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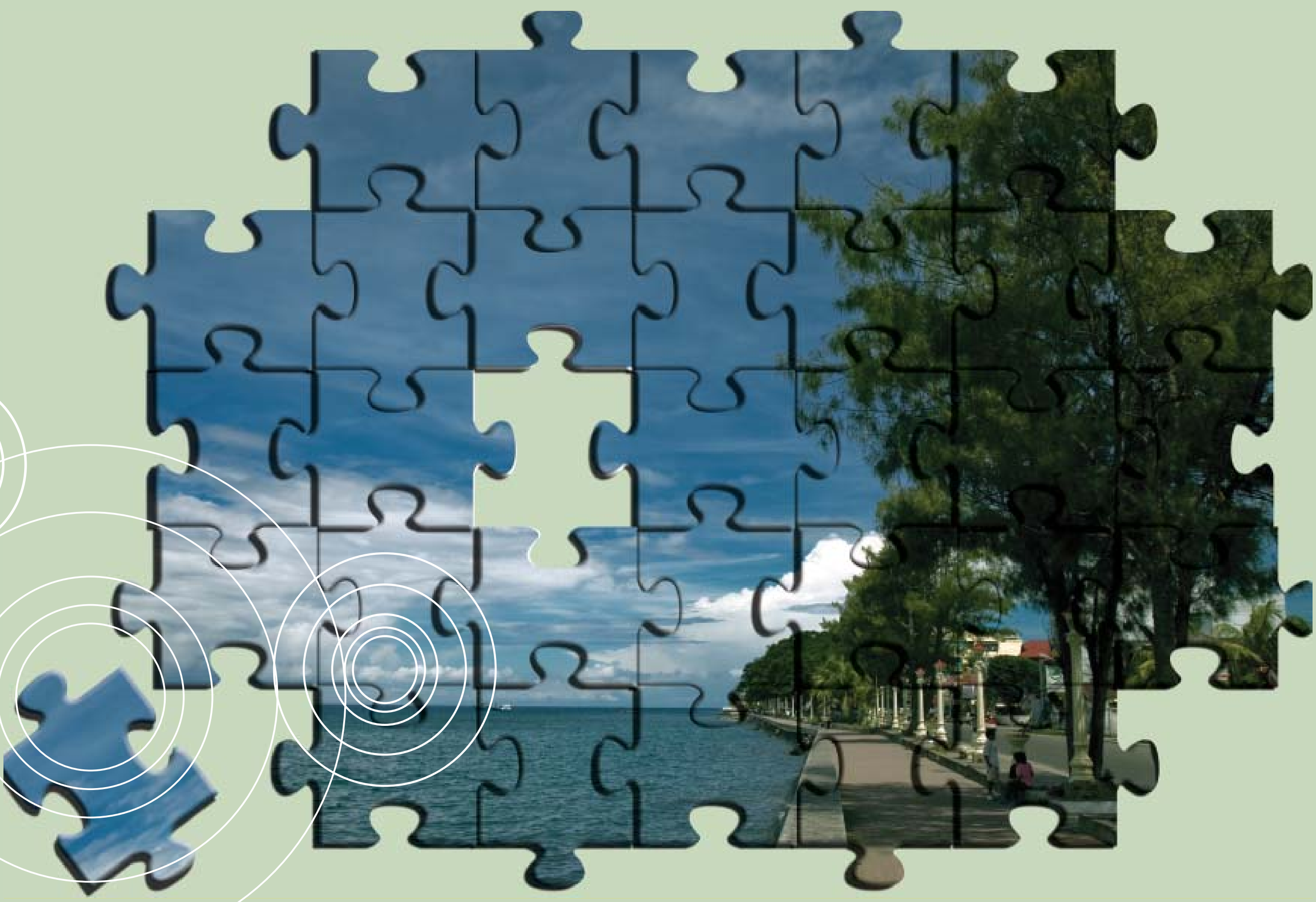
Field Note

An Analysis of 35 Water Districts

Prospects and Pitfalls in Integrated Water Services in the Philippines

The Philippine water supply sector is characterized by large numbers of service providers – almost 2,000. The biggest challenge for integrated water supply in the Philippines is to improve efficiency in order to take fuller advantage of economies of scale.



Formed at the option of local governments, water districts are local public corporations serving urban areas that have a population of more than 20,000 people.These water districts serve the largest portion of the urban population with house connections.

Executive Summary

Water districts—local public corporations serving urban areas with a population of at least 20,000 people—serve the largest portion of urban populations with house connections of all providers in the Philippines. This Field Note looks into the experience of integration among municipalities and cities under a water district structure. Using data from 35 integrated and 109 nonintegrated water districts, the study confirms the potential advantage of increasing scale to the reduction of unit costs. However, the study notes that integrated water districts did not perform as well as nonintegrated water districts of the same size because of higher fixed costs and greater inefficiency.

Introduction

The biggest challenge for integrated water supply in the Philippines is to improve efficiency in order to take fuller advantage of economies of scale. This is a key finding of this empirical study of 35 integrated water districts.

The Philippine water supply sector is characterized by large numbers of service providers – almost 2,000. There are many types of water operators, but across the board, the large majority of these are small in scale.[1] Sector policy makers are therefore interested in understanding whether integration, identified by *a single administrative structure providing services to more than one city or municipality*, could be a strategy to increase access to sustainable services.

The Study

Integration outcomes were examined, primarily from water district data. Three-year performance and financial data (2003 to 2005) for 35 integrated water districts were analyzed, and compared with parallel data from nonintegrated water districts. To control for the effects of size and system design in the comparison, systems were categorized by type and size, as shown in Tables 1 and 2.

Table 1. Water Supply Systems Categorized by Type	
System 1	Pump-fed (either source supply or distribution) with chlorination
System 2	Pump-fed with water treatment facility
System 3	Gravity-fed (both source and distribution) with chlorination

1 In 2007, representatives of the Philippine water sector made several attempts to define a "small" utility, but no consensus was reached. However, Local Water Utilities Administration (LWUA) water districts, which number around 468, are grouped by size into five categories. Those categorized as small have a maximum of 2,000 service connections. In addition, about 90% of around 200 water cooperatives that have fewer than 2,000 service connections have generally been categorized as small utilities.

Table 2. Water Supply Systems Categorized by Size	
Group A	less than 1,000 service connections
Group B	1,000 to < 2,000 service connections
Group C	2,000 to < 3,000 service connections
Group D	3,000 to < 4,000 service connections
Group E	4,000 to < 6,000 service connections
Group F	6,000 to < 8,000 service connections
Group G	8,000 to < 10,000 service connections
Group H	10,000 to < 30,000 service connections
Group I	30,000 and above

Water district management and operations are governed by a special law, which may affect some of the results. The general conclusions, however, were also observed in the few cases of integration involving nonwater districts, which are not discussed in this note.[2]

Integration of Water Districts

Formed at the option of local governments, water districts are local public corporations serving urban areas that have a population of more than 20,000 people. They are established with the support of a specialized national lending institution, the Local Water Utilities Administration (LWUA). Of all providers, these water districts serve the largest portion of the urban population with house connections – around 14 million people in total.

The Provincial Water Utilities Act of 1973 stipulates rules on the formation of integrated water districts and allows for the consolidation of assets or joint operation of services based on a finding of 'best interest' by LWUA and following a public hearing.

Number and Coverage: There are 45 integrated water districts. Together, they account for a quarter of the total number of connections provided by the country's 468 water districts, which is an indication of their size advantage. Fourteen of these integrated water districts fall within the second largest size category (between 10,000 and 29,999 connections). Twenty-seven serve between three and nine municipalities or cities, while the remaining 18 cover just two municipalities (see Figure 1).

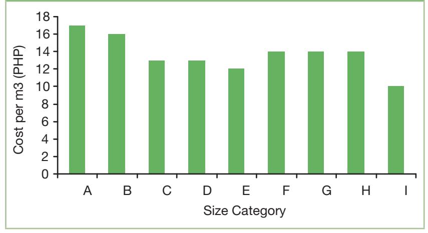
Scope of Integration: Just under half of the systems (20) are unified by a single system and network covering the service area; another 21 are clustered, with separate production and distribution systems under one entity; and four systems have bulk water supply arrangements.

Where are the Economies of Scale?

A potential advantage of integrating water supply services across administrative units is reduction of unit costs as scale increases.

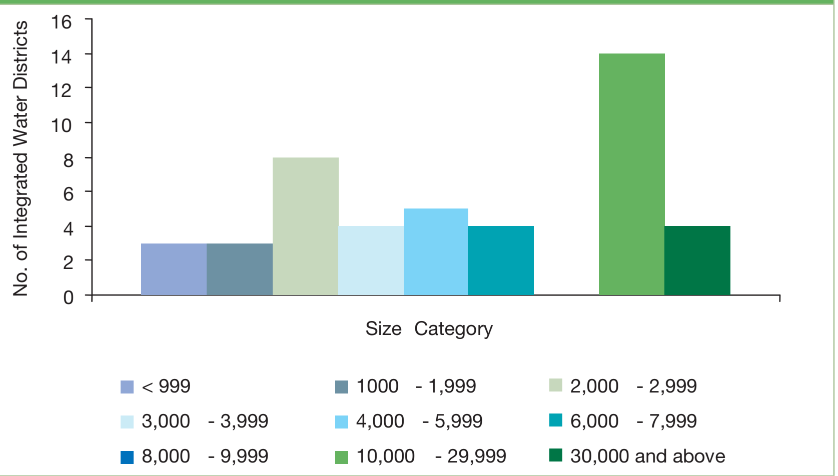
The study found that in nonintegrated water districts, cost per cubic meter decreased with growth in utility size from category A (< 1000 service connections) to category E (< 6000 service connections), before rising and remaining constant until the utility size reached category I (> 30,000 service connections), as shown in Figure 2.

Figure 2. Cost of Water (per cubic meter) by Utility Size



Returns to scale were further measured using a simple linear model that forecasted the change in cost if the volume of production was doubled. Only data from water districts using pump-fed with chlorination systems (type 1) were studied, and only for utilities in size categories A, C, D, E, F, H and I, since these were the only categories that yielded sufficient numbers of observations. The forecasting was done for both integrated

Figure 1. Integrated Water Districts by Size



2 De Vera, Calderon and Sy, "Philippine Experience in Integrated Water Supply Systems" (2008).

> The combined results for integrated water districts and for nonintegrated water districts confirm that per unit input costs fall as output increases. Comparing nonintegrated and integrated water districts, the potential gain from increasing production is greater in the latter.

and single water district systems, and then separately for each size group.

The combined results for integrated water districts and for nonintegrated water districts confirm that per unit input costs fall as output increases. In integrated water districts, costs increased at the rate of 70% for a 100% increase in volume produced, for a decrease in unit cost of production from PHP 10.00/m^3 to PHP 8.20/m^3. A similar result, though somewhat less dramatic, was observed for nonintegrated utilities. The rate of increase in cost was 83% for a doubling of volume produced, which translates as a reduction in unit cost from PHP 9.00/m^3 to PHP 8.30/m^3. Note, however, that at current production levels, the average per unit cost of production is lower for nonintegrated utilities (PHP 9.00/m^3) than for integrated utilities (PHP 10.00/m^3).

Comparing nonintegrated and integrated water districts, the potential gain from increasing production is greater in the latter. This is explained by the higher proportion of fixed expenditure in the cost structure of integrated systems. Fixed costs in nonintegrated water districts comprise 70% of total cost, compared with 80% in integrated water districts. This is because integrated water districts have longer pipelines and wider service areas with satellite offices, which require a larger pool of personnel to operate and maintain. Also, due to peculiarities in water district regulations, staff salaries in integrated water districts tend to be higher than in nonintegrated water districts.[3]

Water Supply Service Mergers

During the six-year period between 1999 and 2005, the integration of municipalities into 17 water districts and the division of four integrated systems took place, resulting in the current 45 integrated systems.

Why do cities and municipalities come together under a single water district?

While mergers of private businesses are commonly driven by a desire to enhance revenues either through a larger market share or reduction of per unit costs, the primary reasons for water district integration in the Philippines were rather different.

Existing System Design: Integrated systems were the design of choice for water supply development during the years of centralized water management before the introduction of the water district model. Prior to the 1970s, a central agency was responsible for constructing water supply distribution systems across the country, which were later transferred to provincial governments.

Water Source Sharing: For 14 water districts, integration was driven by water scarcity in adjacent municipalities and cities. This type of arrangement benefits 40 municipalities and cities where water supply is scarce and customer concentration is high.

Political Vision: In a few cases, the creation of integrated water districts was driven mainly by the political vision of a provincial governor or member of congress, or by their recognition of the administrative expedience of such an arrangement.

Where the advantages of scale were recognized, the specific drivers were:

Lower Tariffs: The creators of the integrated water districts of Camarines Norte and Moncada conducted comprehensive tariff studies to support the decision to integrate. In both cases, lower tariffs would result in the investment costs being spread across a wider customer base.

Access to Financing: The specialized lender to water districts, the Local Water Utilities Administration (LWUA), encouraged nearby municipalities to join an existing water district or to come together to facilitate loan financing. In some cases, project financing proposals would not have been considered viable had the integration over the larger revenue base not taken place. Interestingly, however, it appears that in a few cases, the motivation had more to do with reducing the project preparation cost and timeframe by simply joining a water district already covered by LWUA's funding program.

Table 3 (next page) shows the rates of increase in costs for integrated systems, for the size categories studied, when production is doubled. With the exception of categories D and I, all size categories exhibit increasing returns to scale. Group I exhibits almost constant returns to scale, suggesting that this is close to the optimum size. The utilities examined within this category have between 40,000 to 64,000 connections, with around half having fewer than 50,000 connections.

3 Under the regulations of water district operations, the level of staff salaries and Board member honorarium increases as the size and revenue of the water utility go up.

Table 3. Increase in Total Cost and Comparison of Current and Projected Unit Costs, Assuming a 100% Increase in Production			
Size	Increase in Total Cost	Comparison of Unit Costs (PHP/m3)	
	%	Current Unit Cost	Projected Unit Cost
A	43%	13.82	9.91
C	36%	11.21	7.65
D	131%	20.89	24.17
E	39%	8.21	5.71
F	35%	10.19	6.90
H	67%	10.83	9.05
I	112%	8.45	8.94

Performance of Integrated Systems

As a class, integrated water districts have better potential to maximize revenues. Compared with nonintegrated systems, they cater to about twice as many customers and produce and bill double the volume (see Table 4). Volume of sales, however, is only one part of the revenue equation.

Table 4. Comparison of Revenue Potential

Parameters	Integrated Systems	Nonintegrated Systems
Average No. of Connections	17,666	9,418
Average Production, m3/year	8,289,024	3,502,083
Average Billed Water, m3/year	5,485,289	2,590,923

In general, the cost per cubic meter of water sold by integrated water districts is higher than that sold by nonintegrated water districts.

Table 5. Comparison of Average Operating Cost

	Unit Operating Cost (PHP/m^3)		
Size	Integrated	Single	All WDs
Group A	15.38	17.77	17.54
Group B	15.25	13.77	13.82
Group C	16.52	13.67	14.14
Group D	25.22	12.37	15.23
Group E	17.91	11.38	12.68
Group F	17.10	13.80	14.48
Group G	No sample	15.40	15.40
Group H	13.20	15.13	14.53
Group I	12.18	11.22	11.66

Operational Efficiency: The operational efficiency of integrated systems consistently fell short of their nonintegrated counterparts in all size groups. They exhibited poorer nonrevenue water reduction efforts (see Figure 3), and compared with an average of 5.4 staff per 1000 connections for nonintegrated water districts, integrated water districts employ 7 staff per 1000 connections (see Figure 4).

Figure 3. Comparison of Nonrevenue Water (System-1 Water Districts)

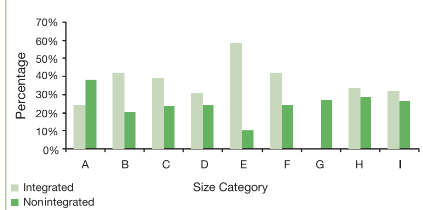
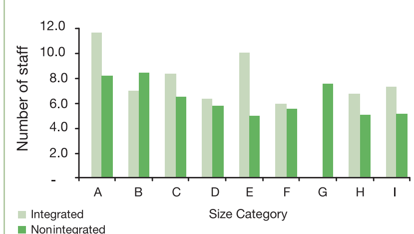


Figure 4. Comparison of Average Number of Staff (System-1 Water Districts)



Although poised to benefit from significant economies of scale, integrated systems did not perform as well as their nonintegrated counterparts. Customers within integrated systems are paying more for their water than customers in nonintegrated service areas, and growth in connections is slower in integrated water districts than in nonintegrated water districts.

Financial Performance: Integrated systems are financially healthy, in that they are generally able to cover their operations and maintenance costs. But compared with nonintegrated systems, they tend to be less profitable and have poorer short-term liquidity. On the other hand, the long-run liquidity of integrated water districts, measured by the ratio of debt to equity, is better than that of nonintegrated water districts of the same size (see Figure 5).

Figure 5. Comparison of Return on Revenue (System-1 Water Districts)

Table 6. Comparison of Average Working Capital (System-1 Water Districts)

Size	Integrated	Nonintegrated
	Days	Days
Group A	1,744	186
Group B	181	73
Group C	64	92
Group D	75	118
Group E	(108)	183
Group F	(72)	69
Group G	Not Applicable	110
Group H	114	107
Group I	131	182

Stakeholders' Proxy Indicators: Using connection growth and average tariffs as indicators, again, nonintegrated systems outperform integrated water districts. The average connection growth rate for integrated water districts for the three-year period was only 5% compared with 6% for nonintegrated systems. As shown in table 7, average tariffs are higher for integrated water districts in all but size group H.

Table 7. Comparison of Average Tariffs by Size (in PHP)

Size	Integrated	Nonintegrated
Group A	24.15	20.43
Group B	24.09	17.71
Group C	19.37	18.03
Group D	29.34	17.34
Group E	18.00	14.31
Group F	21.79	17.62
Group G	Not Applicable	19.84
Group H	16.76	18.06
Group I	18.01	13.15

Conclusions

Whether through expansion of single systems or integration of service areas, most water district size groups are in a position to take advantage of increased scale. Although poised to benefit from significant economies of scale, integrated systems did not perform as well as their nonintegrated counterparts. Customers within integrated systems are paying more for their water than customers in nonintegrated service areas, and growth in connections is slower in integrated water districts than in nonintegrated water districts.

Higher fixed operating costs combined with poorer efficiency stand out as the key challenge.

Performance results are partly explained by the higher fixed costs involved in operating water systems that cover more than one municipality or city. The largest cost components of integrated water districts are 'administrative and general expenses' (> 35%) and salaries (> 22%), both of which are fixed expenses. By comparison, the largest cost component for nonintegrated systems is also 'administrative and general expenses' (> 29%), but this is closely followed by variable costs (20%).

Integrated systems are also less efficient than their nonintegrated counterparts. They have larger losses from unaccounted-for-water, higher staffing per 1000 connection ratios and poorer bill collection.

Water supply presents challenges not found in most other infrastructure sectors in that arrangements to optimize delivery rest on many set geophysical variables, such as the location of water sources, settlement patterns, operational logistics, and the quality of other infrastructure such as roads.

Integrating water supply services across administrative borders to include more than one municipality or city, presents additional challenges. The findings show that integrated water districts need to maintain a higher standard of efficiency and cost control to offset their starting point disadvantage of higher operating costs.

Implications

A few lessons emerge from the findings where policy makers and program managers seek to actively encourage integration as a strategy for water supply development.

- *Promote integration where drivers are clear.* Water scarcity was found to be one of the strongest drivers for integration. A program for promoting integration of services might consider investing in the generation of water resources maps and support sector planning in target areas, where integration of services across towns may make sense. This would help local governments come to their own conclusions about the desirability of integrating into a common service area. Bulk water development and supply arrangements are less intensive forms of cooperation/integration, which could be explored.

- *Integration will need adequate investment finance.* Given the significant capital investment involved in developing integrated water supply infrastructure, advisors to local governments considering integration must look carefully at the options for financing and capital structure of the enterprise. Integrated systems are more likely to have a higher borrowing capacity, but a high level of debt also means higher routine costs and poorer liquidity.
- *Introduce efficiency and performance improvement programs with integration.* Because of its more challenging structure, a strong program of efficiency needs to accompany integration. Incentives linked to staff and utility performance may be considered. Technical innovations can also bring significant efficiency advantage.
- *Promote minimum scale in integration areas.* The results of the study show that because of their cost structure, the scale at which integrated systems achieve optimal returns is much larger than that of their nonintegrated counterparts. In this study, integrated systems with 40,000 to 50,000 service connections showed constant returns to scale. In this context, local governments and other support agencies can think about whether a level of saturation within service areas needs to be achieved in preparation for integration.

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