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Drinking Water Service Delivery Choices in Poland: Empirical Analysis of Impact Factors

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ABSTRACT: This paper focuses on poli-organisational governance structures in which local governments provide services in the drinking water sector. A set of hypotheses was developed relating to the choice between in-house, corporatized, or externalised service delivery. The empirical evidence was based on long term socio-economic factors at local government levels in Poland. Local Polish government constitutes a highly decentralised system which features a wide range of service delivery governance arrangements. This is the first systematic attempt to investigate the different types of water service delivery in this environment. The model was tested using quantitative tools created on statistical variables, and by a survey of 1089 municipal representatives. The research findings provide insight into a set of context variables which describe the conditions under which local officials keep the service in-house, and the conditions that incline local authorities to engage public or private agents. The survey questionnaire allowed us to identify 15 different arrangements for drinking water supply delivery. The research findings provide evidence that the likelihood of in-house provision of water services is determined by the size of the local government, the abundance of the environment, the level of modernisation, and the locality's financial self-management.

KEYWORDS: Service delivery modes, local government, water services, drinking water provision, Poland

INTRODUCTION

Provision of drinking water is a matter of general economic interest (Wollmann, 2016). The quality and efficiency of its delivery is always the responsibility of public organisations, even if water services are operated by a private sector organisation. In the literature, there is a general debate on the efficiency of public versus private sector in terms of water service delivery; the debate, however, is inconclusive with regard to how best to increase the efficiency of service delivery in particular service markets. Moreover, since the contemporary discourse includes the notion of governance and hybrid solutions that are situated at the border between the public and private sectors – that is to say poli-organisational arrangements (Bel et al., 2018; Bel and Fageda, 2017) – the debate is widening from a twofold, private – public perspective to a more diversified one.

Drinking water provision is controlled by public organisations, very often by local governments; the actual service, however, can be provided by very different types of operators. The drinking water sector is usually composed of a large network of interorganisational relationships between principals and agents; the origins of these relationships are often difficult to identify, as are even the reasons for their creation in the first place. They cross sectoral lines and territories of operation, as well as straddling various types of resource ownership and systems of delivery to the user. The complexity of these

relationships with regard to one of the most important of Earth's resources is a reason to seek a decrease in the transparency of its management.

We address this issue by asking the question: what are the characteristics of local governments that decide to relinquish in-house bureaucratic control over drinking water provision to external service providers? We defined a set of the most important and relatively consistent characteristics of the local government system in Poland. We analysed choices of service delivery modes made by municipalities between the beginning of the 1990s and 2017. The choice, once made, remains stable over time; among the defined set of indicators there are therefore characteristics which are relatively stable over the course of the study period. We investigated four organisational forms of control over drinking water provision: in-house bureaucracy, corporatisation, contracting out to a public organisation, and contracting out to a private organisation.

These are considered to be disjoint alternative forms of public service delivery (Feiock et al., 2003; Carr et al., 2009; Rodrigues et al., 2012). In-house bureaucracy is defined as control by public servants; corporatisation is when a local government creates a corporation which operates under private law; contracting out to a public organisation is when a local government engages another public organisation such as a governmental or non-governmental organisation; and contracting out to a private organisation is when a local government engages a private enterprise. These definitions are context specific in their details, and the Polish context will be given later in the text.

Our approach seeks to address several knowledge gaps. The first is the lack of studies on service delivery mode choices in a single policy field when more than one alternative is applied to a single analytic model. The second is the lack of studies on service delivery modes within Polish local governments in general and in the drinking water sector in particular. The most recent studies that were designed to gather and analyse this type of data in Poland were conducted in the mid-1990s (Aziewicz, 1994, 1998). The Polish case has been little studied despite it being an exciting laboratory; its local governments have relatively high financial and political autonomy and were created against a Central European economic and historical background. The setting for their creation constituted a dynamically changing institutional environment under the pressure of Europeanisation (Ladner et al., 2019c). The third knowledge gap we seek to address concerns the relationship between financial stress and privatisation, extending recent work by Zafra-Gómez et al. (2016). We do this by examining the association between the financial situation of local governments and the four alternative service delivery modes. In this way, we go beyond the conventional privatisation perspective to include in a single study the various governance organisational modes. The fourth knowledge gap we address is with regard to the impact of external financial intervention on service delivery mode choice. Only one study is somewhat similar to ours on this matter, that of Geys and Sørensen (2016). The general question is whether access to external financing – in this case, funds from the European cohesion policy – influences the choice of service delivery modes at the local level.

The study relies primarily on quantitative data and methods. We employ survey data on Polish local governments in 2018 and statistical and financial data for the years 2012 to 2017. We use multinomial (MLNM) logistic regression, applying data for 2012-2017, and logistic regression models using subsequent years from this period.

The next two sections explain the theoretical background and hypotheses; this is followed by a description of method and data and then a presentation of the results of the questionnaire which describes the essential characteristics of the water sector in Poland in the context of service delivery modes. A literature review yielded so little knowledge on the subject that we decided to present a general description, which allows a more in-depth discussion of the statistical analysis outcomes and enables analysis in the context of research presented for other countries. That section is followed by the presentation of findings. The discussion and conclusions are given in the final section of the paper.

THEORETICAL BACKGROUND

Differences in organisational control over water service delivery are reflected in four distinct forms of service provision: in-house bureaucracy, corporatisation, contracting out to a public organisation, and contracting out to a private organisation. These organisational forms represent different types of control over the delivery process; they involve different decision-making processes, various tools of negotiation and influence, different information gathering processes and, very often, different types of infrastructure ownership (Wollmann, 2016).

There are many typologies in the literature which suggest how to classify service delivery modes (Torsteinsen and van Genugten, 2016). Some of these are more detailed, based on the legal status and degree of externalisation (Argento et al., 2010), while others are more general sector-based typologies (Rodrigues et al., 2012). The two criteria most often chosen as reference points for these classifications are the range of local government control and the share of public ownership versus private in the service delivery mode. Organisational control is considered in the context of the principal-agent literature (decision-making, bargaining, monitoring and agency costs) (Brown and Potoski, 2003; Kwon et al., 2010). Meanwhile, the question of the range of private ownership is tackled by the contractual literature in economics; this literature discusses the transaction costs associated with service measurability, asset specificity, market competition and efficiency (Bel and Fageda, 2007; Hansen et al., 2011b; Argento et al., 2010).

In line with the principal-agent literature, we argue that the choice of in-house production entails an internal delegation of authority to the local bureaucracy by elected officials. Except for this in-house mode, all the types of water service delivery entail different levels of external delegation of authority; they will be jointly referred to here as externalisation (Clingermyer and Feiock, 1997; Rodrigues et al., 2012; Rodrigues and Tavares, 2017; Shrestha and Feiock, 2011; Łukomska and Szmigiel-Rawska, 2019; Argento et al., 2010; Hansen et al., 2011b). Delegation contracts vary in extent from delegating service delivery to a public agent at arm's length (municipal corporation) to delegating it to a single public or private agent (contracting out).

Among the four analysed modes, municipally owned corporations (MOCs) allow the municipality to retain arm's length control through an appointed board and the retaining of majority shareholder status. Typically, the shift from in-house provision to corporatisation involves a change in legal status, since MOCs tend to operate under private law or a mix of public and private law. MOCs with 100% of shares held by the municipality are usually classified as MOCs, with the local government acting as the sole residual claimant (Rodrigues and Tavares, 2017); by contrast, companies with a mix of public (municipal) and private shareholders are classified as mixed corporations (Bel and Fageda, 2010; Cuadrado-Ballesteros et al., 2012; Rodrigues and Tavares, 2017).

The literature addressing water governance has highlighted the role of profit as a prime motivator for externalisation to private providers (Rodrigues and Tavares, 2017). Water markets possess specific features such as economies of scale, large numbers of clients, and private firm availability, which constitute strong incentives for private investment (Levin and Tadelis, 2010). Larger markets may also entail significant investment in water infrastructure that the public sector may not be able to undertake. Under those conditions, the externalisation of water services to private agents represents a more viable alternative than public sector based options; on the other hand, privatisation of natural monopolies such as water services can lead to a private monopoly. In a typical case, a monopoly maximises profits and the only constraint is the elasticity of demand, and a regulator is therefore needed. In the case of a monopoly owned or controlled by local authorities, the political cost of higher prices is a constraint (Łukomska and Neneman, 2018).

Besides corporatisation and concession to private firms, municipalities in many European countries have relied on a third alternative to in-house bureaucratic control of water governance (Hefetz et al., 2015; Drew et al., 2019), that of collaboration with other municipalities on the joint provision of public

services; this has allowed for these services to be provided at a lower cost (Bel and Warner, 2015; Pérez-López et al., 2015). Contracting out to other municipalities or non-profit organisations allows a municipality to avoid the opportunism associated with the profit motive, which is likely to compensate for the transaction costs involved in concession contracts.

HYPOTHESES

We situated the analysis of the Polish case within a wide comparative perspective of public management by including contextual factors in our model. 'Context' is understood according to the framework proposed by Meier et al. (2017), where it is defined as the set of factors that impacts functional relationships between variables.

Our analysis of the choice of modes for water service delivery is driven primarily by factors describing long-standing processes; the mode of delivery has been a matter of choice in Poland since the beginning of the 1990s. According to the results of our questionnaire, once the choice is made it remains stable over time; the most significant dynamics in the change of water service delivery have been noted in the last decade. The factors that we considered were selected from among those that impact change over a period of decades and those that impact change within a single decade; the more stable factors within those two sets are "constrained by the shadow of the past" (Williamson, 2000: 598). The long-standing view of Polish socio-economic space is that the Polish social system never fully recovered after the 123-year partition of the country. Between 1795 and 1918, Poland was divided into three parts, the Prussian, Russian and Austrian Partitions; during this time it lost state sovereignty, which was only regained at the end of World War I. After the Second World War, the additional land, called the Recovered Lands, was added to the Polish territory due to the fact that large of the Eastern part of Poland was assigned to the Soviet Union. There is a large body of economic and sociological literature that shows the effects of Poland's long partition on its contemporary social occurrences and choices. Its history has shaped patterns of rural property rights, urbanisation trends, approaches towards life-shaping education and career decisions, and political views; these divisions are also still visible in electoral geography (Gorzela, 1998, 2006; Swianiewicz, 2000; Zukowski, 2004; Tridico, 2006; Herbst, 2006; Zarycki, 2015; Herbst and Rivkin, 2013; Druszcz, 2014).

We account for the influences of partition and of the results of World War II by referring to Bourdieu's (1986) concept of economic, social and cultural capital. Studies show that the eastern part of Poland, which is less well equipped with economic capital, compensates for this disadvantage by assigning larger importance to cultural capital (Zarycki, 2015). 'Cultural capital' is both material cultural heritage and a state of mind, both of which constitute a socio-economic advantage. Cultural capital can be defined by formal education and by the knowledge and skills built up within families and other social groups; it can be converted into economic capital and from there into financial gain. The conversion from cultural to economic capital, however, comes with certain costs (ibid).

The areas of the former Prussian section of Poland and the Recovered Territories are more oriented towards economic capital, while the parts of Poland that were Russian and Austrian are more oriented towards cultural capital; these are factors which motivate the respective social choices made by citizens of those two parts of Poland (Zarycki, 2000, 2014, 2015). Local government analyses following the example of Putnam's studies (1993) made for the area of Poland at the turn of the centuries show that, along with the hypothesis of modernisation, local governments in Western Poland display a higher level of institutional performance and a higher level of socio-economic modernisation than local governments in Eastern Poland. Moreover, in line with the civic tradition hypothesis, local governments in Western Poland display a higher level of institutional performance and civic society indicators than those in Eastern Poland (Swianiewicz, 2000).

We do not try to provide evidence for this view; we accept the view that the location in the chosen area is a factor assigning local community to more (West) or less (East) modernised part of the country

with a relevant focus on economic capital. Assuming this distinction, we include the location of the municipality in our model; we assume that corporatisation and contracting out are considered to be the progressive governance solutions (Roeger and Tavares, 2018, 2020). We thus suggest:

Hypothesis 1: that a municipality's location within the former Russian or Austrian Partitions raises the probability of in-house drinking water provision.

The next two hypotheses also relate to institutional contextual factors (Meier et al., 2017). We refer to the political stability of a mayor in the post over time, which we understand as a circumstance favouring concentration of power resulting from the national organisation of the political system on a local level, and to municipality embeddedness in networks, which we understand as a circumstance favouring the dispersion of power.

Political stability and political climate have previously been proven to be factors influencing externalisation; even so, the direction of influence has not yet been clearly defined (Hefetz and Warner, 2012). Several studies, for example, indicate that political turmoil leads to externalisation, the suggested reason being politicians' desire to avoid the blame for possible service disruption and, to that end, their shifting of the responsibility to an agent (Frant, 1996; Clingermayer and Feiock, 1997; Rodrigues et al., 2012). Alternatively, it has been suggested that political turmoil leads to *less* externalisation because under conditions of political instability the private sector is more reluctant to enter into a relationship with the public sector (Feiock and Jang, 2009; Rodrigues et al., 2012).

The research by Łukomska and Szmigiel-Rawska (2019) in Poland shows that political stability correlates positively with externalisation to another local government but not with the decision to enter into a relationship with a public agent; but the volume of financial investment engagement when the decision to enter relationship with an agent has already been made is positively correlated with political stability (two-stage Heckman regression model).

Polish local politics displays a high level of institutional stability; mayors (in the analysed period) are directly elected for four-year terms with no limit on the number of terms that can be served. They have strong executive powers and usually stay in the post for more than one term (Copus et al., 2017; Gendźwiłł and Swianiewicz, 2017). Following the description by Meier et al. (2017) of the influence of specific contexts on public management, we assume that mayors who concentrate more power are more likely to focus on management performance and bureaucracy, a situation which will more likely lead to organisational changes. In line with the assumption that externalisation is a progressive and risky solution, we claim that it is more available to well-embedded mayors. Moreover, corporatisation allows some decisions to be removed from democratic control (Kuhlmann, 2008), which is a strategy that may be attractive to strong leaders.

Hypothesis 2: Local political stability diminishes the probability of in-house drinking water provision.

In research on American local governments, network involvement is used to explain externalisation patterns (Bae, 2009; Shrestha and Feiock, 2011; Kim, 2018). Involvement in financial relations with other local governments is considered to be a general proxy for externalisation to the public sector (Bae, 2009). At the same time, the networking of municipalities is seen as an inhibitor of privatisation due to the competition between public and private suppliers (Kim, 2018).

We use a measure of local government networks based on inter-local financial transfers build on the American example (Shrestha and Feiock, 2011) and previously described as a measure of externalisation for Polish local governments (Łukomska and Szmigiel-Rawska, 2019). We assume that a high level of inter-local financial relations promotes externalisation due to its diminishing of transaction costs and the way in which it builds generalised trust for entering into relationships with agents. Mayors managing external agents, moreover, are likely to have a greater impact on performance (Meier et al., 2017) and will therefore be more active in implementing progressive management solutions.

Hypothesis 3: A high level of embeddedness of municipality networks diminishes the probability of in-house drinking water provision.

The use of investment funds in a study somewhat similar to ours was scrutinised by Geys and Sørensen (2016) in Norway. They analysed the income of hydropower plants as a factor shaping local financial conditions and local government externalisation decisions. They define these revenues as being independent of the local government decision-making process since the plants were built long before the decision on externalisation was made. This is not precisely the case of the Polish local government situation, but a parallel can be drawn because the flow of money is to some extent independent of local government decisions, since the large volume of money allocated to Polish local governments since 2004 makes European funds highly accessible; this creates a significant external incentive to shape policy in a way that enables these funds to be used regardless of the local tradition and/or political context.

The use of EU funds can be considered in relation to the concept of the abundant organisational environment (Meier et al., 2017); the availability of these funds inclines public managers to focus attention on the external environment and prioritise it over internal organisational changes and performance.

According to Norwegian research, the significant income from hydropower plants inhibits the externalisation process. Given these results and the importance of contextual factors, we suggest:

Hypothesis 4. Extensive use of external financing raises the probability of in-house drinking water provision.

The general assumption is that financial stress (which is sometimes called fiscal stress, and is operationalised in different ways) enhances externalisation due to local politicians' willingness to look for financial resources beyond the tax base, and inter-governmental transfers (Bae, 2009; González-Gómez and Guardiola, 2009; Bel and Fageda, 2010; Martin, 2004; Kuhlmann, 2008). More recently, however, Zafra-Gómez et al. (2016) have pointed out the lack of systematic evidence for the relationship between financial stress and privatisation; they also underline the need for a more detailed and encompassing operationalisation of financial stress in the analysis of service delivery mode choices. Among others, the value of expenditures per capita has been tested as an indicator of the financial stress – privatisation relationship, but no significant correlation was found (Hefetz and Warner, 2004). Studies, including that by Hefetz and Warner (2012), have shown, however, that low per capita expenditures may indicate a reduced ability to choose innovative solutions such as for-profit delivery, or cooperation in chosen institutional arrangements.

Furthermore, Pallesen (2004) suggests that contracting out is "the politics of good times". The literature yields examples of the positive relationship between outsourcing and local government wealth as well as studies which suggest the absence of any interrelation (Zullo, 2009; Hefetz and Warner, 2004; Petersen et al., 2015).

Research in Spain used the sum of financial expenditures over the sum of the ordinary revenues of the local government as a measure of fiscal stress; fiscal stress, by this calculation, was found to be an accelerator of externalisation processes (Picazo-Tadeo et al., 2012; Bel and Fageda, 2010). Pallesen (2004), in his Danish study, used two more-complicated measures: tax base and a combined measure which included local government income sources and capital expenditure; this is a measure developed by Mouritzen (1991). We followed Pallesen's (2004) argumentation on the usefulness of this twofold measure as a proxy for the municipal economic situation, and applied a measure of affluence that was developed by Swianiewicz and Łukomska (2017) which encompasses the aims set for both measures used by Pallesen (2004).

For our study, we looked for financial measures that seemed to be relatively stable over time. We use three measures that jointly described the local government's long term financial situation: affluence,

debt and financial autonomy. Affluence is defined as the sum of (a) the local tax base per capita,¹ (b) the local government's shares in revenues from personal income tax (PIT) and corporate income tax (CIT),² and (c) revenue from a general purpose grant.³ This shows precisely what amount of money a local government could potentially spend each year, since it includes the local tax base and not the actual value of income. A decrease in this measure shows the actual financial pressure on the local government and not the effect of the local tax policies that may result from the pro-developmental attitude of the local government. We adopt Pallesen's (2004) thesis and accept his claim that externalisation is a policy of good times.

Externalisation is also seen as a managerial strategy for debt avoidance. Previous research in France proved that in-house provision enables low pricing at the expense of higher debt level, as managers decide to finance part of the service delivery costs by debt in order to maintain a low price for users. The externalisation (to the private sector) of water service delivery results in a higher price for citizens but lower sector debt (Porcher, 2016). This may promote externalisation as a managerial strategy in municipalities experiencing expenditure pressure (due to the high need for additional financial resources to meet citizens' expectations) and in municipalities with high discretion over revenue sources (to avoid political responsibility for debt creation and high price levels). We assume that externalisation is a managerial strategy that influences the municipality's budget structure in that part of the income, spending and debts can be shifted to the agents, which allows for flexible budget management. In Poland, as well as in other countries (Bastida and Benito, 2006; Grossi and Mussari, 2008), financial reporting is not consolidated; the municipality and agents submit separate financial reports. In a fragmented organisational environment, reporting of debt thus may be incomplete; this has been investigated with regard to local budgets in the federal state of North Rhine-Westphalia in Germany, where 42% of debts were shifted to public sector enterprises (Papenuß and Schaefer, 2010). Therefore, we assume that a municipality that has decided to stay with in-house service provision will report higher debt.

The assumption we make is that externalisation was seen in the past two decades as a progressive public management solution and as such was more accessible to local governments with stronger financial autonomy. Financial autonomy (as a gauge of prospects in mobilising internal and external resources) has been measured as the amount of revenue a municipality can mobilise internally from its sources (robustness) or by the level of dependence on external funding that is received via transfers and grants (Zafra-Gómez et al., 2016; Bae, 2009). We define financial autonomy as the share of a municipality's own revenues in its total revenues. This measure is not dependent on transfers from the central government, it shows only the income from local resources. This measure is only useful for local governments with relatively high financial autonomy, as is the case in Poland (Swianiewicz, 2014; Ladner et al., 2019a, 2019b). Taking into account all financial measures and the inconclusive nature of previous findings, we assume the following hypotheses:

Hypothesis 5: A municipality's budgetary affluence diminishes the probability of in-house drinking water provision.

Hypothesis 6: High levels of municipal debt raise the probability of in-house drinking water provision.

Hypothesis 7: Financial autonomy diminishes the probability of in-house drinking water provision.

We employ two control variables that are essential factors in the general operation of local government: size of the municipality and level of urbanisation; we also employ one control variable that

¹ Local tax base per capita is treated as potentially available revenue from the authority's own sources if no reductions or exemptions are applied.

² A component of own revenue in Poland; however, local authorities have no discretion when deciding on these revenues and they should be classified strictly as tax-sharing.

³ This general purpose grant consists of three parts: education (approximately 80%), which primarily covers the costs of primary and secondary schools; equalising, which represents the vertical equalisation scheme in which a grant flows from central to subnational budgets; and balancing, which is a horizontal equalisation – a Robin Hood-type mechanism.

is particularly necessary for water utility management: altimetric variation. Size is one of the most critical variables for local government operation (Denters et al., 2014); it is also considered to be a factor influencing externalisation processes as it affects economies of scale, service demand, and transaction costs (Hansen et al., 2011a; Schoute et al., 2017; Brown and Potoski, 2003; Shrestha and Feiock, 2011; Hefetz and Warner, 2004; Bae, 2009; Bel and Fageda, 2010).

The level of urbanisation is a proxy for modernisation; this variable accounts for municipalities in which the urban fabric is significantly larger. (This follows the Corine Land Cover databases terminology, a database built on geographic information systems data from satellite imagery.) The spatial distribution of this variable shows that it covers Polish urban centres and functional urban areas and complements the spatial characteristics of the analysed set of municipalities.

Altimetric variation is the difference in metres between maximum and minimum height above sea level, which has an impact on the costs of water provision. In municipalities with larger altimetric differences, investment in water service infrastructure may be very high even if the number of inhabitants is significant. Small altimetric differences will favour externalisation, while higher altimetric variations should favour in-house production. In municipalities with large altimetric variations, a local service market that is based on a network/line infrastructure requires a high investment value and is therefore less attractive to private contractors; the result is a market with high transaction costs that also favours in-house production (Brown and Potoski, 2003).

DATA AND METHODS

In order to test our hypotheses, we relied primarily on data from a survey conducted by the authors in 2018. We asked all municipalities in Poland about their current mode of water service delivery and the decisions they had made to change to these modes in the past; they were offered a vast range of choices of delivery modes. The questionnaire was partially inspired by the one developed in Portugal by Rodrigues et al. (2012). A second source of questionnaire items was a pilot study conducted by the authors in 2017. That study took place in one of Poland's largest cities and in several surrounding rural and urban municipalities; it consisted of five semi-structured interviews with non-elected personnel who were responsible for the management of local service provision: municipal heads of office (*Sekretarz*), heads of accounting (*Skarbnik*), and the heads of certain municipal departments that were responsible for service delivery. This range allowed for a diversification of the service delivery modes included in the questionnaire and was the basis for the initial selection of independent variables.

The questionnaire response rate was over 40% (1089 out of a total of 2478). Of the responding municipalities, 890 declared that they provided water supply services to the local community.⁴ Additionally, we used data from the Polish Main Statistical Office and the Ministry of Finance, as well as from our own sources (i.e. completed research projects). We implemented a multivariate analysis to identify the critical design drivers and correlations across different variables (Table 1). The explanation is based on the analysis of the newest available data. The dependent variables are built on the questionnaire data (2018) and the independent variables on the data panel for the years 2012 to 2017. (The most recent census in Poland was conducted in 2011, so we decided to incorporate population estimations from after the census results.) The dependents are the binary variable in-house (0) and change into other models (1), and a nominal variable: in-house (1), corporatisation (2), contracting out to public organisations (3), and contracting out to private organisations (4). The data was based on the answer regarding the organisational form in which the service is provided; a question was also asked

⁴ The remaining 199 municipalities admitted that they do not provide water services to residents; these cases are recorded as 'lack of response'.

about the percentage of water (and sewage) service that was provided via the chosen form of service delivery. The dominant form (more than 50%) was coded into the dependent variable.

We counted the answers to the question, "Please indicate the form (or forms) in which water and sewage services are provided in your municipality".⁵ (We decided to join these two elements of the water sector together to make the questionnaire clearer, taking into consideration that these two services might be provided jointly or separately.) To make the answers more precise, we asked about the share (%) of the total service that was provided by a chosen form of service delivery. More than 71% of municipalities indicated that more than 80% of their water and sewage service was provided via one chosen form (66% indicated 100% provision via the chosen form). This means that water services are usually provided under a single form of service delivery and that the water sector is not usually divided into diverse organisational structures of provision; there is often a dominant form, though in this the largest cities may be an exception.

Table 1. Descriptions of variables.

Variable	Description	Source	Model	Mean	SD	Min	Max
Change-out	Service delivery choice different than in-house. Binary dependent variable	Survey 2018	1			0	1
Dominant form	Service delivery choice in water sector, between in-house, corporatisation, contracting out to public or private organisation. Nominal dependent variable	Survey 2018	2,3			1	4
Location: former Russian or Austrian Partition	Location in the region that was a part of Russian or Austrian state 1795-1918	Own calculations	1, 2			0	1
Location: Prussian Partition	Location in the region that was a part of Prussian state in 1795-1918	Own calculations	3			0	1
Location: Recovered Territories	Location in the region that was a part of German state until 1945	Own calculations	3			0	1
Political stability	Each second and following mayor's term counted from local elections in 2002	Central Electoral Commission	1, 2, 3	2.02	0.81	0	3
Transfers IMC per capita	The amount of expenditures transferred to other municipality(ies) (in PLN per capita)	Ministry of Finance, reports on local budget execution (2012-2017)	1, 2, 3	60.44	172.86	0	8594.13
EU expenditure per capita	Value of municipal budget expenditures financed from EU grants per capita (in PLN per capita)	Ministry of Finance, reports on local budget execution (2012-2017)	1, 2, 3	156.57	222.13	0	3284.86
Affluence per capita	Local budget revenues per capita (consists of local tax base, shares in PIT and CIT, and general purpose grants) (in PLN per capita)	Ministry of Finance, reports on local budget execution (2012-2017)	1, 2,3	2771.06	1510.36	171.9	44330.2

⁵ Out of the 890 municipalities that declared that they were providing water services to the local community, 848 indicated the form (or forms) in which the water and sewage services are provided.

Debt per capita	Total amount of debt incurred by the local budget at the end of the year (in PLN per capita)	Ministry of Finance, reports on local budget execution (2012-2017)	1, 2,3	975.04	664.58	0	12130.5
Share of own revenue	Share of own revenue (mainly from local taxes, fees and tax sharing) in total revenues of local budget	Ministry of Finance, reports on local budget execution (2012-2017)	1, 2, 3	38.99	14.50	10.48	96.90
Urban	Dichotomous variable assigning municipalities with the highest level of urban land	Corine Land Cover GIS data, 2012	1,2,3			0	1
Size	Total population of the municipality at the end of the year	Main Statistical Office (2012-2017)	1, 2, 3	19671	77 193	1644	1764615
Altimetric variation	Difference in metres between maximum and minimum height above sea level	Analysis of data from ASTER and PCGCD (Dobosz, 2017)	1, 2, 3	195.23	140.18	30	1133
In-house	% of answers to the question on service delivery form	Survey 2018	1, 2, 3			48.25	
Corporatization			2, 3			35.34	
Contracting out to a public agency			2,3			6.39	
Contracting out to a private agency			2,3			10.02	

Note: ASTER = Advanced Spaceborne Thermal Emission and Reflection Radiometer; PCGCD = Polish Centre for Geodetic and Cartographic Documentation; PIT = personal income tax; CIT = corporate income tax; Transfers IMC = inter-municipal cooperation transfers; Model 1, 2 = logistic regression for cross-sectional analysis (1) and multinomial logistic regression model (2); Observations: 5088 (848 municipalities for the six-year period 2012-2017)

Source: Authors' own calculations.

The analysis procedure is made up of subsequent and subordinated steps. First, we analyse the logit regression models for every year from 2012 to 2017 with a binary variable (in-house versus change-out to either of the three other modes) to check the robustness of the analysis over the years. Then, using MLNM logistic regression, we analyse the two models for the dependent nominal variable (in-house, corporatization, contracting out to a public organisation, contracting out to a private organisation). The location in different parts of the country could not be analysed in one model due to interdependency of variables; we conducted a separate analysis depending on the municipalities' location in formerly Russian and Austrian parts of the country (Model 2) or in formerly Prussian or Recovered Territories (Model 3).

We decided to use MNLM because this method, unlike the series of independent regression models, allows for comparison between chosen alternatives and one pivotal mode of service delivery (in-house in our case). We control for the socio-economic characteristics, and cluster standard errors by municipality based on the assumption that their choices of service delivery modes are independent across municipalities but not within them (Levin and Tadelis, 2010).

DESCRIPTION OF THE WATER SERVICE DELIVERY SECTOR

In the investigated period, the Polish system of water supply and sewage was based on the devolution rule and was built on meso-institutions under which property rights and decision rights are at the municipal (micro-) level (Ménard, 2017). A large part of the control of the decision on service delivery mode and service price, as well as property rights, was in the hands of the almost 2500 municipal governments. Several organisational arrangements were identified as the implementation of micro-institutions. We have organised these arrangements under the four modes of service delivery: in-house provision, corporatisation, contracting out to a public organisation, contracting out to a private organisation.

In our study, in-house provision represents three organisational settings: office structure, budgetary unit, and budgetary establishment. Office structure is mentioned when the service is operated by the local bureaucracy; this method of service management ensures full political control. The budgetary unit (*jednostka budżetowa*) does not have a legal personality or budget that is separate from the local government; it is, however, organised separately from the local government office structure, which gives it more flexibility in management procedures and makes it more specialised than the usual structures of the local government bureaucracy. It is a task-oriented organisation under the full control of the local government. The budgetary establishment (*zakład budżetowy*) also does not have a legal personality separate from the local government but it is financially semi-independent; it keeps revenues from sale of services and may use them to finance its current operation. Where its revenues do not cover the full cost, it may receive a transfer (subsidy) from the local government budget, but according to the law this subsidy cannot exceed 50% of annual operating costs. It is an organisation operating under the full control of local government and the administrative law. As in the case of the budgetary unit, the manager of the budgetary establishment is appointed and dismissed by the city mayor.

The corporatisation mode includes municipally owned corporations (*spółka komunalna*) with either 50 to 100% municipal ownership or 100% municipal ownership. In Poland, these generally reflect the definition developed by Tavares and Camões (2007: 535): they "rely on revenues derived from user fees, are governed by an appointed executive board, and have independent corporate status". They operate under private law and their managers are appointed by the local government (see also Tavares, 2017; Voorn et al., 2017). Municipally owned corporations are financially self-sufficient, i.e. they finance their operation with their own revenues and they may apply for bank credit, issue bonds and apply for external funding. Municipal company debt does not count against the legally stipulated debt limit of local governments. In this mode, the inter-municipal corporation over 50% of municipal ownership were also accounted.

Contracting out to a public organisation consists of:

- inter-municipal joint authority,
- joint metropolitan authority,
- administrative agreement,
- purchase from another local government,
- purchase from an external organisation established by another local government,
- inter-municipal contract with a non-governmental organisation,
- contract with a non-governmental organisation (association, foundation, etc).

Among our respondents, there was no indication of a joint metropolitan authority (*związek metropolitalny*); there is only one such organisational unit – in the Silesia region of Poland – that has the formal approval of the central government and operates in a variety of services. The inter-municipal joint authority (*związek komunalny*), also known as an inter-municipal union, acts as an organisational agent for two or more local governments. According to Polish administrative law, these organisations have legal

personality and follow specific laws and responsibilities; their budget and authority are separate from the local government and their governing board is appointed by the parent local governments (Swianiewicz et al., 2016; Łukomska and Szmigiel-Rawska, 2018; Swianiewicz and Gendźwił, 2018; Szmigiel-Rawska, 2017). This form of inter-municipal cooperation is relatively common in Europe (Hulst and Van Montfort, 2007; Teles and Swianiewicz, 2018).

Municipalities may sign agreements with other public administration bodies. A contract established between administrative bodies is referred to in Polish law as an administrative agreement (*porozumienie administracyjne*). The distinction of the agreement as a type of contract is primarily related to the fact that it is a 'public law agreement', that is, it is subject to public, and not private, law. An administrative arrangement may lay down rules for the joint performance of tasks or the transfer of a task from one entity to another; the agreement must include arrangements as to how and which organisation will provide funds to implement it (Wyporska-Frankiewicz, 2010).

The contracting out to private agencies consists of:

- a municipal corporation with less than 50% municipal ownership,
- a contract with a private enterprise,
- an inter-municipal contract with a private enterprise.

Contracts with private enterprises and non-governmental organisations are performed under public procurement law and conflicts arising under these contracts are resolved under private law. The inter-municipal contract with a non-governmental organisation or private organisation is performed under public procurement law, and there is no difference between contracts with private or non-governmental organisations. More than one local government signs and negotiates the contract with the organisation from the private or non-governmental sector.

The municipally owned corporation with less than 50% of municipal ownership covers corporations in which the remaining shares are owned by the private sector. This assumption is only an estimation based on a sample analysis, as there is no easily accessible data and there have been no comprehensive studies on this in Poland. Purchase from another local government or external organisation established by another local government is executed in the form of a contract, but a written contract need not be prepared under Polish law. The transaction can sometimes take the form of a buyer decision (often approved by the municipal council) to use an offer made by another local government or its agent, with no contract other than an oral agreement and financial documents.

According to the results of our questionnaire, the dominant form of water service delivery in Poland is in-house provision (49%). Municipally owned corporations are also a popular form; with more than 29% of municipalities indicating them, Poland is situated within the general European trend of the popularisation of this form (Voorn et al., 2017; Bel and Fageda, 2010; Tavares, 2017). In-house and corporatisation together represent almost 84% of the water service delivery modes in Poland, while just over 16% of municipalities decided to contract out water service delivery (see the bottom of Table 1).⁶ Referring to the title of the extensively cited work of Walker et al. (2011), new public management in water supply and sewage in Poland has definitely not "gone mad", since the public sector is relatively strong. In Poland in the 1990s, there was a fear of privatisation of water and sewage services. The concern was that natural monopolies would turn into private monopolies and that water prices would go up. (A

⁶ These numbers seem to be very different from Germany and France (Kuhlmann, 2008) and from Spain in 2003. According to Bel and Fageda (2010: 136):

"Concerning water distribution, 42 per cent of municipalities with a population over 2,000 had contracted out solid waste collection to private firms in 2003, which implies that 40 per cent of the Spanish population was being served by a private firm, since the average population of municipalities with private production is close to the mean. Public production (bureaucracy plus public firm) exists in more than 50 per cent of municipalities, but only 48 per cent of the population is served by public delivery. Finally, a little more than six per cent of municipalities are served by mixed firms, but this represents 12 per cent of the population".

central regulator was not established until 2018.) From an economic point of view, the countries of Central and Eastern Europe treated water as a public good; providing free access to all citizens was considered a state obligation (Lewington, 1998). Even until now in Poland, therefore, the conviction that the provision of water should not be profitable – i.e. it cannot cost too much – is often foremost in local community consciousness. Local authorities, taking care of their political capital, watch over the price of water; getting rid of the control of the company providing these services could result in them losing their position in local elections. Thus, the modes associated with loss of control by the local government are less popular in Poland.

FINDINGS

The three factors which have the strongest impact on externalisation choices in the municipally managed drinking water sector in Poland are: the part of the country in which the municipality is located, the size of the municipality, and the fact of urbanisation of the municipality.

We found full support for Hypothesis 1 (Tables 2 and 3): local governments located in formerly Russian and Austrian parts of the country externalise drinking water provision less often, and service is externalised most in the Recovered Territories in the western part of the country.

Hypothesis 2, that local political stability diminishes the probability of in-house water provision, is confirmed only when the alternative is contracting out to a private provider (Table 3); this is a significant impact factor despite the location of the local government and its level of urbanisation. This result is also confirmed throughout most of the years analysed in the model for the overall externalisation (Table 2).

We did not find support for Hypothesis 3, that a high level of embeddedness of municipality networks diminishes the probability of in-house drinking water provision. A possible explanation is that the proxy we implemented did not successfully capture the occurrence; we measured cooperation only by financial flows, which may have omitted its important elements. The more precise quantitative measure of network embeddedness which could be implemented to the model is not available in Poland.

Hypothesis 4, that extensive use of external financing raises the probability of in-house water provision, is true when the alternative is corporatisation. We did not find this factor significant for other analysed modes of drinking water provision.

Hypothesis 5, that the municipality's budgetary affluence diminishes the probability of in-house water provision, was not verified by the models; in the model built for 2017, however, affluence displayed significant coefficients its value is relatively high. The noted relationship between affluence and externalisation contradicts the relationship assumed in the hypothesis (Table 2).

Hypothesis 6, that high levels of municipal debt raise the probability of externalisation of drinking water provision, shows convincing results throughout the years analysed in the models for the overall externalisation (Table 2); results are significant for two analysed alternatives, corporatisation and contracting out to a private agent (Table 3).

Hypothesis 7, which states that financial autonomy diminishes the probability of in-house water provision, was also not verified.

The findings give a better insight into the factors explaining corporatisation and contracting out to private organisations than they do into contracting out to public organisations. The model consists of three controlling factors and two of them are found to be significant: the size of the municipality and whether or not the municipality is urbanised. Among all the factors, size of municipality is the factor with the highest coefficients in the models explaining corporatisation. Size is also an important factor in explaining contracting out to private agents: the larger the municipality, the higher the probability of these externalisation modes. Urbanisation is the most important factor explaining the probability of contracting out to private agents; despite size and location, urbanisation is important in raising the likelihood of externalisation and is the only factor significant for all three externalisation modes.

Table 2. Results of logistic regression models for cross-sectional analysis of choices of service delivery mode, in-house to other analysed forms (the combined set of corporatisation and externalisation choices, N = 848) (MODELS GROUP 1).

	Year	Prob>chi2	Pseudo R2	Location in formerly Russian and Austrian Partition	Political stability	Inter-Municipal Cooperation Transfers per capita	EU expenditure per capita	Ln Affluence per capita	Debt per capita	Ln share own revenue	Urbanisation	Ln size	Ln altimetric variation
Coeff.	2012	0.000	0.189	-0.699***	0.151	-0.000	0.000	-0.225	0.000**	0.126	0.963***	1.036***	-0.156
SE				0.177	0.106	0.000	0.000	0.666	0.000	0.283	0.360	0.155	0.179
Coeff.	2013	0.000	0.199	-0.708***	0.177*	-0.002	-0.000	-0.131	0.000**	0.184	1.059***	1.064***	-0.129
SE				0.183	0.107	0.001	0.000	0.846	0.000	0.305	0.367	0.153	0.181
Coeff.	2014	0.000	0.206	-0.718***	0.204*	0.002	-0.001**	-0.614	0.001***	0.146	0.989***	1.040***	-0.123
SE				0.178	0.109	0.002	0.000	0.572	0.000	0.289	0.370	0.146	0.182
Coeff.	2015	0.000	0.211	-0.727***	0.217**	0.002	-0.000	-1.359	0.001***	0.416	1.056***	1.027***	-0.109
SE				0.186	0.110	0.001	0.000	1.077	0.000	0.350	0.396	0.146	0.184
Coeff.	2016	0.000	0.214	-0.756***	0.187*	0.001	-0.000	-1.205	0.000***	0.295	1.218***	1.107***	-0.041
SE				0.182	0.111	0.001	0.002	0.891	0.000	0.336	0.404	0.148	0.182
Coeff.	2017	0.000	0.223	-0.802***	0.165	0.002	0.001	-1.494*	0.000***	0.501	1.259***	1.124***	-0.032
SE				0.185	0.111	0.002	0.001	0.894	0.000	0.343	0.426	0.152	0.186

Note: * p < 0.1, ** p < 0.05, *** p < 0.01; SE = standard error.

Source: Authors' calculations.

Table 3. Results of multinomial logistic regression model for the choice of externalisation mode as an alternative towards in-house forms of water service delivery in 2012-2017 (MODELS 2 and 3).

Group of factors	Variable	MODEL 2			MODEL 3		
		Corporatisation	Contracting out public	Contracting out private	Corporatisation	Contracting out public	Contracting out private
		Coeff./ Robust SE	Coeff./ Robust SE	Coeff./ Robust SE	Coeff./ Robust SE	Coeff./ Robust SE	Coeff./ Robust SE
Long term processes impact (Hypothesis 1)	Location in Russian and Austrian Partition	-.969/***	.067/	-.675/**	NA	NA	NA
	Location in Prussian Partition	NA	NA	NA	.531/***	.017/	.344/
	Location in Recovered Territories	NA	NA	NA	1.268/***	-.195/	.897/***
Political stability (Hypothesis 2)	Political stability	.072/	.158/	.485/***	.087/	.156/	.499/***
Network embeddedness (Hypothesis 3)	Inter-Municipal Cooperation Transfers per capita	-.002/	.000/	.000/	-.002/	.000/	.000/
Use of external funds (Hypothesis 4)	EU expenditure per capita	-.001/**	.000/	-.000/	-.001/**	.000/	-.000/
Financial factors (Hypotheses 5, 6, 7)	Ln affluence per capita	-.723/	-1.046/	.079/	-.584/	-1.050/	.172/
	Debt per capita	.915	.785	.497	.912	.804	.495
	Ln share own revenue	.000/***	.000/	.001/***	.000/**	.000/	.001/***
Controlling factors	Urbanisation	.000	.000	.000	.000	.000	.000
	Ln size	.183/	.499/	.019/	.086/	.508/	-.039/
	Ln altimetric variation	.329	.475	.438	.332	.479	.444
_cons		.963/**	1.500/**	1.107/**	1.001/***	1.471/**	1.141/**
		.382	.630	.500	.384	.608	.498
		1.472/***	.343/	.496/*	1.528/***	.359/	.541/**
		.185	.400	.264	.191	.405	.269
		-.083/	-.054/	-.113/	-.150/	-.053/	-.163/
		.211	.315	.280	.212	.327	.288
		-8.123/	.815/	-7.280/	-10.017/	.734/	-8.654/*
		7.287	7.956	4.589	7.227	8.027	4.537
Number of observations				5088			5088
Log pseudolikelihood				4761.4337			4738.3715
Wald chi2(30)				207.89			208.28
Prob>chi2				.0000			.0000
Pseudo R2				.1685			.1726

Note: Base = in-house; Standard errors adjusted for 848 clusters in number; * p < 0.1, ** p < 0.05, *** p < 0.01; NA = not applicable. Source: Authors' calculations.

DISCUSSION AND CONCLUSION

In our research, we attempt to explain factors influencing governance-structure choices in drinking water service provision. We tested several statistical models which showed convincing results. The findings add to the existing literature on local service delivery choices, offering a thorough description of the operational context within which municipalities change their water service delivery mode from in-house to external providers.

The most important explanatory factors are: the size of the municipality, whether or not it is urbanised, and the municipality's location in particular historically relevant parts of the country. These three factors compound each other in explanations of modes of drinking water provision in Poland; together, they substantially explain the variance and they are all proxies for long-standing processes. The results show that a quantitative analysis of local service provision should be comprised of the factors that describe not only the technical and financial context, but also the wider social and political one.

The mean size of Poland's local governments is approximately in line with the European average. In the 2014 ranking of 40 European local government systems – which includes most of the members of the Council of Europe – Poland came twenty-second in a ranking from least to most fragmented (Swianiewicz et al., 2016). Our findings cannot be applied to highly fragmented systems such as the French, Czech, or Slovakian; they are most applicable to systems whose local governments have a mean size that is close to that of Poland, such as those of Norway, Latvia, Finland and Belgium.

In the literature, municipality size usually correlates positively with corporatisation but results for externalisation are mixed. Externalisation is often seen as a tool for gaining economies of scale and is therefore implemented by smaller local governments (Tavares, 2017; Shrestha and Feiock, 2011; Bae, 2009; Zafra-Gómez et al., 2016). We interpret our findings in the light of the diffusion of innovation processes. We claim that corporatisation and contracting out are characteristics of municipalities that are considered to display relatively high organisational capacity; high organisational capacity is a factor which enables the adoption of organisational innovations, which is a characteristic of larger urbanised municipalities (Walker et al., 2011). Size of municipality, moreover, helps explain the likelihood of externalisation forms which shift provision closer to the market; a relationship is indicated between corporatisation and contracting out to a private provider, and market size. The close-to-market solutions are more available to local governments which are serving larger markets; contracting out to public organisations is an option that is more available to municipalities which are located in urbanised areas where functional interconnections are stronger.

Results show that poorly developed civic society and a low level of modernisation inhibit water service delivery choices beyond in-house provision. As Zarycki (2015: 122) states, in reference to the western part of Poland, "economic capital seems to have a relatively higher status in the logic of social stratification and reproduction, which makes this region more similar to a typical Western European society"; in other words, contracting out and corporatisation are more likely in societies that are oriented towards economic capital than in those that are oriented more strongly towards cultural capital. In Western Poland, the importance of investments in infrastructure, as well as economic benefits esteem is higher than in Eastern Poland; this conditions a creation of governance structures that are open to private markets and cooperation. This finding is an important factor in academic local-studies discussions that take place in the context of comparative global-scale analysis; it is also important in discussions of the history-driven institutional divisions within Europe, including the north – south division. These institutional divisions do not correspond to nation state borders, which therefore diminishes the accuracy of country-oriented analysis.

Longer-serving mayors are more strongly oriented towards progressive drinking water management solutions; they engage in contracting out to private organisations more often than do mayors with a less politically (electorally) stable position. This finding is in line with research on innovativeness in local

government; it suggests that political uncertainty has a significantly destructive impact on the innovativeness of public agencies and leads to defensive strategies (Walker et al., 2015). Overall, the concentration and stability of a leader's political power favours the choice of external private provision.

Predictably, an abundant organisational environment (Meier et al., 2017) impacts corporatisation. Our research showed that municipalities that focused on attracting external resources were less likely to introduce organisational changes; this result, however, may also be explained by the fragmented financial reporting, as municipalities that introduce corporatisation as an organisational change may report lower revenues from EU grants because part of these grants is shifted to municipal corporations. In general, an abundant environment reduces the likelihood of organisational change. If, however, the change is made even so, and if a transaction with an agent is established, the context becomes more complex; it is then difficult to assess the impact of the abundance of the environment on managerial choices.

In a system in which capitalism is relatively new, corporatisation and contracting out in the drinking water sector are, in the words of Pallesen (2004), the "politics of good times". In a certain sense, however, they are the politics of modernisation; they occur in the part of the country that has the highest level of modernisation and civic engagement and in the largest municipalities and urban centres. The difference is especially evident when compared to the least modernised part of the country; there, differences between urban and rural areas are the largest ones for the centuries (Zarycki, 2015).

Results for the financial aspects of the choice do not show a clear pattern. On the one hand, municipal debt is the key factor explaining the government's choice between in-house or other analysed modes. This confirms the findings of Porcher (2017) for France, that in-house provision of water services may lead to higher debt as it results from a political strategy that is aimed at avoiding higher prices in the water sector; this conclusion, however, needs further confirmation through research that jointly analyses mode, debt and service prices.

On the other hand, a consideration of financial autonomy within the analysed years begins to display a positive correlation with the choice of non-in-house modes of service delivery. Considering the cumulative nature of the described phenomenon, plus its ubiquity in the largest and urbanised local governments in Poland, financial self-management proved to be the key financial indicator of governance-structure choice. 'Financial self-management' can be defined as the amount of financial means that a municipality is able to mobilise independently, through debt or taxation; it is, in a sense, a sign of 'good times' for local government.

There are two important limitations to our research. The first is that changes in the mode of service delivery were indicated by a questionnaire study. We diminished the impact of this limitation by using a sample of qualitative checks on answers; these checks were based on available registers and websites. The study should be repeated, however, as soon as coherent public registers on corporatisation and contracting out become available, though the authors feel that a study based on these kinds of registers related to past choices will probably never be possible for Poland.

The second limitation is that we did not investigate the timeline of the change of service delivery mode; due to the limited number of moments of change reported in the questionnaire, it was impossible to create reliable models. This is a gap that still needs to be filled for the Polish water sector if the factors directly impacting mode-change decisions are to be explained. In general, this kind of empirical proof is still scant in the literature on local government.

One of the next steps in the research on service delivery modes should be the inclusion of spatial analysis and cluster analysis; this is necessary in order to check for the influence of neighbours' activities on decisions relating to delivery mode choice. It was recently proven in a Spanish study that in specific institutional contexts this is an influencing factor in the water sector (Zafra-Gómez and Chica-Olmo, 2019).

The study would also benefit from a broadening of the scope of explanation of the impacts of political system features, for example the involvement of political parties, the relationship between the council

and the mayor, and political cycle influence. Finally, there remains a need for a more detailed analysis of market structure and competition influence on the choices made by local governments on water service delivery modes.

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