	1.024	1,165			
Output legitimacy	Total	3.68	1.228	2,566	0.04	0.05	0.431
	Borlänge	3.66	1.255	1,247			
	Falun	3.70	1.201	1,319			

Std dev. = Standard deviation; N = Sample size; SE = Standard Error; p = probability value (p-value).

survey, consumers rated their satisfaction with their current drinking water at 4.9 out of 5, with 94% of the respondents fully satisfied with their tap water (5 out of 5). In Falun, the water was rated 4.6, and 73% of the respondents were fully satisfied. Less than 7% of the respondents would prefer potable water from a private well over the municipal drinking water and 6.7% of the respondents were concerned about becoming sick by consuming their tap water. In Falun, more people would prefer their own well and more people were concerned over falling ill by drinking water consumption than in Borlänge. On average, the drinking water perceptions of consumers in Borlänge were significantly more positive than in Falun (0.21–0.35; $p < 0.001$).

Less than 46% of the respondents from Borlänge believe (in retrospect) that the decision to change the water source was a good decision, regardless of the positive perceptions of the current drinking water in Borlänge. In Falun, almost 50% of the population were positive about the future change of their water source. Overall, nearly 54% of the respondents supported the decision to change their water source, while 11.5% explicitly did not support this decision. Respondents supporting the decision were significantly less likely to share their opinions with the authorities (Beta coefficient (B) = −0.313; $p < 0.001$).

Input legitimacy (the degree of opportunity for citizen participation in a decision-making process) and throughput legitimacy (the transparency of the decision-making and policy implementation process) are both perceived significantly more positive in Borlänge than in Falun. Overall, legitimacy tended to be rated higher in Borlänge as well, but the difference was not significant ($p > 0.05$). For output legitimacy (i.e. how the outcome of a process was received by the citizens), no significant differences were observed between the two municipalities.

In terms of the decision-making process, almost 30% of the respondents feel they were given limited possibility to influence the decision to change the water source, whereas 27.5% of the respondents felt that their interests were sufficiently represented in the decision-making process. In spite of this, 37% of the respondents said that the decision to change the water source was a democratic decision. The reasons for the respondents not sharing their opinion about the decision with the authorities are shown in Figure 1. The younger respondents thought that they did not have the experience to know whether this was a good decision or not and therefore chose not to contact the authorities. Approximately 20% in each age group indicated that they did not know how to make their opinion heard.

In terms of transparency, 16.5% of respondents felt that they had insight in the decision-making process, and almost 28% agreed that the authorities have fully informed them about the decision. Almost half of the respondents (more than 45%) felt that the authorities did not fully inform them about the decision. Respondents reported that their main source of information about the change of water source was newspapers (see Figure 2).

Correlation of consumer perceptions and legitimacy

The consumer perceptions (trust, risk perception and acceptance) of drinking water were strongly correlated with each other ($p < 0.001$); see Table 2. Higher trust was associated with lower risk perception and higher consumer acceptance levels, and lower levels of risk perception were in turn associated with higher levels of acceptance. All legitimacy variables were strongly correlated ($p < 0.001$), with r ranging from 0.44 to 0.79; see Table 2. These correlations were all positive, i.e., a higher level of

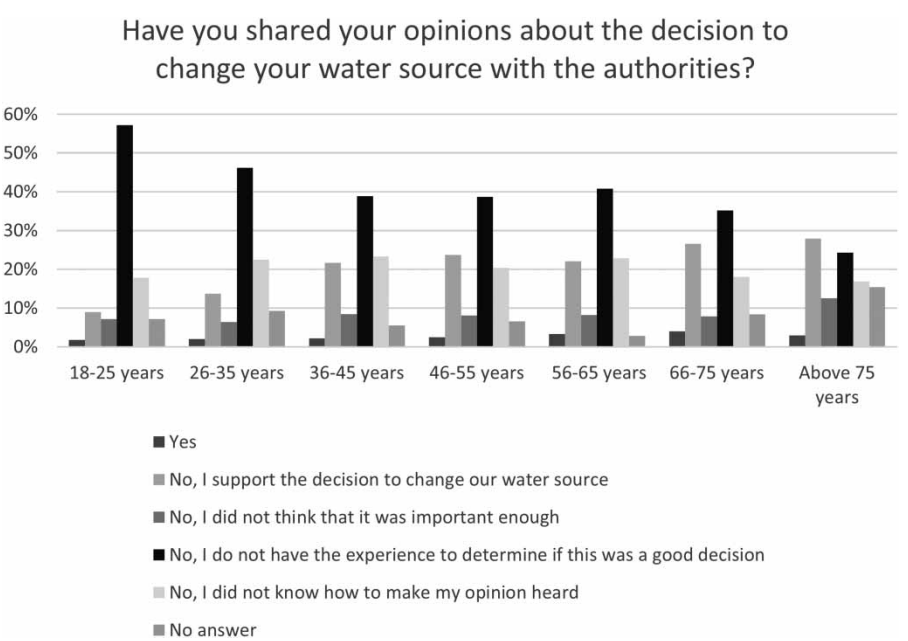

Fig. 1. Reasons for consumers not sharing their opinions about the decision with the authorities. Each age group was assessed separately. Respondents were asked to select one option only.

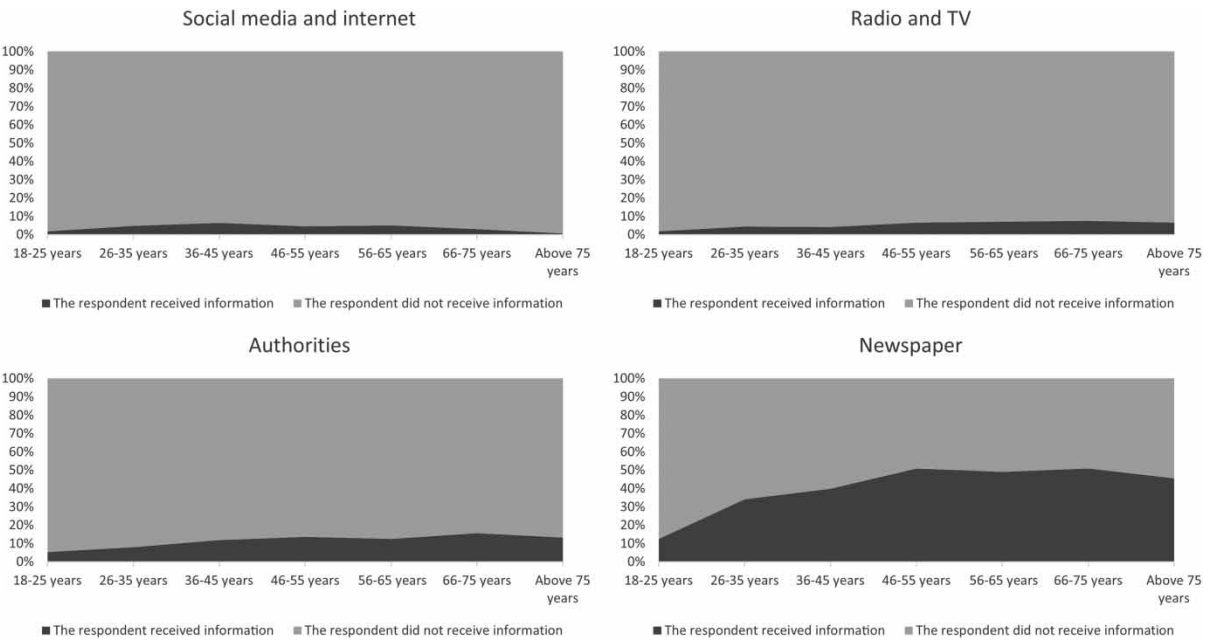

Fig. 2. Respondents were asked where they received information from about the decision to change the water source and could pick as many options as they wanted. Most respondents received their information through newspapers.

Table 2. Bivariate correlations (r) and regression coefficient (B) for consumer perception and legitimacy.

Correlation	Trust × Risk perception	Trust × Acceptance	Risk perception × Acceptance
r	−0.391	0.335	−0.332
B	−0.412	0.326	−0.316
SE	0.020	0.019	0.017
p	0.000	0.000	0.000
Correlation	Legitimacy × Input	Legitimacy × Throughput	Legitimacy × Output
r	0.663	0.680	0.706
B	0.773	0.731	0.877
SE	0.019	0.017	0.019
p	0.000	0.000	0.000
Correlation	Input × Throughput	Input × Output	Throughput × Output
r	0.793	0.451	0.441
B	0.738	0.479	0.510
SE	0.012	0.020	0.022
p	0.000	0.000	0.000

r = Bivariate correlation (Pearson's correlation coefficient); B = Regression coefficient; SE = Standard Error; p = probability value (p-value).

perceived input legitimacy was associated with higher levels of perceived output legitimacy. This indicates that more positive perceptions of certain aspects of the decision-making process (such as perceived transparency, honesty and quality) are associated with more positive perceptions of the decision-making process as a whole, as well as with more positive perceptions of (and more support for) the decision itself. Also, it indicates that positive perceptions of certain aspects of the process are correlated with each other. Hence, consumers perceiving the process as more transparent tended also to have more positive perceptions of their opportunities to influence the process and the decision. This notion is supported by the regression results of the individual indicators. When correcting the correlations between the input and throughput legitimacy variables for the output legitimacy variable, the strength of the correlation decreases, but the correlation remains significant. The same applies to correcting the correlation between input and output legitimacy for throughput legitimacy, as well as to correcting the correlation between throughput and output legitimacy for input legitimacy.

Regression analyses consumer perceptions and legitimacy

This study finds that, in Falun and Borlänge, the consumer perceptions (trust, risk perception and acceptance) are strongly correlated with the perceived democratic legitimacy of the decision-making process and the decision to change the drinking water source in the towns; see Table 3. The strongest correlations are observed for the trust levels among consumers. For each unit increase in overall legitimacy, consumer trust increased on average 0.18 units (3.6%). This means that, on average, reported trust levels among consumers in Falun and Borlänge are 14% higher for consumers with a democratic legitimacy perception of 5, than for those with a democratic legitimacy perception of 1.

Throughput legitimacy was observed to have the strongest correlation with consumer trust (B = 0.197); see Table 3. Consumers perceiving the transparency and correctness of the decision-making process more positively were found to express higher levels of trust in their water and those responsible for

Table 3. Regression coefficients for consumer perceptions and legitimacy.

		Trust	Risk perception	Acceptance
Legitimacy	r^2	0.071	0.006	0.025
	B	0.181	−0.057	0.106
	SE	0.015	0.016	0.014
	p	**0.000**	**0.000**	**0.000**
Input legitimacy	r^2	0.083	0.007	0.024
	B	0.167	−0.051	0.089
	SE	0.012	0.012	0.012
	p	**0.000**	**0.000**	**0.000**
Throughput legitimacy	r^2	0.097	0.005	0.018
	B	0.197	−0.048	0.083
	SE	0.013	0.014	0.013
	p	**0.000**	**0.001**	**0.000**
Output legitimacy	r^2	0.020	0.000	0.003
	B	0.075	0.000	0.028
	SE	0.011	0.011	0.011
	p	**0.000**	**0.976**	**0.009**

r^2 = coefficient of determination; B = Beta coefficient; SE = Standard Error; p = probability value (p-value).

their water. Similarly, consumers more positive about their opportunities to influence the decision to change the water source in Falun and Borlänge tend to express higher levels of trust (B = 0.167). To a lesser extent, the same applies for consumers that are more satisfied with the decision to change the water source (B = 0.075). While the correlations found for legitimacy and risk perception are mostly significant, these correlations are weaker. For each unit increase in overall legitimacy, perceived risks among consumers decreased with 0.06 units (1.2%). The range of the effect found in this study is thus lower than 5%. Similar patterns are observed for input and throughput legitimacy. For output legitimacy (i.e., consumer satisfaction with the outcomes of the decision-making process), the (positive) correlation was statistically insignificant. Moderately strong, significant correlations were found between all legitimacy variables and consumer acceptance; see Table 3. For overall legitimacy, the regression coefficient exceeds 0.1 (2%); for the other legitimacy variables the regression coefficients are consistently lower than that. The weakest (and least significant) effect was observed for output legitimacy (B = 0.028).

Comparison between Falun and Borlänge

Overall, the correlations described in this study are highly comparable and consistent among the consumer samples in Falun and Borlänge. For the output legitimacy correlations, however, interesting differences were found between the samples. In the aggregated sample (combined data from Falun and Borlänge), output legitimacy showed the weakest correlation with consumer perception variables; see Table 3. For output legitimacy and risk perception, no significant correlation was observed. When comparing the output legitimacy correlations found in the Falun and Borlänge samples, it was observed that the correlation with trust is similar for both samples (B = 0.078 and B = 0.073 for Falun and Borlänge, respectively); see Table 4. For consumer acceptance, however, the correlation was significant in the Borlänge sample (B = 0.056; $p < 0.001$), but not in Falun (B = 0.003; $p = 0.849$). Risk perception, finally, was not found to be significantly correlated with output legitimacy in the aggregated sample, while it was found to have a moderately significant ($p = 0.054$) positive correlation in Falun and a significant ($p = 0.007$) negative correlation with output legitimacy in Borlänge.

Table 4. Regression coefficients for output legitimacy and consumer perception for Falun and Borlänge.

			Trust	Risk perception	Acceptance
Output legitimacy	*Falun*	r^2	0.018	0.003	0.000
		B	0.078	0.035	0.003
		SE	0.017	0.018	0.016
		p	**0.000**	**0.054**	**0.849**
	Borlänge	r^2	0.023	0.006	0.016
		B	0.073	−0.036	0.056
		SE	0.014	0.013	0.012
		p	**0.000**	**0.007**	**0.000**
	Total	r^2	0.020	0.000	0.003
		B	0.075	0.000	0.028
		SE	0.011	0.011	0.011
		p	**0.000**	**0.976**	**0.009**

r^2 = coefficient of determination; B = Beta coefficient; SE = Standard Error; p = probability.

Most probably this is due to the fact that, at the time of the survey, the drinking water source in Falun had not yet been changed, while in Borlänge, it had. Since the risk perception variable relates strongly to the consumers' current drinking water, theoretically, an opposite mechanism could be expected in Falun and Borlänge. When consumers are satisfied with the decision that their drinking water source is changed, it is likely that they are less happy with their current drinking water and more positive about their future water. The water in Falun had previously won a prize for the best tasting tap water in Sweden and it was expected that consumers in Falun may have been more reluctant to changing their water. This mechanism is less applicable to trust and acceptance, as these are variables that provide a more general (less specific) perspective, and relate more to the water producers and authorities than to the drinking water itself.

For the correlations of the remaining legitimacy variables (input legitimacy, throughput legitimacy and overall legitimacy) with the dependent variable risk perception, similar (though less prominent) tendencies can be observed; see Table 5. All correlations lose their significance on a reliability level of 95%; even though the negative correlation between input legitimacy and risk perception remained significant on a reliability level of 90% ($p = 0.084$) in Falun. Other than the correlation between output legitimacy and risk perception, no correlations between the legitimacy variables and risk perception change direction (i.e. turn positive) when the Falun sample was compared with the Borlänge and/or the total sample. The lesser significance or insignificance of the correlations between input legitimacy, throughput legitimacy and overall legitimacy on the one hand, and risk perception on the other may be explained by the absence of retrospect for consumers in Falun. In other words, the consumers in Falun are not able to effectively assess the outcomes of the decision-making process (other than the decision itself) since the water source had not been changed at the time of the telephone survey.

Table 5. Regression analysis between output legitimacy and risk perception for Falun and Borlänge.

		Risk perception		
		Falun	Borlänge	Total
Legitimacy	r^2	0.000	0.024	0.006
	B	−0.008	−0.095	−0.057
	SE	0.025	0.019	0.016
	p	**0.752**	**0.000**	**0.000**
Input legitimacy	r^2	0.003	0.013	0.007
	B	−0.034	−0.058	−0.051
	SE	0.020	0.015	0.012
	p	**0.084**	**0.000**	**0.000**
Throughput legitimacy	r^2	0.001	0.011	0.005
	B	−0.029	−0.056	−0.048
	SE	0.023	0.016	0.014
	p	**0.204**	**0.001**	**0.001**
Output legitimacy	r^2	0.003	0.006	0.000
	B	0.035	−0.036	0.000
	SE	0.018	0.013	0.011
	p	**0.054**	**0.007**	**0.976**

r^2 = coefficient of determination; B = Beta coefficient; SE = Standard Error; p = probability value (p-value).

Transparency, support and correctness

From the analyses of two of the components of the legitimacy variables (i.e. transparency and interest representation), a moderately strong and significant negative correlation was observed between risk perception and all tested legitimacy-related consumer perceptions, except for perceived passive transparency. Again, the results for the risk perception variable need to be addressed carefully, due to the two different situations in Falun and Borlänge. The strongest risk perception correlation is observed for the perceived correctness of the decision-making process (B = −0.07); see Table 6. For the other consumer attitudes, the strongest correlations were also found to be with correctness. In general, the other consumer attitudes (trust and acceptance) were more strongly correlated with the legitimacy-related consumer perceptions than risk perception. All trust correlations have regression coefficients larger than 0.1, while the regression coefficients for the acceptance correlations range between 0.027 and 0.097; see Table 6.

None of the correlations between the consumer attitudes and legitimacy-related consumer perceptions were found to be as strong as the correlations between the legitimacy indicators and citizen support, for which the regression coefficients range between 0.299 and 0.553. The strongest correlations with citizen

Table 6. Regression coefficients for transparency, support and consumer perception.

		Citizen support	Trust	Risk perception	Acceptance
Passive transparency	r^2	0.101	0.043	0.001	0.003
	B	0.299	0.106	−0.015	0.027
	SE	0.018	0.010	0.010	0.010
	p	**0.000**	**0.000**	**0.153**	**0.007**
Active transparency	r^2	0.130	0.046	0.002	0.012
	B	0.311	0.100	−0.019	0.049
	SE	0.016	0.009	0.009	0.009
	p	**0.000**	**0.000**	**0.043**	**0.000**
Transparency	r^2	0.145	0.056	0.002	0.009
	B	0.382	0.128	−0.023	0.051
	SE	0.019	0.011	0.011	0.010
	p	**0.000**	**0.000**	**0.041**	**0.000**
Correctness	r^2	0.238	0.121	0.012	0.027
	B	0.553	0.212	−0.070	0.097
	SE	0.021	0.012	0.013	0.012
	p	**0.000**	**0.000**	**0.000**	**0.000**
Interest representation	r^2	0.220	0.074	0.009	0.023
	B	0.448	0.140	−0.050	0.077
	SE	0.017	0.011	0.011	0.010
	p	**0.000**	**0.000**	**0.000**	**0.000**
Influence opportunity	r^2	0.121	0.045	0.002	0.012
	B	0.327	0.108	−0.025	0.054
	SE	0.018	0.010	0.010	0.010
	p	**0.000**	**0.000**	**0.018**	**0.000**
Citizen support	r^2	–	0.026	0.002	0.007
	B	–	0.086	−0.024	0.044
	SE	–	0.011	0.011	0.010
	p	**–**	**0.000**	**0.027**	**0.000**

r^2 = coefficient of determination; B = Beta coefficient; SE = Standard Error; p = probability value (p-value).

support were observed for transparency (B = 0.382), interest representation (B = 0.448), and correctness (B = 0.553). In other words, consumers who ranked their perception of the correctness of the decision-making process 1 unit higher, on average ranked their support for the decision 11% higher. For transparency and interest representation, this was 7.6% and 9%, respectively. Thus, between consumers who indicate that their perception score of the correctness of the decision-making process is 1 and those that indicate it is 5, there is an average difference of 2.20 units (44%) in their support for the decision to change the water source.

These results support the theoretical mechanism proposed in this study, i.e. that consumers perceiving the decision-making process more positively tend to support the ultimate decision more, which in turn helps to establish (better) positive consumer attitudes towards drinking water and those responsible for it. More support for this mechanism is derived from the observation that both citizen support and overall legitimacy themselves were strongly correlated with trust, risk perception and acceptance. Moreover, when assessing and comparing the correlations between legitimacy-related consumer perceptions (e.g., perceived transparency and correctness) and overall legitimacy or citizen support on the one hand, and consumer trust on the other, it can be observed that the correlations between the legitimacy indicators and trust strongly depend on the mediating effect of overall legitimacy/citizen support; see Table 7. Further, the correlations between the legitimacy indicators and overall legitimacy and citizen support are only moderately affected by taking the effect of (prior) trust into account.

The addition of both the trust and legitimacy variables to the above-mentioned analyses does not seem to have an impact on the significance of the overall strong correlations (Table 7). However, the correlation strength generally decreases for the trust correlations when the effect of overall legitimacy is considered. This decrease in correlation strength ranges between 34% and 55%. On the other hand, the correlation coefficients of the legitimacy correlations only drop between 3% and 7% when trust is added to the analysis. Where citizen support alone is considered, a similar pattern can be observed. The respective ranges of observed reduction in correlation strength were then 11–21% and 2–7%.

Supported model

In an attempt to assess the causal chain of the correlations, zero-order and partial correlations were compared (Table 7). This provided an indication of whether consumer perceptions have a stronger influence on legitimacy than legitimacy on consumer perceptions (i.e. a comparison of the relative contributions of one in building the other). Three core sets of variables were included in this analysis: the set of input, throughput and output legitimacy; overall democratic legitimacy; and consumer perceptions (trust, risk perception and acceptance). All three of these sets of variables are strongly correlated. The central premise of the analyses was to see how these correlations held up under the introduction of the impact of the third set of variables. The conclusion is that while the impact of trust/risk perception/acceptance on the correlations between input/throughput/output legitimacy and overall legitimacy is negligible, the impact of overall legitimacy on the correlations between input/throughput/output legitimacy and consumer attitudes is large. While the correlations remain significant, in many cases the strength of the correlations dropped over 50% when the effect of overall legitimacy was added to the model. This indicates that the important chain of effects here is the effect of consumer perceptions of the decision-making on citizen support for the decision; and the effect of this level of citizen support on consumer perceptions of drinking water; see Figure 3.

Table 7. Zero-order and partial correlations.

Correlation	Zero-order		Controlling	Partial		Reduction
Passive transparency × Trust	r	0.212	Legitimacy	r	0.102	0.110
	p	0.000		*p*	0.000	51.89%
Passive transparency × Legitimacy	r	0.474	Trust	r	0.443	0.031
	p	0.000		*p*	0.000	6.54%
Active transparency × Trust	r	0.226	Legitimacy	r	0.103	0.123
	p	0.000		*p*	0.000	54.42%
Active transparency × Legitimacy	r	0.534	Trust	r	0.505	0.029
	p	0.000		*p*	0.000	5.43%
Transparency × Trust	r	0.244	Legitimacy	r	0.119	0.125
	p	0.000		*p*	0.000	51.23%
Transparency × Legitimacy	r	0.561	Trust	r	0.531	0.030
	p	0.000		*p*	0.000	5.35%
Correctness × Trust	r	0.340	Legitimacy	r	0.223	0.117
	p	0.000		*p*	0.000	34.41%
Correctness × Legitimacy	r	0.718	Trust	r	0.693	0.025
	p	0.000		*p*	0.000	3.48%
Interest representation × Trust	r	0.273	Legitimacy	r	0.132	0.151
	p	0.000		*p*	0.000	55.31%
Interest representation × Legitimacy	r	0.669	Trust	r	0.643	0.026
	p	0.000		*p*	0.000	3.89%
Influence opportunity × Trust	r	0.219	Legitimacy	r	0.105	0.114
	p	0.000		*p*	0.000	52.05%
Influence opportunity × Legitimacy	r	0.501	Trust	r	0.471	0.030
	p	0.000		*p*	0.000	5.98%

r = Pearson's correlation coefficient; *p* = probability value (*p*-value).

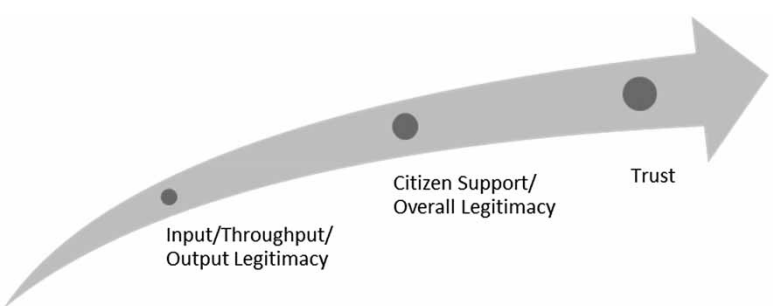

Fig. 3. The supported model: Increased Input/Throughput/Output Legitimacy improves Citizen Support/Overall Legitimacy and Citizen Support/Overall Legitimacy improves Trust which, in turn may lower risk perception and increase acceptance.

Discussion

The results provide support for the theoretical mechanism, proposed in this study, that consumers who perceive the decision-making process more positively tend to support the ultimate decision more, which

in turn helps to establish (more) positive consumer attitudes towards drinking water and those responsible for producing and providing it to the consumers.

This study indicates that more positive perceptions of certain aspects of the decision-making process (such as perceived transparency, honesty and quality) are associated with more positive perceptions of the decision-making process as a whole, as well as with more positive perceptions of, and more support for the decision itself. Also, this study indicates that positive perceptions of certain aspects of the process are correlated with each other, one relevant example being that consumers perceiving the process as more transparent also tend to have better perceptions of their opportunities to influence the process and the decision too. Between consumers who indicated that their perception score of the correctness of the decision-making process was 1, and those that indicate it as 5, there is an average difference of 2.20 (44%) in their support for the decision to change the water source. The results are in accordance with the findings of Delli Priscoli (2004), Hartley (2006) and Domenech & Sauri (2010). They show that stimulating communication, civic participation and an open, public dialogue, ensuring fair and sound decision-making, as well as an improvement of consumer knowledge, helps to build trust among consumers.

This study shows that respondents supporting the decision were significantly less likely to share their opinions with the authorities. Consequently, this indicates that it is more likely that a consumer contacting the authorities disapproves of the decision. This underlines the importance of meeting the information needs of worried, concerned or disapproving consumers. Consumers also need to know how to share their opinions with the authorities. Approximately 20% of the respondents in each age group indicated that they did not know how to make their opinion heard. In terms of transparency, 16.5% of the respondents felt they had insight into the decision-making process, and almost half of the respondents felt that the authorities had not fully informed them about the decision, indicating the importance of finding the right channels to communicate the information. Respondents report that their main source of information about the change of water source was newspapers. In 2014 when the survey was fielded, the use of social media may have been lower than it is today, particularly in the older age groups which showed more interest in the decision-making process than younger residents of the cities. Also, disseminating information via social media could help to involve younger citizens in decision-making processes (Loader *et al*., 2014). This should be considered to be of particular importance by the authorities, as negative news could spread very quickly via social media even if the information is inaccurate or 'fake' (Törnberg, 2018). Social media users can therefore be considered a particularly important target group from which to obtain legitimacy.

Domenech & Sauri (2010) found that improvement of consumer knowledge about technological aspects of drinking water provision reduces the risk of social refusal of new technology. Additionally, they also concluded that public authorities and implementers of new technology need to build trust among residents in the new governance network in case of decentralisation and/or implementation of new, alternative water supply systems. The results from this study indicate that younger respondents felt they did not have the experience to know if the decision was good or bad and therefore chose not to contact the authorities about the decision.

The strongest influence on consumer perceptions of water quality is, according to De França Doria (2010), represented by organoleptic features, particularly taste of the water. According to a study by Wright *et al*. (2012), perceived drinking water risks are primarily related to organoleptic features (taste, odour and clarity) rather than socio-economic or demographic factors. This may, to some extent, explain the reluctance of consumers in Falun to change their water source, as the water in Falun had previously won the prize for the best tasting tap water in Sweden.

A limitation of this study is that its observational nature did not allow for a thorough investigation of potential social psychology mechanisms underlying the citizens' need for insight and involvement in the

decision-making process. Further research is also needed to determine whether support for important decisions such as the change of a water source are driven by heuristics such as negativity biases (Tversky & Kahneman, 1974) and/or loss aversion (McGraw *et al.*, 2010). For example, it could be hypothesised that the consumers in Falun were less supportive of the change of water source due to the projected, potential loss of their award-winning drinking water.

While it is theoretically more plausible that positive perceptions of decision-making processes and support for decisions precede increased trust and more positive consumer perceptions of drinking water in general, it could also be argued that: higher levels of consumer trust (in drinking water producers) have a positive impact on how consumers perceive decisions and decision-making processes; that lower levels of risk perception decrease the perceived need for consumers to influence decisions or decision-making processes, or even to have insight into these processes; and that higher levels of consumer acceptance affect the needs and demands of consumers when it comes to having influence and insight. Our reasoning is that these correlations form a more or less circular pattern (satisfaction with decisions and decision-making processes leads to improved consumer perceptions, which in turn may increase initial support for the decisions and decision-making processes of the institutions that citizens are now more positive about), but it is hard to argue for this idea with the currently available data. More research is required to explore this idea further.

This study has not dealt with the complex question of the co-production of drinking water between public and semi-public or private institutions. It is, however, of importance for the continued investigation of legitimacy within the water sector. Decisions about water production and distribution are taken by municipalities, while specialist local level entities deal with the practice of producing drinking water and distributing it to the consumers (Seppälä *et al.*, 2001). In Sweden, nearly all public water production and distribution of drinking water, as well as sewage management, are run as natural monopolies. This means that water and sewage services are financed by municipal tariffs (i.e. not taxes), which are set by each municipality. While municipalities are at the very least directly accountable for their performance through regularly held local elections, semi-private and private organisations can almost never be held directly accountable for their actions. Instead, the municipalities carry the political responsibility for the practices of such organisations, and consequently only an indirect accountability relationship exists between citizens and the semi-private or private structures, namely through the responsible municipality (Kay, 1996). This fits into a common field of tension caused by the need for competence in dealing with increasingly complex policy issues, such as drinking water production and provision. This competence is provided by administration not politics, and this poses a challenge to the legitimacy of these municipalities, as well as of their decision and their (outsourced) utilities (Majone, 1999) – which may be even more applicable when it concerns health-sensitive topics such as drinking water provision (Gilson, 2003; Ogden & Clarke, 2005). This study provides support for the idea that direct and deliberative democracy initiatives – involving citizens in the decision-making process – can help to combine competent and legitimate decision-making, potentially benefiting water safety, authorities and citizens alike.

Conclusions

The main premise of this study has been to assess the contribution of the democratic legitimacy of key decisions in improving consumer perceptions of drinking water. The study demonstrates that overall legitimacy, input legitimacy, throughput legitimacy and output legitimacy are strongly correlated with

consumer attitudes (trust, risk perception and acceptance). Additionally, the democratic legitimacy of important water related decisions seems an important precursor for building trust, which in turn may lower risk perception and increase acceptance.

Although a case study, the outcomes of this study can be generalised to provide water producers and decision-makers with valuable practical advice and guidance for water related decisions:

- An open public dialogue should be stimulated and consumers should be clearly informed on how to make their opinion heard. Respondents reported that their main source of information about the change of water source was from newspapers, and almost half of the respondents felt that the authorities had not fully informed them about the decision, so clearly the channels where information is distributed to consumers should be chosen carefully.
- Clear and properly disseminated information helps to involve citizens in the decision-making process, improving their appreciation of the eventual decision and, in turn, improving their attitudes to the drinking water.
- Respondents who support a decision are significantly less likely to share their opinions with the authorities. Therefore, it is important to prepare material that will meet the concerns of all consumers, especially worried, concerned or disapproving consumers.

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