Decentralisation, HRD and production efficiency of water utilities: evidence from India

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Abstract

Decentralisation of water supplies in developing countries is being promoted by international aid agencies. It is argued that decentralisation by a government close to the people will generate better project performance. This article compares the performance of piped water supply schemes run by the state governments and local government in central India and finds that the latter are running less efficiently than the former. It finds that a serious drawback of decentralisation is the neglect of human resource development (HRD). Empirical analysis shows that this neglect lowers production efficiency. Thus, decentralisation has a negative effect on production efficiency, directly as well as through lower HRD. Government ‘closer to the people’ may not necessarily be better suited to provide water supply services.

Keywords: Decentralisation; Drinking water; Economic analysis; Water policy; Water supply

1. Introduction

The decentralisation drum has been rolling on for quarter of a century. Governments of the developing countries have been under pressure from the donor agencies as well as their own metropolitan elite to decentralise provision of public services, like drinking water supply to local government. Among the international agencies, a consensus has emerged that decentralisation is desirable for sustenance of democracy as well as for improvement in efficiency. Often these agencies do not hesitate to demand decentralisation to local government as a condition in their projects. High expectations from decentralisation seem to stem partly from experiences of failed centralised states under planned economic and political systems. The bias could also be explained because of a lack of empirical studies of comparative efficiency. Arguments are based on subjective assessments in which the meaning of decentralisation is often not clear.

Decentralisation is essentially transfer of powers and/or responsibilities from a higher level of government to a lower level. Since decentralisation has been a core concept in the field of public administration...
for decades, its typologies have flourished (Dubois & Fattore, 2009). The most widely accepted approach to classification of decentralisation in the literature is to classify it into three types – deconcentration, delegation and devolution (Brennan & Buchanan, 1980). Deconcentration is the transfer of authority over specified management functions by administrative fiat to different levels under the jurisdictional authority of the government. Delegation usually refers to the transfer of authority for carefully spelled out tasks to organisations, not under direct control of the government. Devolution occurs when the authority is transferred by a higher level of government to autonomous lower levels of government through constitutional or legislative means.

Decentralisation and public participation are two different concepts in social sciences and yet quite often in development debates, the two terms are used interchangeably. For example, the World Bank (2000) claims that ‘decentralization can be powerful for achieving development goals in ways that respond to the needs of local communities, by assigning control rights to people who have the information and incentives to make decisions best suited to those needs and who have the responsibility for the political and economic consequences of their decisions’. The World Bank’s rhetoric apart, some recent academic papers in the water sector (e.g. Araral, 2010; Tankha & Fuller, 2010) too do not make a clear distinction between decentralisation and participation. Water professionals agree that participation of the intended beneficiaries improves performance1, yet this cannot be taken to be an endorsement of decentralisation. The two terms have entirely different meanings; conflating the two terms robs both of their full potential.

Decentralisation literature usually concerns itself with devolution which is recommended on political as well as economic grounds. Protagonists of decentralisation, including international organisations, recommend that devolution should be made to the lowest level of government, except for externality, chargeability or technical reasons, it is not possible to do so. The basic presumption here is that decentralised political systems are more conducive to citizen impact on political outcomes. Political arguments in favour of transfer of power and responsibility from the national to sub-national governments are strong as autocratic dictatorial regimes tend to centralise power. Decentralisation is viewed as a promoter of democracy.

The economic reason behind this increased interest in decentralisation is the prospect of improving citizens’ welfare through efficiency gains. According to the allocative efficiency argument, an efficient level of output for a local good, for which the sum of residents’ marginal benefits equals marginal cost, is likely to vary across jurisdictions as a result of both differences in preferences and cost differentials (Oates, 2006). Owing to asymmetries of information at different levels, it is argued that local government is better placed to provide public goods and services tailored to the preferences and tastes of individual residents, compared to regional or national government.

Of late there has been some realisation that the developing countries do not meet most of the explicit or implicit assumptions of the classical model. In the developing countries, the problem is not to reveal the fine differences in preferences between jurisdictions but to satisfy basic needs which, like safe drinking water, are quite well known. With hundreds of studies now being available, the empirical literature on whether local government allocates resources better has grown even faster than the theoretical literature on allocative efficiency. Even so, taken as a whole, it is difficult to draw clear lessons from these

1 Research reports on public involvement published by the US Army Corps of Engineers (Creighton et al., 1992, 1998) and Delli Priscoli (2009) explain how perception about participation has evolved over time from tolerating nuisance to value-based consensus building. In the end, participation builds on open access to information and empowerment of people (Delli Priscoli & Wolf, 2009).
empirical studies about the potential of decentralisation for social development or responsiveness to local needs on the basis of allocative efficiency.

While the standard decentralisation model says little about production efficiency, the assumption is that as an organising principle, decentralisation brings government closer to the people and empowers the citizens so that they are able to hold those in positions of leadership accountable (McGuire, 2010). It is also argued that for public services like water supply, the provision in a given location is independent of that in other locations and hence welfare loss on account of economies of scale would be minimal.

By comparing efficiency and human resource development (HRD) in water utilities run by the state government and the local government in India and analysing the effect of decentralisation on HRD and of decentralisation and HRD on efficiency, this article seeks to determine the mechanism through which decentralisation affects efficiency. Earlier studies on the subject (Khellaf, 1992; Prud’hommme, 1995) while identifying lower efficiency in decentralised water utilities have, on the basis of anecdotal evidence, pointed out that low HRD could be a reason for low efficiency. This article extends the literature in the direction of measurement of the impact of decentralisation on HRD and that of decentralisation and HRD on efficiency of water supply schemes.

2. HRD in the water sector

For some time, there has been a realisation that for universal access to safe drinking water, sector reforms have to address themselves centrally to the personnel staffing the service (Pickford, 1991). Strengthening managerial systems through the building of human and institutional capacity is the foundation of sustainable water resources management and service delivery. The implications of decentralisation for HRD, however, are poorly researched and inadequately understood.

Decentralisation transfers power and responsibility from central to local bureaucracies. While the public sector in developing countries performs far from the technical production frontier, there is reason to believe that local bureaucracies are likely to be farther away from this frontier compared to central or regional bureaucracies. In many developing countries, whereas federal or state governments make few investments in technology, research and development, innovation and HRD, local governments make almost none.

While international agencies are pushing decentralisation of provision of public services with scant regard to its effect on HRD and efficiency, some case studies reveal that decentralisation may undermine efficiency owing to neglect of HRD. Two studies from the water and sanitation sector are of particular interest. A World Bank (1990) document on water supply and sanitation in Peru while describing decentralisation as a ‘desirable trend as it brings the level of responsibility closer to the users’ frankly admitted:

The management of services in more than 400 urban centres of less than 100,000 inhabitants is of particular concern. These towns are unable to offer attractive working conditions and vocational training to qualified personnel and run water and sanitation operations at a satisfactory level …In the next two or three years, it is likely that response capacity of the new sector will be even worse than it is today.

This is true even in progressive states like Karnataka in India (Saleth & Sastry, 2004).
Another example of water collection and treatment comes from Tunisia, where training programmes started after centralisation of water supplies resulted in formation of a competent cadre of technical professionals. Khellaf (1992) attributes steady improvement in the provision, not to centralisation per se, but to streamlining of administration and HRD through training of personnel.

As the main component of capacity building, HRD in the water sector is often viewed as a holistic concept which includes training for research in technical subjects as well as policy analysis. However, the most relevant component for supply efficiency is vocational training, because technicians are charged with the operation, repair and maintenance of the equipment. Technicians must not only learn what is needed today but also how to meet the needs of tomorrow. Such training covers technicians who operate water purification plants, community level water supply caretakers and the people who undertake water testing. Vocational training also includes special programmes for accounting and book keeping. Only continuous learning through vocational training will ensure that the water professionals keep up-to-date with the latest developments that are having an impact on the water sector.

3. The setting

In India’s constitution, subject matter relating to water is within the purview of the state governments. Water is a major input to other sectors like health, agriculture, industry, inland transport and tourism. These subjects are also within the purview of state governments. Theoretically, the role of the federal government is limited to policy formulation relating to water and environmental issues and the coordination of inter-state water sharing and the adjudication of its disputes. However, in practice, the role of the federal government is enhanced, as it provides substantial amounts to the state governments to fund irrigation and drinking water schemes directly as well as through federal welfare schemes like the employment guarantee scheme.

Over the last two decades, there has not been much change in the financing pattern of the drinking water sector. For new and augmentation projects, sub-national governments provide 60% of the finances, federal government provides 35% and 5% comes from international aid agencies. For operations and maintenance (O&M), 100% of the funds come from sub-national governments. The water supply programme in India is not aid-dependent as the financial contribution from international agencies as a proportion of total expenditure in the sector is very small. Thus, policy making is autonomous. The aid component is found to be useful by federal and state government officials for demonstration projects, trainings and visits abroad. International agencies are also viewed as a source of intellectual capital.

While India’s federal system goes back six decades, an amendment to the Constitution in 1993 formalised the political structure of local government. State governments are encouraged to decentralise more and more functions to local government. Much of the federal funds being transferred to the state governments in the drinking water sector are tied to the conditionality of decentralisation to local bodies. In a large number of programmes, for example employment guarantee schemes, the state government exercises authority functions and the provider function is handed over to local government. In some cases, for example in the construction of a piped water supply scheme, local government may take a loan from a public institution and because it does not have the technical capacity, gets a state government agency to execute the project as a ‘deposit work’. The O&M functions of the government infrastructure remain with the respective government, that is, the authority functions and provider functions remain amalgamated. All state governments are committed to the transfer of O&M of drinking
water schemes to local bodies. This decision has not yet been fully implemented mainly because the local bodies are unwilling to accept responsibility for utilities, none of which are likely to return a profit. Where the decentralised operations have been implemented, state governments continue to provide support, both financial and logistic, to train the officials of local government, but the local government is not always willing to take full advantage of such offers.

The study covers large villages and small towns of the three large Indian states: Madhya Pradesh, Chhattisgarh and Jharkhand. With a total area of 523,000 km² and a population of 93 million, the states taken together cover the whole of the central and a part of eastern India. About 85% of the population of large villages and small towns is covered by piped water supply schemes, either with household connections or public stand posts within easy reach. The uncovered population, usually on the periphery of the habitations, gets water from hand pumps or from unsafe sources. Water vending is not prevalent in the area of study. Often people with household connections and those living near public stand posts supplement their water requirements from other sources, as the piped water supply is available for only few hours a day.

Non-government organisations (NGOs) are in favour of decentralisation; but they hold the state government responsible in a crisis situation even where the water utility is under the control of the local government. Federal and state human rights commissions have become active since a General Comment on the Right to Water was adopted by the UN Committee on Economic, Social and Cultural Rights at its 29th session in November 2002. This Comment (No. 15) affirms that: ‘the human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses’. The human rights commissions hold the concerned state government responsible for human rights violation when a water utility, decentralised or not, fails to deliver. In a crisis situation, when a local government utility fails to provide drinking water, the state government has to step in and the utility starts working de facto as a centralised utility. In a number of cases where state governments were found to be reluctant to take over such a water supply system, the courts have compelled the state governments to do so, citing the state’s responsibility to protect its citizens. In essence, hard budget constraint does not operate on the local bodies.

4. Data, methodology and preliminary analysis

4.1. Data

The data for this study were obtained from a large survey which also covers issues other than decentralisation and HRD. The sampling frame was the 2001 census list of small towns and large villages (with a population above 2000). This list is deemed to be reliable because unlike many third world countries, India has a non-controversial technocratic system for collection of statistics. In the absence of any significant private sector market for data, federal and state governments are the best sources of data. While the data are not published systematically or regularly, either on a website or in print, they are usually available to researchers. After obtaining the relevant information from the Public Health Engineering Departments of the three state governments, villages which did not have a functioning piped water supply scheme were left out. From this pruned list, 200 small towns and villages were selected randomly using the methodology of National Sample Survey of India with a probability proportional to the population. This method is commonly used by the National Sample Survey Organisation in India, whose methodology was copied.
Basic data relating to the water utilities, including financial data available at the two state capitals were not up to date. Accordingly, the data was obtained from the utilities directly. Data relating to loss in transmission and actual use by consumers were found to be unreliable, as the metering of water supply at the consumer level is often either absent or dysfunctional. However, figures relating to annual production by the utility are available. An acceptable quality has been standardised by the federal government. However, the acceptable quality of ‘safe water’ is only a benchmark and the utilities do supply water which does not measure up to the standards set by the federal government. In large villages and small towns the quality of water is examined only once a day. After all the tests, the chemist records whether the water sample tested is of the requisite standard. Figures relating to quantity and quality of water were obtained from each utility surveyed. Data on availability of training at the place of work and the distance between the utility and the training centre (usually at the district headquarter) in kilometres was also recorded.

Utilities were visited by research assistants in the summer of 2010. The training of research assistants was done by consultants M/s Mott Macdonald who have long experience in the water sector of South Asia and covered, among other subjects, examination of the records of the utilities including accounts. Research assistants were required to furnish a short one page case study along with the data.

4.2. Dependent variables

We use three empirical measures of efficiency, one each relating to cost, quantity and quality:

1. Expense ratio, that is, operating expense scaled by annual production indicates how effectively the utility controls its operating costs. In an industry, operating expense is defined as total expenses minus cost of goods sold, interest expense and managerial compensation. In the present instance, since no royalty is payable on raw water, the cost of goods sold is zero. O&M costs used in the computations do not include depreciation and debt service. Controlling for size, inefficient utilities are likely to have higher operating expenses.

2. Asset utilisation, that is, annual production of potable water divided by assets indicates how well the industry utilises its assets. Low productivity of employees will lower asset utilisation. Inefficient utilities can be expected to have lower asset utilisation.

3. Water quality, that is, the percentage of water samples found to be up to standard during the last year.

4.3. Independent variables

The utilities under the administrative control of the state (regional) government are classified as centralised, whereas those under the control of local government are classified as decentralised. A small number of utilities were found to be functioning de jure under local government but were manned by personnel from the state government on deputation. Such virtual takeovers occur either when a local government fails to run the utility and the state government has to step in to provide for the people or when the local government implodes and all its functions are temporarily taken over by the state government’s bureaucrats. Such utilities are categorised as centralised for our purpose. As a determinant of supply efficiency, independent variable decentralisation is a dummy variable, taking a value of 1 for decentralised utility and of 0 otherwise.

Since a similar study has not been done before, other independent variables required careful selection. These independent variables have been chosen on the basis of economic logic rather than through
computer programs which facilitate choice of variables which give the highest adjusted $R$ square. Since some utilities use surface water and some use ground water, water source is a geographical variable – a dummy variable taking a value of 1 for surface water and 0 for ground water. On the other hand, the age of the water supply scheme in years (at the end of March 2010) is a continuous variable.

For appropriate scaling, we have adopted 1,000 L as a unit of annual production. When we regress the expense ratio against annual production, we find a negative relationship that is statistically significant ($t = 6.3$) indicating the existence of scale economies. Regression for asset utilisation ratio against annual production also yields an inverse relationship ($t = 2.1$). Similar results were obtained when these measures were regressed against the natural logarithm of annual production. We use the test proposed by Bera & Jarque (1982) and the MWD test (MacKinnon et al., 1983) and find that as an explanatory variable, log of annual production will be more appropriate. Accordingly, log of annual production is used as the size variable.

Financing variables are based on debt, as it is widely recognised that external monitoring by the lenders can improve efficiency. Quantitative research in this field, beginning with Diamond (1984) and Fama (1985), has been continued by Diamond (1991), Rajan (1992) and Chava & Roberts (2008), among others. Debt has two dimensions – quantity of debt and whether it is long term or short term. Macaulay’s duration, roughly the weighted average of the repayment period, measures the maturity structure of debt. The higher the debt-to-asset ratio and the higher the duration, the greater is the incentive for the lender to monitor the managers. Consistent with literature in Finance, we include ‘debt-to-asset ratio’ and ‘duration’ as financing variables.

To explore whether HRD is a significant determinant of production efficiency, we focus on vocational training. On the job training is available at very few places and employees have to be sent out of their place of work for training. It has not been possible to estimate the amount spent on training because much of the training was provided free of cost by state and federal government agencies. The training variable has been measured as the number of days of training per year for an average employee.

### 4.4. Preliminary analysis

Table 1 reports the mean and median of the two measures of efficiency in respect of decentralised and centralised utilities. The mean expense ratio for decentralised utilities is 44.0 whereas that for centralised utility is 40.1. This difference of 3.9 is statistically significant at one percentage level. Looking at the asset utilisation, we find that production by decentralised utilities is almost 10% less than that of centralised utilities. The difference is statistically significant at the 5% level. These figures are only an indication as the impact of other factors has not been controlled in the comparison at this stage.

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Decentralised</td>
</tr>
<tr>
<td>Expense ratio (operating expenses in US$ scaled by annual production)</td>
<td>44.0</td>
</tr>
<tr>
<td>Asset utilisation (annual production of potable water divided by assets)</td>
<td>188</td>
</tr>
<tr>
<td>Water quality (percentage of samples found to be up to the standard)</td>
<td>86.9</td>
</tr>
<tr>
<td>Training (number of days per year per employee)</td>
<td>3.54</td>
</tr>
</tbody>
</table>

***indicates significance at the 1% level, **at 5%, *at 10%.
Comparison of means and medians is at best an indicator of directionality. From Table 1 we also note that the number of days spent training an employee of a decentralised utility is only half the number of days spent on training an employee of a centralised utility.

5. The model

To establish a linear relationship between supply efficiency and decentralisation, it will be useful to note that most of the variables that are hypothesised to influence supply efficiency or inefficiency ($E$), viz. financing variables, water source, size and age of the utility (denoted by the matrix $Z$) are not determined even in part by decentralisation. On the other hand, the training variable ($T$) may be determined by decentralisation and other inputs. Multivariate equations are then:

$$E_i = \alpha + \beta D_i + \delta_Z Z_i + \delta_T T_i + \epsilon_i$$  \hspace{1cm} (1)

$$T_i = \alpha + \beta' D_i + \gamma_Z Z_i + \gamma_X X_i + \epsilon$$  \hspace{1cm} (2)

where $D_i = 1$ for decentralised projects and $D_i = 0$ for centralised projects, while $X$ is the matrix of non-decentralisation determinants of the $T$ variable.

The distinction between $Z$ and $T$ is important for maintaining the distinction between the partial and total impact of decentralisation on the supply efficiency. In Equation (1), the $\beta$ coefficient gives the direct impact of decentralisation, that is, holding all included variables constant:

$$\frac{\partial E}{\partial D} = \beta$$  \hspace{1cm} (3)

But decentralisation may also influence supply efficiency indirectly because of its effect on training. The total impact of decentralisation is the sum of the direct and indirect impacts:

$$\frac{dE}{dD} = \frac{\partial E}{\partial D} + \frac{\partial E}{\partial T} * \frac{\partial T}{\partial D} = \beta + \delta_T * \beta'$$  \hspace{1cm} (4)

Before adopting the model we have considered the issues relating to subjectivity, joint determination and causality, the details of which are given in the Appendix.

6. Results

Table 2 presents the results obtained from multivariate regressions to explain the determinants of efficiency. Columns 2 and 3 of Table 2 present the results of multivariate regression with expense ratio (i.e. operating expense scaled by annual production) as the dependent variable. We find that the coefficient for decentralisation is highly significant. However, its value does not indicate the full impact of decentralisation which, in our model is also acting through HRD. Expense ratio is larger in surface water schemes compared to ground water schemes. As expected, the coefficient for utility size is negative,
indicating economies of scale. The coefficient for utility age was not found to be significant. Unexpectedly, financing variables were found to be insignificant. The possible reason is discussed in the next section. The training variable was found to be significant at the 1% level. The negative sign of the coefficient confirms that training improves performance, reducing the operating ratio. To check on diminishing returns for training, we introduced the square of training as a variable. The coefficient was not found to be significant. Columns 4 and 5 present results obtained from multivariate regression to explain the determinants of asset utilisation. The levels of significance of various variables and the adjusted R square are lower than in the previous set of regressions reported in columns 2 and 3. Nevertheless, the coefficient for decentralisation is negative and its absolute value is smaller than that of difference in means. Asset utilisation is better in the case of ground water schemes and in the case of larger water utilities. The coefficient for utility size is not significant. Once again, we fail to find significance in either of the two financing variables. The training variable is positive and significant at the 1% level, indicating better asset utilisation by trained personnel.

Results relating to determinants of water quality are presented in columns 6 and 7. We find that water quality is better in newer and larger utilities and those using ground water (because of the problem of residual chlorine in surface water treatment). Unexpectedly, not only the financing variables but also the decentralisation variable failed to show significance. This, however, does not mean that the effect of decentralisation on water quality is uncertain. The decentralisation is acting through the training variable which we find significant at the 1% level.
In the next set of regressions, training is used as a dependent variable. We have used two extra independent variables that could affect HRD but do not affect decentralisation. Availability of training on site is a dummy variable with a value of 1 when such a rare facility is available and a value of 0 otherwise. Another variable is remoteness. Instead of taking the distance between the place of work and the training centre, on the basis of the Bera & Jarque test and the MWD test, we have taken the log of distance as an independent variable. Results are reported in Table 3.

We find that decentralisation is a significant variable with a negative sign. Its absolute value is less than that of difference of means. This is so because other factors that could affect decentralisation also affect training. We find more training per employee in utilities using surface water in larger and older utilities. Financing variables were not found to be significant. Unlike loans to micro-enterprises, loans to water utilities do not have a training component. Two variables that are not correlated to decentralisation, viz., availability of training on site and remoteness from training were also found to be significant with the expected signs. We extract from $\delta_T$ from Table 3 and calculate the direct and indirect influence of decentralisation on supply efficiency in Table 4.

In most of our regressions, adjusted $R$ square is not too high but the $F$ statistic is significant. More importantly, the coefficients of our interest are significant. The coefficient for the decentralisation

### Table 3. Determinants of HRD.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th></th>
<th>(2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>$-8.25^*(4.22)$</td>
<td></td>
<td>$-9.23^{**}(4.10)$</td>
<td></td>
</tr>
<tr>
<td>Decentralisation</td>
<td>$-2.79^{**}(1.09)$</td>
<td></td>
<td>$-2.61^{***}(0.98)$</td>
<td></td>
</tr>
<tr>
<td>Water source</td>
<td>$0.28^*(0.15)$</td>
<td></td>
<td>$0.30^{**}(0.14)$</td>
<td></td>
</tr>
<tr>
<td>Financing variables:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) Debt to asset ratio</td>
<td>$0.20(0.13)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Duration</td>
<td>$0.08(0.05)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility size</td>
<td>$1.18^{**}(0.58)$</td>
<td></td>
<td>$1.27^{***}(0.48)$</td>
<td></td>
</tr>
<tr>
<td>Utility age</td>
<td>$0.40^*(0.22)$</td>
<td></td>
<td>$0.45^{**}(0.22)$</td>
<td></td>
</tr>
<tr>
<td>Availability on site</td>
<td>$2.20^{**}(0.10)$</td>
<td></td>
<td>$2.21^{**}(0.99)$</td>
<td></td>
</tr>
<tr>
<td>Remoteness</td>
<td>$-0.20^{*}(0.10)$</td>
<td></td>
<td>$-0.20^{*}(0.09)$</td>
<td></td>
</tr>
<tr>
<td>Regression summary statistics:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted $R$ square</td>
<td>$0.288$</td>
<td></td>
<td>$0.305$</td>
<td></td>
</tr>
<tr>
<td>$F$</td>
<td>$753^{***}$</td>
<td></td>
<td>$545^{***}$</td>
<td></td>
</tr>
<tr>
<td>$N$</td>
<td>$200$</td>
<td></td>
<td>$200$</td>
<td></td>
</tr>
</tbody>
</table>

***indicates significance at the 1% level, ** at 5%, * at 10%.

### Table 4. Direct and indirect influence of decentralisation on production efficiency

<table>
<thead>
<tr>
<th>Measures of efficiency</th>
<th>Direct $\beta$</th>
<th>$\delta_T$</th>
<th>$\beta$</th>
<th>$\delta_T \times \beta$</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expense ratio (operating expenses in US$ scaled by annual production)</td>
<td>1.19</td>
<td>$-0.51$</td>
<td>$-2.89$</td>
<td>1.47</td>
<td>2.66</td>
</tr>
<tr>
<td>Asset utilisation (annual production of potable water divided by assets)</td>
<td>$-5.19$</td>
<td>$2.53$</td>
<td>$-2.89$</td>
<td>$-7.31$</td>
<td>$-12.50$</td>
</tr>
<tr>
<td>Water quality (percentage of samples found to be up to the standard)</td>
<td>0</td>
<td>0.39</td>
<td>$-2.89$</td>
<td>1.13</td>
<td>1.13</td>
</tr>
</tbody>
</table>
variable is not too large either, yet its significance and sign go against the prevailing policy advice in favour of decentralisation.

7. Policy implications and conclusion

International agencies have come to believe that in the interest of democracy and efficiency, the responsibility for provision of public services like drinking water should lie with the lowest level of government. In the area of study, the German aid agency KfW cancelled the second phase of their water supply project because decentralisation was incomplete. In their view, as in Germany, provision of public services should lie at the lowest level of government.

Political arguments in favour of decentralisation appear to be strong because most of the literature on decentralisation concerns itself with decentralisation from national to sub-national government. Decentralisation of responsibilities from one level of sub-national government to a lower level may not necessarily be conducive to promotion of democracy. The view that the people want decentralisation while the regional level politicians and bureaucrats oppose it is without foundation. Decisions relating to decentralisation are taken without any referendum, paradoxically at the central level. Often military dictatorships and other autocrats have devolved powers to local government thereby weakening regional (provincial or state) governments, incapacitating them from posing any challenge to the central leadership. For example, every time a military dictator takes over neighbouring Pakistan, decentralisation of powers and responsibilities, including those relating to water management, to local government takes place; when a democratic government returns, there is a reversal (Haidar & Badami, 2010). Mishandling of the situation caused by the floods which devastated vast areas of the country in 2010 is partly attributable to the fact that at the time of the floods, administrative transition was in progress, causing confusion all round. Decentralisation of water supply to local government can be justified only on the basis of project outcomes rather than a vague notion of promotion of democratic values.

Some empirical evidence substantiates the view that beneficiary participation at various stages of the drinking water projects could improve efficiency (Isham et al., 1995), but it cannot be taken for granted that decentralisation will lead to productive participation. Even strong votaries of decentralisation have warned that we should not idealise the village community (Petrella, 2001). The pressures of caste, tribe and local politics are too strong for local government to ignore. The location of public water stand posts is an example. The federal and state governments have issued clear guidelines as to how these should be located with a view to serving the disadvantaged sections of the population. Often, functionaries of local government install these stand posts near influential households. Where patron–client relationships predominate, the local elite tends to satisfy their client networks by manipulating devolved resources (Manzetti & Wilson, 2007). Instead of ‘voice and choice’ often one comes across an ‘I decide; you participate’ kind of situation. In a fragmented unequal society, the decentralisation process is political rather than participative and elite capture is a common occurrence (Platteau, 2004).

Decentralisation is also viewed as a mechanism for controlling the size of the public sector. From this perspective, the government sector is viewed as a Leviathan that seeks its own aggrandisement while decentralisation places constraints on the Leviathan to channel resources to itself. In some international organisations pushing structural adjustment and transitional reform, decentralisation has often been used in the same breath as privatisation (Wilder & Lankao, 2010). While the gains of privatisation are context specific, the potential for violent opposition is never far away. In India, privatisation is limited to some
small industrial areas. Owing to a lack of political consensus and appetite for social conflict, the option of privatisation has not been debated even in respect of cities. Privatisation of water supplies in small towns or villages is nowhere on the horizon.

Short of privatisation, can the decentralised utilities be made more responsive by using vigorous monitoring by the financial institutions? Our results show that financing variables are not significant determinants of efficiency. Loans to water utilities are available without collateral because the state government stands guarantee to the loan. In case of default, the guarantee is rarely invoked and the matter is sorted out between the lender and the borrower by rescheduling of loans. Loans are provided by the Life Insurance Corporation of India and some other nationalised institutions at a low rate of interest as a social obligation to the health sector. Often loan conditions specify a benchmark for performance and commitment on the part of the borrower in respect of good practice including HRD. Since foreclosure is only a theoretical possibility, such conditions are not of much relevance. State government guarantees generate a flow of funds to the sector. At the same time they have a perverse effect in the sense that the lender has little incentive to monitor the performance of the borrower.

The lack of funds available for training is not the reason why local government officials are not well-trained. Another reason is diseconomy of scale. When a state government official goes to be trained, there is no problem in finding another official who can share the load, often from another utility. However, in the case of local government, there is reluctance to send technicians out for training and on the spot training is not easily feasible. Thus local officials often miss out even on the free training programmes provided by state governments. It is possible to overcome this handicap through cooperation between the local governments or through assistance from the state government. The case studies reveal that local leaders were not much concerned with training³. The main reason for neglect of HRD seems to be a lack of understanding of the importance of training among the local level politicians who have less interaction with the outside world compared to their counterparts at the regional or national level.

The answer would appear to be to incorporate HRD in the scheme of decentralisation. This is easier said than done. The adequacy of available information on human resources is never appropriate or timely. The definition of personnel management processes does not proceed in parallel with the design of organisational structures. Moulding organisational structure to suit the needs of decentralised management or the creation of new structures is very difficult, especially when the timetable for implementing the new decentralisation arrangements is often very constrained, allowing little time for examining the human resource implications of the proposed reforms. Decisions or absence thereof about the responsibility for training and training institutions can have a long-term impact on the level of competence of the field level staff.

There is a need to segregate political and economic outcomes while considering decentralisation of water supplies in developing countries. When it is a case of decentralisation from the national level to a sub-national government (regional or local), political objectives would probably trump economic ones. When it comes to decentralisation from one level of sub-national government to a lower level, this is unlikely to be the case. This is not to suggest that local governments would remain less responsible or less efficient forever. The situation could change through learning by doing. This would require

³ The case studies also confirmed findings of many earlier studies (e.g. Narayana, 2005) that the educational level of leaders of local government is substantially lower than that of their counterparts at the state level. According to Bardhan (2002), the decentralization literature typically assumes that leaders at different levels of government all have similar levels of capacity which is not true in developing countries – street cleaning or garbage collection may not require capacity building but bulk supply of clean water and public sanitation do.
moving away from an *ad hoc* attitude towards consistent long-term plans. At present, in most developing countries, no long-term viable strategy for decentralisation and human resource development is in place. There is only ham handed pressure from the donor community and the metropolitan elite to decentralise. Decentralisation does not seem to lend itself to increased efficiency in water supply. Instead, the increase in efficiency seems largely to depend on the HRD which is negatively associated with decentralisation. The assumption that a government which is ‘closer to the people’ will provide better public services is intuitively appealing but does not pass the test of empirical validity.

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**References**


Appendix. Issues relating to subjectivity, joint determination and causality

A.1. Halo effect

While everyone appreciates efficiency, decentralisation too, notwithstanding the voices of caution mentioned earlier, is generally regarded as a good thing. HRD is like motherhood and apple pie; nobody is opposed to it. The halo effect is a systematic measurement error induced by an association between subjectively measured variables even in the absence of any true relation between these variables. It is a psychological tendency to associate all good things (Hamermesh & Biddle, 1994). In studies trying to measure effects of participation, democracy, transparency and so on, the halo effect can affect the measurement of the dependent variable. Subjective measures relating to efficiency, decentralisation and HRD would be subject to the halo effect. For this reason, we have avoided subjective cardinal or ordinal measures of project effectiveness and focused on three measures of supply efficiency which can be easily measured. This obviates the problem of the halo effect.

A.2. Simultaneity

Could it be that while decentralisation affects supply efficiency, efficiency also affects decentralisation? When the project is ineffective for extraneous reasons, does the state government pass the problem on to the local government in the name of decentralisation? It is important to test for simultaneity because in the presence of simultaneity, while Equation (1) will continue to hold, another relationship will develop:

\[ D_i = \lambda + \delta_D * E_i + \hat{\eta} \]  

(A1)
where \( D_i = 1 \) for decentralised projects and \( D_i = 0 \) for centralised projects. We observe that \( \eta \) affects \( D \) in Equation (4) and \( \eta \) and \( \varepsilon \) are correlated. Since in Equation (1) an explanatory variable is correlated with the independent variable, if the relationship specified in Equation (4) exists, the ordinary least squares (OLS) regression will not give correct results.

The problem of the possibility of simultaneity can be circumvented by using an instrumental variable in a two-stage least square regression (2SLS). In the presence of simultaneity, use of OLS is inappropriate; but if there is no simultaneity, we should avoid using 2SLS. This is because OLS estimates are unbiased and have minimum variance. In the absence of simultaneity, OLS estimators will be BLUE (best linear unbiased estimators). Hence we need to test for simultaneity before choosing the regression method.

Since the sample size is not small, the non-normality problem of linear probability model has been minimised. The heteroscedasticity problem has been solved by the use of weighted least squares. Resort to restricted least squares or mathematical programming was not required as the values of the estimator of \( E \) did not lie outside the 0–1 range. To test for simultaneity, we use a version of the Hausman (1978) test. First we estimate \( E \) in Equation (1) as a linear probability model to obtain \( \hat{D} \) and then substitute this linear probability in a new equation:

\[
E = \alpha + \beta * D + \gamma Z + Z + \delta \hat{D} + \varepsilon
\]  

(A2)

We then test the hypothesis that \( \delta = 0 \) and conclude that the hypothesis is not rejected. Hence \( D \) can be treated as exogenous. There seems to be no problem of simultaneity.

### A.3. Spurious correlation

Could it be that the joint determination of the supply efficiency of the project and decentralisation may be driven by a third local or project attribute? Although we have tried to address this concern by including all possible performance determinants, some unobservable variables could cause spurious correlation. If this were the case, decentralisation and supply efficiency data could be strongly associated with each other, positively or negatively, even without an independent causal effect of decentralisation on production efficiency. We use two approaches to resolve the problem of joint association and to demonstrate a causal impact: timing and case studies.

We find that more often than not supply efficiency deteriorated after decentralisation even when other determinants remained the same. In some cases, on account of public agitation against poor service, the state governments had to *de facto* re-centralise the projects. There seems to be no evidence of any third factor driving the supply efficiency and decentralisation together in the same or opposite direction. Accordingly, reverse causation and spurious correlation can safely be ruled out.