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The Politics of Performance Benchmarking in Urban Water Supply: Sacrificing Equity on the Altar of Efficiency

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ABSTRACT: This study excavates the experts, ideas and methods behind the earliest water utility performance benchmarking efforts initiated in the 1990s using archive materials and secondary sources. The results contend that benchmarking is public sector reform by other means. Quantification allows performance benchmarking to escape the scrutiny and controversy that follows market-led reform, even though both privilege economic efficiency at the expense of distributional equity. Benchmarking experts advance economisation, a process that, through economic reasoning, metrics and quantitative comparisons, transforms water utilities into calculative Pareto-maximising entities that privilege existing consumers to the detriment of the unserved. Economisation is not inevitable, however. Heterodox experts can choose different benchmarking methods to advance alternative values. Two professors in India, for instance, introduced explicitly equity-focused indicators into the country's water utility benchmarking system, challenging the prevailing orthodoxy. Nonetheless, while fairer benchmarking systems have the potential to reduce resource inequities, they also risk domesticating power relations.

KEYWORDS: Quantification, economisation, Pareto efficiency, expertise, water utilities, India

INTRODUCTION

Urban water supply reform has been contentious (Davis, 2005). After governments began embracing market-led reform in the late 1980s, often at the behest of multilateral development banks and donors, the urban water sector was increasingly drawn into the longstanding efficiency versus equity debate. In the 1970s, the influential macroeconomist Arthur Okun popularised the idea that a tradeoff exists between a nation's economic productivity and its income inequality (Okun, 2015; Osberg, 1995). Scholars note that in water resource management a similar tension – if not an outright tradeoff – exists between allocative (Pareto) efficiency and distributional equity (Hu et al., 2016; Whiteley et al., 2008; Prieto, 2021; Roa-García, 2014). This tension became evident when, within a decade of the start of the privatisation movement, academics questioned the private sector's ability to outperform the public sector, civil society organisations rebuked the private sector's disregard for the poor, and citizens took to the streets in protest (Assies, 2003; Bayliss, 2003; Hall et al., 2005; Neves-Silva et al., 2023; Prasad, 2006). Even as some scholars argued that equity was more important for water policy than efficiency, reform advocates successfully advanced economic efficiency objectives in urban water supply (Boelens and Vos, 2012; Whiteley et al., 2008; Prieto, 2021).

Both structural reform efforts and the global project of benchmarking water utilities' performance privilege economic efficiency at the expense of distributional equity; unlike structural reform, however, performance benchmarking has gone largely unchallenged (McDonald, 2016). This paradox merits investigation. While benchmarking experts claim to be generating urban water sector data that is useful for monitoring, learning and capacity building, they also share reformers' goals of increasing utilities' efficiency, financial autonomy and privatisation.[1] The key difference between the two agendas is that privatisation and the related corporatisation and commercialisation efforts are governed by laws that direct ownership and operation; performance benchmarking, on the other hand, is a strategy of "governing by numbers" (Supiot, 2017).

Quantification allows benchmarking experts to cast their political project of economisation – the process by which water utilities are transformed into performance-oriented organisations focused on maximising productive and Pareto efficiency – as natural and neutral. In this article, I analyse the earliest water utility benchmarking efforts by multilateral development banks (referred to hereafter as 'development banks') in the 1990s. To do so, I employ the work of social scientists who study the politics and sociology of quantification. In the process, I respond to Power's (2004) plea to, "open up the black box of performance measurement systems, to de-naturalize them and recover the social and political work that has gone into their construction as instruments of control". Studying early benchmarking projects (rather than contemporary ones) excavates their ideological and institutional foundations, which are a missing piece of the benchmarking narrative (McDonald, 2016). Newer benchmarking projects have become more data intensive and technologically sophisticated (see, for example, Krause et al., 2018), but the fundamentals driving their generation and use remain unchanged. This is especially so since performance indicators exhibit "inertia" (Merry, 2016), which can restrict the consideration of alternative governance objectives and approaches.

Research methods and outcomes

To conduct this study, I used primary archival material from the Asian Development Bank (ADB), World Bank and Global Water Partnership (GWP); I also used secondary sources on various utility benchmarking efforts across the world and interviews with heterodox benchmarking water experts. I submitted declassification requests to the World Bank and the ADB and worked with archivists on freedom of information requests at the Swedish International Development Cooperation Agency (Sida), host of the GWP.[2] I reviewed existing and newly released documents, triangulating them with already available primary and secondary sources, many of which I accessed through the International Water and Sanitation Centre's (IRC) digital archives.

I conclude that utility performance benchmarking is political-economic reform of urban water provision by other means: benchmarking experts pursue Pareto efficiency at the expense of distributional equity. In other words, benchmarking pushes water providers to prioritise improving service to existing consumers over expanding potable water supply to the unserved. Quantification, however, does not insulate benchmarking efforts from contestation in that heterodox experts can successfully challenge orthodox metrics and promote alternative values. Whether 'counter-quantification' is a sufficiently robust strategy for redressing historic injustices remains an open question, however.

The next section reviews the literature on the politics and sociology of quantification. Section 3 summarises performance benchmarking in urban water supply, which hones in on water utilities' performance. Section 4 reveals how performance benchmarking emphasises service quality and efficiency through key indicators. Section 5 explains how these indicators and benchmarking experts' economic reasoning advance water utilities' economisation, idealising them as islands of efficiency. Section 6 shows how economisation can subordinate concerns for equity to the benefit of a utility's existing consumers and to the detriment of the unserved. Section 7 describes the push by heterodox benchmarking experts in India to advance equity indicators as a way to challenge existing orthodoxy. The

[1] Privatisation is more accurately referred to as private sector participation (PSP); it commonly takes the form of concessions and leases but can involve full divestiture of public assets (Marin, 2009).

[2] The International Water Association did not respond to multiple requests for information.

Conclusion summarises the study's findings and considers what quantifying equity accomplishes and what it leaves undone.

THE POLITICS OF QUANTIFICATION

The last three decades have witnessed "an avalanche of numbers pertaining to performance", with implications for democracy and governance (Kurunmäki et al., 2016; Mennicken and Espeland, 2019). An interdisciplinary group of social scientists has responded by studying 'quantification', a suite of social operations that includes standardisation, measurement, commensuration and calculation (Berman and Hirschman, 2018; Davis et al., 2012; Espeland and Stevens, 2008; Mennicken and Espeland, 2019; Mennicken and Salais, 2022). Quantification represents an intervention that is shaped by experts, politics and technologies (Berman and Hirschman, 2018); in turn, it has political effects that are often concealed by seemingly neutral and technocratic assessments (Broome and Quirk, 2015b; Hirschman and Berman, 2014).

Experts and politics

Experts' epistemic authority effectively equips them to lead quantification (Daston, 1995). Economists have excelled at quantification, but it is engineers who have at times applied quantitative economic methods most faithfully (Eyal and Levy, 2013; Porter, 2004). Experts operating within large bureaucracies have an advantage over their non-state counterparts because quantification is resource intensive (Espeland and Stevens, 2008). As hard as experts try to present their methods as objective and natural, political judgement always precedes measurement (Broome and Quirk, 2015a; Power, 2004). In a process referred to as 'black boxing', experts obscure their normative values through numerical translation (simplification, commensuration and reification) and their cognitive infrastructure (styles of reasoning and policy devices) (Broome and Quirk, 2015a; Hirschman and Berman, 2014; MacKenzie, 2005).

Numbers are considered more accurate, valid and incorruptible than words. In turn, they provide experts with power, albeit the kind that affects change indirectly and incrementally (Broome and Quirk, 2015a; Di Fiore et al., 2022; Espeland and Stevens, 2008). Armed with numbers, the architects of performance measures are motivated by a "democratizing ambition" to hold governments accountable (Mennicken and Espeland, 2019; Williams, 2004). Quantification also advances experts' political agendas such as economisation (Çalışkan and Callon, 2010; Kurunmäki et al., 2016). Economisation, much like privatisation and related reform efforts, propagates neoclassical economic efficiency, market-like elements such as incentives and competition, and financialisation (a process that prioritises return on investments) to traditionally non-economic domains, including public service delivery (Guter-Sandu and Mennicken, 2021).[3] Quantification, however, is integral to economisation because it transforms entities into calculating, performance- and efficiency-oriented agents through technologies that include, but are not limited to, indicators and benchmarking (ibid).

Technologies and effects

Experts rely on diverse technologies of quantification. First order measurements involve the standards, classifications and institutions that make counting possible (Power, 2004). We might describe these measurements as 'raw data'. Second order measurements, created through data aggregation and mathematical calculations, build on first order measurements and "take on a life of their own" to enable new forms of knowledge and comparison (Mennicken and Espeland, 2019; Power, 2004). Ratios and indices are common examples. Experts can name and rank first and second order measurements to

[3] Economisation does not refer exclusively to the spread of market rationality and institutions. Quantification in Soviet five-year plans, for example, equally contributed to economisation (Kurunmäki et al., 2016).

create indicators, which simplifies and aids the comparison of different units (Davis et al., 2012). This process involves commensuration, or comparing qualitatively different entities along a common metric where differences are represented in degree rather than kind (Espeland and Stevens, 1998).

Quantification shapes human cognition. It creates new forms of visibility and invisibility, especially by rendering organisational performance visible and comparable for managing efficiency (Guter-Sandu and Mennicken, 2021; Mennicken and Espeland, 2019). If visibility eases inclusion by defining problems and getting them on the political agenda, invisibility leads to exclusion by restricting the recognition and debate of issues (Demortain, 2019). Visibility in turn compels comparison, which is greatly facilitated by benchmarking: using indicators to systematically compare entities to each other or a reference standard to permit judgement (Broome and Quirk, 2015a; Marques et al., 2011). Humans also react to quantification. They can internalise, buffer against, or resist measurement (Sauder and Espeland, 2009). 'Counter-quantification', one form of resistance to measurement, uses numbers and indicators to unsettle or destabilise existing quantification regimes (Davis et al., 2012; Guter-Sandu and Mennicken, 2021). A genuine challenge to quantification, however, must critically engage with the very logic of managing by numbers (Salais, 2022).

PERFORMANCE BENCHMARKING IN URBAN WATER SUPPLY

A defining feature of urban water supply governance is the management of a reticulated network of pipes and associated infrastructure by a centralised water supplier that is commonly referred to as a utility (Bakker, 2003). Governments – normally municipalities – delegate responsibility for water supply to utilities; these can be managed publicly, privately or through public – private partnerships (Bruijn and Dicke, 2006).

Interest in benchmarking utilities is already high and continues to grow (McDonald, 2016). Experts produce process benchmarks that measure how organisations try to achieve outcomes, and metric benchmarks that focus on outcomes irrespective of internal organisational processes (Mehta et al., 2013). Experts establish and publish standards for both benchmarking types (as found in, for example, ISO 24510 for drinking water services), but this study focuses on data collection and comparison for metric (not process) benchmarking (referred to hereafter as 'benchmarking').

Development banks and governments engage in benchmarking, including those in Australia, Brazil, South Africa and Tanzania; so do water regulators in the United Kingdom (UK), Vietnam, Zambia and several other countries (Mehta et al., 2013). European water utility associations embraced benchmarking early, followed by sub-Saharan African, Pacific and Southeast Asian associations (McDonald, 2016; Mehta et al., 2013). Researchers have used these same measures in at least 65 quantitative assessments of sector performance and reforms (Berg and Marques, 2011).

Multilateral development banks pioneer benchmarking

A backlash in the 1980s against the prevailing state hydraulic paradigm, fuelled in part by the Washington Consensus, prompted development banks to shift towards market-led water resource management, which included pushing for private sector participation (PSP) and competition in urban water supply (Bakker, 2014; World Bank, 1991). Unlike the market fundamentalist macroeconomists who championed the Washington Consensus, however, benchmarking experts considered performance indicators that furthered utilities' efficiency, demand-responsiveness and financial autonomy as tools to transform, rather than eliminate, governments' role in infrastructure development (Berman, 2022; World Bank, 1991). By doing so, however, they erected boundaries around the sector goals that could be considered politically reasonable and feasible.

Seasoned civil engineers at development banks pioneered water utility benchmarking. Five of the eight founders had at least one degree in civil engineering, one was an economist, and the educational background of two experts could not be determined. Seven experts were men and the single female expert was the only one with a doctorate. They all began their careers in the 1960s or 1970s and by the time they embarked on benchmarking in the 1990s they had, on average, at least two decades of experience in the water sector, including roles managing utilities. They hailed from across the globe, including Europe (UK, Belgium, Netherlands), Latin America (Colombia, Peru), the Asia-Pacific (New Zealand, Philippines), and North Africa (Morocco).

The Asian Development Bank began its benchmarking work with the electricity sector, publishing its inaugural *Electric Utilities Databook* in 1983 (ADB, 1992). In 1992, the ADB broadened its efforts to include water utilities, releasing the *Water Utilities Data Book: Asian and Pacific Region,* the first of its kind (ADB, 1993). The regional development bank continued to expand its work on water utilities through the 1990s (Table 1).

Table 1. Original water utility benchmarking initiatives.

Benchmarking initiative	Sponsor	Year launched	Total utilities assessed	Lead experts
Water Utilities Data Book: Asian and Pacific Region	ADB	1992	38	Arthur C. McIntosh Cesar E. Yñiguez
Second Water Utilities Data Book: Asian and Pacific Region	ADB	1996	50	Arthur C. McIntosh Cesar E. Yñiguez
Performance Benchmarking for Pacific Power and Water Utilities	ADB	1999	Not available	Not available
Water and Wastewater Utilities: Operational Indicators	World Bank	1993	Not available	Guillermo Yepes
Water and Wastewater Utilities: Financial Indicators	World Bank	1994	Not available	Guillermo Yepes
Water and Wastewater Utilities: Indicators 2nd Edition	World Bank	1996	34	Guillermo Yepes Augusta Dianderas
Water Utilities Partnership/SPBNET.Africa	World Bank, DFID, and UAWS	1996	110	Mohammed Fouad Djerrari Jan G. Janssens William (Bill) Kingdom
International Benchmarking Network for the Water and Wastewater Utilities	World Bank	1997	4400+	William (Bill) Kingdom Caroline van den Berg

Note: ADB = Asian Development Bank; DFID = Department for International Development; UAWS = Union of African Water Suppliers (Union Africaine des Distributeurs d'Eau).

The World Bank also promoted benchmarking. Its Transportation, Water, and Urban Development Department (TWU), a sector department with broad analysis and advisory functions, released its first set of operational indicators in 1993 (*Water and Wastewater Utilities: Operational Indicators*) and inaugural financial indicators in 1994 (*Water and Wastewater Utilities: Financial Indicators*) (World Bank, 1995). These works compared utility performance with already available data. The TWU then followed up with a second edition in 1996 that combined updated operational and financial indicators (Yepes and Dianderas, 1996). That same year, the World Bank also established the Water Utilities Partnership (WUP) for Capacity Building in Africa and the International Benchmarking Network for the Water and Wastewater Utilities (IBNET) (van den Berg and Danilenko, 2010).[4] The WUP initiative, led by the Union of African Water Suppliers (Union Africaine des Distributeurs d'Eau) in Côte d'Ivoire, included a benchmarking component as part of a programme that financed projects on PSP promotion, managing for efficiency, and pro-poor service delivery (Djerrari et al., 1998). The WUP expanded its pilot work in West Africa to include data collection with water supplier associations across the continent; this was encouraged by the GWP and backed by funding from the UK's Department for International Development (DFID). It culminated in the Service Provider Performance and Benchmarking Network – Africa (SPBNET.Africa), which in 2001 produced a report (with database) on 110 African utilities' performance (Ramsey and Mobbs, 2001; WRc plc, 2001).

The World Bank's IBNET is the first global water utilities benchmarking initiative and is now the most extensive. It benefited early on from a web-based data entry platform (World Bank, 1999). IBNET relied on the International Water Association's (IWA) worldwide network of members, including in the Global South, and by 2013 it included over 4400 utilities in its database (Danilenko et al., 2014). In 1997, the International Water Supply Association, or IWSA (which merged in 1999 with the International Association of Water Quality, or IAWQ, to become The IWA) also launched a highly influential water utility performance standards initiative (Alegre, 1999). Many utilities have adopted the IWA's metrics to monitor performance and the indicators have also become a reference for water utility researchers. Unlike the efforts of development banks, however, the IWA's work culminated in a best-practices handbook rather than a utility benchmarking enterprise (Alegre et al., 2006).

Implementing a benchmarking project

Multilateral development banks executed the various benchmarking projects listed in Table 1 in similar ways.[5] An expert at the sponsoring organisation (referred to hereafter as the 'sponsor') developed utility performance indicators that they felt were worthy of data collection and monitoring. The sponsor then produced a survey instrument to collect utilities' raw data and solicited some utility leaders' feedback on the instrument at workshops. After finalising the instrument, the sponsor distributed it to all target utilities and retained local consultants with a background in urban water supply to maximise data collection and provide a degree of data quality control. The sponsor hired an external benchmarking advisor for data analysis, ratio calculations and presentation of the results, but they maintained editorial control over the structure and content of the final publication.

Benchmarking experts presented utility comparisons in various tables, bar charts, pie charts and graphs. Their publications also provided utility snapshots that displayed a few handpicked indicators alongside descriptions of utilities and some operational context. They limited commensuration in early studies to standardising the measurement of ratios' denominators (for example, a utility's coverage area, water production and expenses). As IBNET grew in size, its creators developed a *Water Utility Apgar Score* that was inspired by paediatrician Virginia Apgar's newborn infant health rapid assessment tool; it

[4] IBNET would later change its name to the International Benchmarking Network for Water & Sanitation Utilities.

[5] Exceptions to this are the World Bank TWU's early analyses (*Water and Wastewater Utilities: Operational Indicators, Water and Wastewater Utilities: Financial Indicators* and *Water and Wastewater Utilities: Indicators 2nd Edition*), which relied on data already available to World Bank operations staff.

produced a single score to evaluate whether a utility fell above or below 'normal' based on the performance of its IBNET peers (van den Berg and Danilenko, 2010).[6]

The sponsor would sometimes hold a dissemination event after publishing the research results, which were often accompanied by a compact disc with a database of utility indicators that users could analyse. Benchmarking experts presented the findings to sector stakeholders from utilities, government ministries, regulators, universities and non-governmental organisations (NGOs), while espousing the virtues of performance measurement and benchmarking.

EMPHASISING EFFICIENCY

By the late 1980s, public sector reform advocates grew frustrated that infrastructure service quality trailed investment levels, which steadily increased in the 1970s (World Bank, 1994). Reformers blamed these poor outcomes on development banks' reliance on public monopoly service providers that prioritised building infrastructure 'stocks' over ensuring service 'flows' (World Bank, 1992a). As a solution, reformers promoted market-oriented infrastructure provision that was buttressed by competition, demand responsive services, and service providers' financial autonomy. As stated in a 1992 World Bank policy paper (ibid), "The establishment of a competitive environment for the provision of infrastructure services encourages greater productive, allocative, and dynamic efficiency". An efficient market-led approach would, in turn, help utilities to achieve full cost recovery, completing a virtuous circle (ibid).

Reformers welcomed ways to measure the progress of their market-led agenda, and internal evaluators pushed bank operations staff to think in terms of project rates of return and development impact (World Bank, 1992a, 1992b); this was a testament to the early influence of new public management (NPM). NPM is a governing philosophy that pushes bureaucracies, including development banks and donors, to imitate private firms and to manage for results through performance metrics; in the 1990s the metrics were aligned with development banks' structural reform programmes (Bakker, 2014). In response to these pressures, the TWU developed sector-wide and project-level indicators that were 'distilled' from extensive bank experience, and these formed the bedrock of early water utility benchmarking initiatives (World Bank, 1995). In all, project indicators contributed 7 of the 13 most common 'key' indicators found in benchmarking projects, that is, service coverage, water consumption, service availability, water quality, nonrevenue water, working ratio, and debt service ratio (World Bank, 1994).

The 13 key indicators focus on service quality, operational efficiency and financial autonomy. Some efficiency indicators (such as 'staff efficiency') pursue political agendas by, for example, seeking to downsize the public sector. Others such as unit production costs, however, represent more neutral 'technical efficiency' objectives that present fewer tradeoffs with equity (Roa-García, 2014). However, a collective performance benchmarking system that combines operational and financial efficiency indicators with indicators of service quality represents a governing strategy that prioritises service to existing consumers who are able and willing to pay over service expansion to the unserved. This ensures that rising inequality is ignored even as water supply systems approach Pareto efficiency (that is, an increase in the quantity and quality of water supplied to existing consumers that results, at least in part, from improved utility operations). I elaborate on this process in Sections 5 and 6.

The key indicators of benchmarking systems are calculated as simple percentages or ratios; an exception to this is service availability, which is reported as raw data (Table 2). Service coverage is often presented first and through a single measure. Three indicators measure service quality (water consumption, service availability and water quality), four indicators measure operational efficiency (unit

[6] IBNET scored a water utility's performance according to five criteria: coverage, nonrevenue water, revenue collections, operating cost coverage, and affordability. It gave them a score from zero to two using benchmarking experts' self-defined targets. The World Bank then aggregated the individual values into the Apgar score (van den Berg and Danilenko, 2010).

production costs, nonrevenue water, metering efficiency and staffing efficiency), and four other indicators measure financial autonomy (working ratio, collection efficiency, debt service ratio and liquidity ratio). Prices are captured through average tariffs but benchmarking reports also frequently include a separate section that details surveyed utilities' block tariff structures.

Table 2. Key indicators of performance benchmarking systems.

Indicator name	Indicator definition	Typical indicator formula	Comments
Service coverage (%)	Proportion of people in a utility's service area who are supplied with utility water	[(Population served with individual connections + population served by public taps)/(population in the utility's service area)]*100	IBNET calculated separate ratios for individual connections and public taps
Unit production cost (US$/$m^3$)	Amount of operational and maintenance (O&M) costs used to produce a cubic metre of water (m^3)	Annual O&M costs in US$/total annual volume of water produced	O&M costs calculated in local currencies are normalised using current exchange rates; water volume is sometimes represented in litres rather than m^3
Water consumption in litres per capita per day (lpcd)	Litres of water consumed per person per day (lpcd)	[(m^3 of water consumed*1000)/365]/(total population served)]	Sometimes represented as m^3 of water consumed per month
Service availability (hours/day)	Duration of water availability	No calculation; reported as hours of water supply available per day	None
Water quality (%)	Percentage of utility water supplied that is safe to consume	(Annual number of tests that pass the relevant standard/total tests taken that year)*100	Tests vary across contexts, but usually account for pathogens and chlorine
Average tariff (US$/$m^3$)	Amount charged by utility for a specific volume of water	Total annual amount billed to consumers/total annual m^3 of water consumed	ADB and IBNET also calculate the monthly water bill as a percentage of monthly gross national product or gross national income per capita
Nonrevenue water (%)	Difference between water delivered to the distribution system and water sold	(Water supplied – water sold)/(total water supplied)*100	ADB refers to water supplied as 'water produced'; nonrevenue water is often referred to as 'unaccounted- for water'

Metering efficiency (%)	Percentage of connections metered	(Total connections with operational meters/total number connections)*100	ADB measured percentage of water production metered in m^3
Staff efficiency	Ratio of numbers of staff to individual connections	Number of utility staff/(number of connections /1000)	Some studies also measure staff per m^3 of water produced
Working ratio	Ratio of operating costs to operating revenues	Operating costs/ operating revenues	Costs exclude interest payments and depreciation, which are included in a common alternative: the operating ratio
Collection efficiency (%)	Percentage of billing amount issued that is collected by the utility	(Annual accounts receivable/annual operating revenues)*100	None
Debt service ratio	Revenue as a proportion of money spent on servicing debt	Cash income/amount spent on paying debt	Sometimes represented as a percentage by multiplying the ratio by 100
Liquidity ratio	Current assets as a proportion of current liabilities	Total current assets/total current liabilities	The ADB did not measure this indicator

Note: This table synthesises all benchmarking projects listed in Table 1 except the ADB's Performance Benchmarking for Pacific Power and Water Utilities project for which indicators were not available. Additionally, it assesses the IWA's inaugural indicators found in Alegre (1999) and Alegre et al. (2006). IBNET = International Benchmarking Network for Water & Sanitation Utilities; ADB = Asian Development Bank.

Nearly two-thirds of the indicators focus on water utilities' operational efficiency and financial autonomy, thus reflecting the wider benchmarking community's priorities; a literature review showed, furthermore, that financial and operational indicators dominated eight popular benchmarking systems (Haider et al., 2014). Over half of IBNET's current metric benchmark indicators continue to measure operational efficiency, financial autonomy and prices, despite the system having grown to cover 12 performance categories (ibid).

ISLANDS OF EFFICIENCY: THE ECONOMISATION OF WATER UTILITIES

Benchmarking experts share the same roots as reformers; despite this, they escape scrutiny and criticism because while reformers achieve their goals through laws, policies and contracts, benchmarking experts rely on economic reasoning, ratios and comparisons. Prying open the black box of economisation reveals benchmarking experts', "implicit or explicit model of what matters and the way the world works", as revealingly stated by the World Bank's own TWU (World Bank, 1994).

This model involves transforming water utilities into islands of efficiency that are disembedded from their socio-economic relations and political-ecological contexts. Thus, it projects an urban water supply sector with diverse stakeholders and contested ideas squarely in development banks' image. In benchmarking experts' ideal world, utility executives are "managing to the metric"; they maximise efficiency, emulate market-based principles and achieve financial autonomy, all in an effort to outcompete their peers. These executives would increase revenues by metering every litre of water consumed (and ideally every litre produced as well) and they would cut costs by eliminating nonrevenue water, unmetered connections and staff. After achieving financial autonomy, they would try to supply safe potable water 24 hours a day, 7 days a week to as many customers as possible who are able and willing to pay.

Naturalising efficiency

Benchmarking indicators appear natural and neutral thanks to an economic style of reasoning that foregrounds efficiency. After all, as Berman (2022) expressed, "who would advocate for inefficiency?" Benchmarking experts implicitly argue that utilities exhibit productive and Pareto inefficiencies (World Bank, 1991, 1995). In other words, utilities can do more with what they already have (a productivity improvement) and can make someone better off without making anyone worse off (a Pareto improvement) (van Straveren, 2009). By prioritising aggregate utility (an abstract economic measure of welfare not to be confused with a water supplier), Pareto efficiency adheres to a strong 'do no harm' principle that favours the status quo allocation of resources (Prieto, 2021; van Straveren, 2009).

Productive and Pareto efficiencies are rendered technical and explainable because of their "triple naturalization"; that is, both concepts are accepted as being universally applicable, indispensable to economic behaviour, and independent of their sociocultural context (Prieto, 2021). It thus becomes obvious – rather than a subject of debate – that actions should be taken to reduce unit production costs (to boost productive efficiency) and/or to increase water availability to existing connections (to achieve Pareto improvements).

If benchmarking experts had to calculate and monitor only a single indicator it would be nonrevenue water (NRW). The World Bank (1994) called NRW "a powerful measure of efficiency" and the ADB (2007) referred to it as, "[t]he single most important parameter to indicate performance". Nonrevenue water denotes water that is produced but not accounted for. It combines 'physical' losses from infrastructure (such as leaks, reservoir overflows) and 'commercial' losses from administration (for example, water from illegal or unmetered connections that is used but not paid for) (Yepes, 1995). Early benchmarking experts advocated that utilities prioritise reducing commercial losses in an effort to get NRW down to 25% or less, a "developed country standard" (McIntosh and Yñiguez, 1997; Yepes and Dianderas, 1996).

Emulating markets

Economisation is supported by performance metrics' and ratings' dissemination of market forces to economic and non-economic domains like public services (Guter-Sandu and Mennicken, 2021; Mennicken and Espeland, 2019). The 'perfectly competitive market' – like Pareto efficiency – is accepted as natural because economists have effectively maintained that the market is the most efficient mechanism for allocating resources (Berman, 2022).

Benchmarking experts want public water institutions to emulate the private sector to advance quasi-markets. According to the WUP director and a World Bank senior official,

> When private sector participation (PSP) is not feasible, institutional reform of the sector will follow the public management model, with an attempt to improve its performance by: (i) applying rules of commercial management, (ii) *adopting private-sector performance ratios as benchmarks* (…), and (iii) adopting a clear definition of the roles of the stakeholders aiming at financial autonomy and total cost recovery (Djerrari and Janssens, 1998, emphasis added).

Indicators measuring service quality, average tariffs, collection efficiency and working ratio all attempt to appraise a utility's ability to respond to demand, adjust prices and generally behave like a profitmaximising firm. Benchmarking experts also present performance indicators as being useful for attracting private investors, whom they describe as "key stakeholders" who will "identify viable markets and opportunities for creating value" (World Bank, 1999). In one publication, ADB benchmarking experts used a third of the entire narrative text (11 of 33 pages) to discuss best practices in private sector participation, while a section on service to the urban poor comprised just one-fourth of a page (McIntosh and Yñiguez, 1997).

Achieving financial autonomy

Utility benchmarking can also promote financial motives in economic operations, a form of economisation referred to as financialisation (Bayliss, 2014; Loftus et al., 2016). Under financialisation, assets are valued for their capacity to create calculable future returns for an investor (Muniesa et al., 2007). "Companies have to provide a reasonable return for their shareholders", ADB benchmarking expert Arthur McIntosh declared, and "[g]overnments and other stakeholders in the community need to be reconciled to profits being earned from water services" (McIntosh and Yñiguez, 1997).

Financialisation is not motivated only by private investors' priorities. Economic returns, actual or imputed, are also chased by international financial institutions such as development banks and are increasingly sought by donors that operate on aid effectiveness principles. A World Bank evaluation of water sector lending in the 1970s and 1980s revealed development banks' priorities:

> The Bank does not consider a project 'Bankable' at appraisal unless it meets all the Bank's criteria for investment including the existence of, or potential for, viable financial performance. One might argue that most of the projects reviewed were successful because they resulted in facilities to provide water supply and sewerage to many people who were in desperate need. Yet this argument overlooks the criteria for a 'Bankable' project (World Bank, 1992c).

World Bank benchmarking expert Guillermo Yepes (1996) clarified how performance indicators could be of assistance; as he put it, "[t]he technique of ratio analysis is a useful tool to analyse a utility's financial position (…) [;] indicators presented here provide information about (…) credit worthiness and liquidity and profitability". Benchmarking experts also designed indicators to monitor utilities' reliance on "grant financing" – a proxy for any kind of donor or public subsidy – as a way of pushing for utilities' full financial autonomy (ADB, 1993; McIntosh and Yñiguez, 1997).

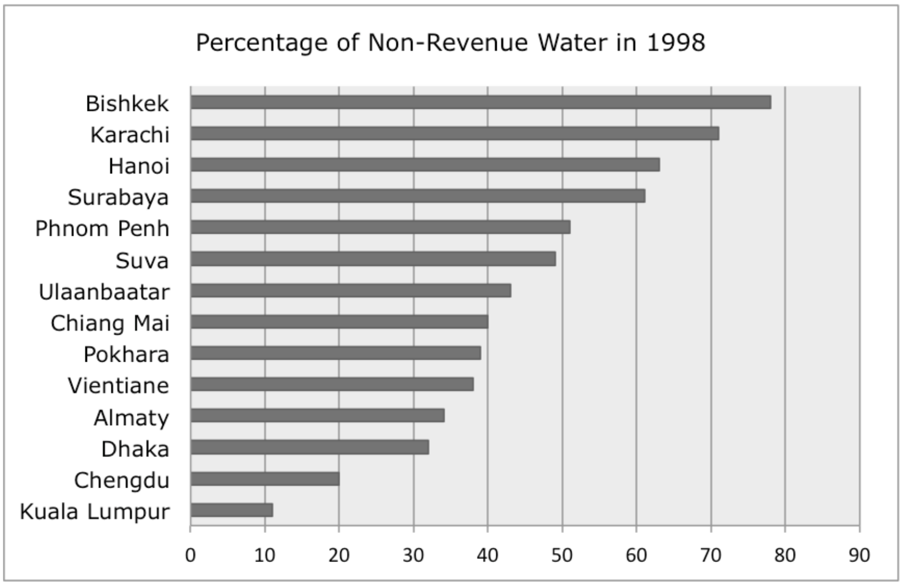
Atomising water utilities

Naturalising efficiency, emulating markets and achieving financial autonomy together generate atomisation, an underexplored effect of economisation in the quantification literature. Economisation establishes a boundary where agents on the economised 'inside' of water utilities behave more rationally than those on the 'outside' (Callon, 1998). This permits the alienation or "radical atomisation" of bureaucracies where "[p]ublic servants (…) are rendered willing tools of the state conceived as a cost-minimising firm, since the effective realisation of their self-interest depends on their loyal and intelligent pursuit of the goals set by the executive levels of this firm" (Yeatman, 1990). The atomised utility is thus isolated, disembedded and "institutionally separate and motivationally distinct" from its surrounding social relations (Polanyi, 1968). An atomised utility's executives, to behave 'rationally', must maximise performance on an abstract set of indicators. How else could benchmarking experts consistently recommend, over an 11-year period, that water utility managers eliminate unmetered consumption, public taps and illegal connections – even advising door-to-door campaigns and home entry to root out unmetered taps – to reduce NRW without once discussing these actions' possible social ramifications (ADB, 1993; Andrews and Yñiguez, 2004; McIntosh and Yñiguez, 1997).

Eliminating free water could also 'free' utilities from government dependence and 'interference', a major objective of the corporatisation movement (McDonald and Ruiters, 2005). Corporatisation involves ringfencing, that is, isolating a water utility's financial resources from other (usually municipal) accounts and segregating water utility management from other government responsibilities without necessarily privatising ownership or operations (Smith, 2004). These institutional changes allow benchmarking experts to more accurately target and measure a utility's assets and liabilities (McInnes, 2005). Financial benchmarks, however, can also engender corporatisation by identifying deficiencies in a utility's financial autonomy or profitability. The end result is that governments become unable to cross-subsidise urban water supply via more lucrative sectors and functions (Smith, 2004).

Once a utility has been successfully atomised, its executives can compete with distant counterparts rather than relate to their proximate public service peers (for example, the post office or electric utility) (Figure 1). Competition involves promoting a competitive mindset and testing entities' capacity to out-do each other (Davies, 2016). The World Bank sought, for example, to have public utilities compete with private utilities and with each other for "considerable efficiency gains" (World Bank, 1992a). In the Asia-Pacific region, Singapore's public water utility was held out as a model to emulate, namely for having very low NRW rates, which it further reduced from 11 to 6% between 1989 and 1995 (McIntosh and Yñiguez, 1997; Yepes, 1995). Comparing and judging utilities against each other can even create new forms of governance. "One method of fostering competition without regulation is benchmarking", the GWP's Technical Advisory Committee noted (GWP, 1998).

Figure 1. Atomised utilities competing.



Source: The author.

Note: The figure replicates graphs commonly found in benchmarking publications; dates, locations and percentages do not represent actual values.

SUBORDINATING EQUITY

Economisation sacrifices equity on the altar of efficiency. As leaders of islands of efficiency, utility executives prioritise existing consumers over the unserved, thereby exacerbating inequality. Inequity is injustice towards those who have been historically penalised with relatively fewer resources through no fault of their own (Hodgson, 2009). Equity must thus be redistributive by addressing the deficits of those that lack utility water to improve their condition *relative* to consumers who have network access, even if existing consumers' water supply remains intermittent or insufficient.[7] The performance measurement system's key indicators *in toto* ensure that rising inequality is ignored and that such indifference produces an economic (Pareto) improvement. Utility executives that increase the quantity and quality of water to existing consumers while leaving residents who consume zero litres of utility water untouched are, by increasing total welfare, approaching Pareto efficiency even if they do nothing to address equity.[8]

Consider the guidance of the ADB's own benchmarking experts, who in 1997 recommended scores for 13 indicators. They assigned a weight of 10% to coverage, the only indicator that can monitor progress on equity (albeit with limitations since there is no guarantee a utility will prioritise the neediest among the unserved). A total of 55%, however, was given to the combined weight of all seven indicators measuring efficiency, financial autonomy, and service to existing consumers (McIntosh and Yñiguez, 1997). A utility executive acting in self-interest to maximise performance on these indicators would outshine any peers who were strictly aiming to increase coverage to the unserved. Benchmarking experts' indicators and weights aligned with reformers' preferences. As stated in a 1992 World Bank document, "The Bank's policy (…) is that utilities should: (a) recover costs by selling their products and services; and (b) earn a reasonable return on invested capital and make a reasonable contribution to expansion *after* meeting their operating costs and debt service obligations" (World Bank, 1992c, emphasis added).

Moving beyond hypothetical scenarios, research across sub-Saharan Africa shows that utilities attempting to maximise cost recovery abandon access and consumption equity (Rusca and Schwartz, 2018; Smith and Hanson, 2003; Twum and Abubakari, 2020). This reinforces historical patterns of injustice since former colonial governments in the Global South explicitly built infrastructure to serve a narrow colonial elite rather than the wider local population (Dill and Crow, 2014; Mathur and Mulwafu, 2018).

Hiding water equity

Benchmarking experts' use of simple ratios ensures that equity remains invisible. Indicators that calculate consumption and tariffs as averages do nothing to visualise distribution; for example, utility executives could supply more litres of water per day to households without grasping which households along the income distribution are consuming the extra water. They could reduce households' average tariffs, but poor households could still be paying more for water than their middle class peers.

Experts calculated ratios exclusively from utilities' raw data, a practice that was established during development banks' creation of project-level water supply indicators. This data did not include information on poor households as utilities' management information systems have historically focused not on welfare but on operations (such as production, connections, prices, revenues and costs) (GWP, 1998). Moreover, early benchmarking experts sent a survey instrument to utility staff to collect non-existent or missing data, hardly adequate to capture complex issues of population poverty, income or wealth. Governments in the Global South at the time whose job it was to assess poverty and inequality, meanwhile, often regarded the unserved as squatters without tenure rights; they thus avoided collecting and disseminating data on their living conditions (UN-HABITAT, 2001).

Pro-poor (half) measures

A few benchmarking projects include indicators that try to capture services to the poor. SPBNET.Africa and IBNET measure the percentage of people served by standpipes or public taps (in addition to those served by private connections) (van den Berg and Danilenko, 2010; Ramsey and Mobbs, 2001); this is an important proxy for service coverage to lower-income populations. IBNET and the ADB also use ratios to

[7] Intermittent supply can affect water quality (Kumpel and Nelson, 2013); this must be considered by water suppliers given the positive externalities and public health impacts of safe water.

[8] It is well documented that those unserved by the utility survive using a variety of small-scale providers, often paying higher prices per litre than those with access to the utility (Kariuki and Schwartz, 2005).

assess household water affordability by comparing average per capita tariffs as a proportion of per capita gross national income (McIntosh and Yñiguez, 1997; van den Berg and Danilenko, 2010).

These efforts to measure pro-poor services are not an adequate substitute for addressing equity (Kiely, 2004). Capturing service improvements through pro-poor indicators will still conceal inequality because the focus remains on measuring total service output rather than its distribution. For instance, when reformers advocate that utilities improve services for existing consumers and then subsidise costs to the unserved by using existing revenue streams to discount new connection fees, they are advocating for a modified Pareto improvement known as a Kaldor-Hicks solution. In these scenarios, the 'winners' of a project or policy change (those connected to the network) compensate the 'losers' (the unserved), while still raising aggregate utility. However, since the focus remains on one group's gains offsetting another's losses, all while increasing total net welfare (as captured by the indicator), Kaldor-Hicks solutions may mitigate the rise of inequality, but they cannot halt it since the winners remain a step ahead of the so-called losers (Cook, 2022; Prieto, 2021; van Straveren, 2009).

Transparency does not equal procedural equity

Early benchmarking experts pursued a participation strategy that was meant to maximise data collection for effective benchmarking (GWP, 1998). They relied on water supplier associations to enrol as many utilities as possible in benchmarking projects and then invited water utility executives to provide feedback on survey instruments. Even then, experts invited only a fraction of this "very important constituency" to provide limited feedback; for instance, only 10 executives attended a workshop for an ADB benchmarking exercise that eventually measured 50 utilities (McIntosh and Yñiguez, 1997; Djerrari et al., 1998).

Procedural equity in water resources demands that those affected by a decision's outcomes be involved in the decision-making process (Roa-García, 2014); benchmarking experts, however, excluded the unserved and their advocates (usually civil society organisations) from the benchmarking process. As for water consumers, the ADB sponsored a survey of 100 randomly sampled households in each utility's service area (a total of 50 service areas) for its second water utilities data book. Benchmarking experts used the survey to triangulate utility performance data rather than involve consumers in indicator development (McIntosh and Yñiguez, 1997), and even then the ADB dismissed consumers' views. When 84% of respondents said they were satisfied with their water utility (the majority of which were publicly managed), the ADB waved off the result, attributing it to consumers "[becoming] accustomed to poor service", that is, service that was not in the ADB's preferred image (McIntosh and Yñiguez, 1997).

QUANTIFICATION AS RESISTANCE

Quantification does not belong exclusively to those spreading economisation (Guter-Sandu and Mennicken, 2021; Mennicken and Espeland, 2019). Heterodox benchmarking experts can engage in 'counter-quantification' by employing different styles of reasoning and policy devices to promote alternative values. Meera Mehta and Dinesh Mehta, two professors at CEPT University in Ahmedabad, India, grew concerned that prevailing performance measures' disregard for equity would exclude India's urban poor from expanded water supply, especially as the central government adopted ADB-inspired metrics. In 2009, they introduced indicators explicitly accounting for equity into utility benchmarking systems covering 416 cities (68 million people) in the western Indian states of Gujarat and Maharashtra, which challenged benchmarking orthodoxy (Mehta et al., 2011, 2013). Mehta and Mehta also involved advocates of slum residents in indicator development and data collection, thereby deepening procedural equity in system design (CEPT University, 2010a).

India adopts orthodox benchmarking with ADB assistance

Like reformers at development banks, Indian policymakers grew concerned that their government's investments in physical assets did not translate into operating efficiency or service quality (MUD, n.d.). In 2005, India's Prime Minister Manmohan Singh launched the US$11 billion, seven-year Jawaharlal Nehru National Urban Renewal Mission (JNNURM), India's largest post-independence urban development initiative. At its launch, he emphasised that it must deliver services that were efficient, accountable and universal (MUD, n.d.; Prime Minister's Office, 2005). Cities that adopted 'investor friendly' reforms such as double-entry accounting, liberalised land management, full operating cost recovery and pro-poor pricing became eligible for grants after an independent advisory panel approved their development plans (MUD, n.d.). Led by the Ministry of Urban Development (MUD), the multisectoral programme had nevertheless directed over 80% of its funds to water supply and sanitation by 2010 (CEPT University, 2010b).

In 2007, the Ministry of Urban Development (referred to hereafter as the 'Ministry') and the ADB joined hands to benchmark 20 Indian water utilities; this culminated in a data book similar to those the ADB had previously produced (see, for example, McIntosh and Yñiguez, 1997). The next year, the Ministry established a utility benchmarking system comprising nine priority indicators that addressed access, operational efficiency and financial autonomy; these were dubbed Service Level Benchmarks (SLBs) and aimed to support the JNNURM and, "improve services in a cost-effective manner" (MUD, 2008). The Ministry, with the World Bank's help, then launched a pilot project to benchmark 28 Indian utilities to the SLBs and the results of this were published in 2009 (MUD, 2010). As early as 1999, the Ministry had sponsored a provider survey to assess water supply conditions in 300 cities and small towns (National Institute of Urban Affairs, 2005). In a testament to the development banks' influence, however, the SLBs resembled indicators the ADB had previously emphasised. The Ministry's data book also produced comparisons and utility profiles that emulated presentations in prior ADB publications (MUD, 2010).

Professors challenge efficiency, promote equity

Unlike other utility benchmarking initiatives, India's SLBs did not escape scrutiny. In one of the only documented instances of resistance to benchmarking orthodoxy, Mehta and Mehta argued that the SLBs ignored equity and that this had significant implications for service delivery in a country like India with a large low-income population (Mehta et al., 2011). With funding from the Bill & Melinda Gates Foundation, they established the Performance Assessment System (PAS) at CEPT University. This was a benchmarking project that focused on equitable water distribution and consumption, especially to lower-income informal settlements or, as Mehta and Mehta refer to them, 'slums' (CEPT University, 2019a; Jaladhi et al., 2016). Through household surveys and digital mapping, the PAS team measured the distribution of water coverage and consumption via three innovative indicators (Table 3). Two of these indicators employ coefficients of variation, that is, ratio measures of dispersion that capture inequality by dividing a sample's standard deviation by its mean (with a value of zero denoting complete equality) (CEPT University, 2010c).

In 2013, at a Ministry-organised workshop in Ahmedabad, Meera Mehta used evidence from PAS pilot projects to argue that the SLBs must be modified to address equity. Ministry officials concurred (CEPT University, 2013). In 2014, they endorsed the PAS and recommended that all state governments in India adopt the new approach, which involved supplementing the Ministry's SLBs with PAS equity indicators (CEPT University, 2019b). By 2019, six states had adopted the approach Mehta and Mehta promoted, which now covers 908 cities that supply water to nearly 97 million people (CEPT University, 2019a); this is roughly equivalent to the entire population of Egypt or Vietnam (Population Reference Bureau, 2019).

Table 3. The Performance Assessment System's water supply indicators.

SLB indicators	CEPT University PAS indicators
Coverage of water supply connections Per capita supply of water Extent of metering of water connections Nonrevenue water Continuity of water supply Quality of water supplied Efficiency in redressal of customer complaints Cost recovery in water supply services Efficiency in collection of fees related to water supply	The nine SLB indicators plus three equity indicators: 1) *Coverage of water supply connections in slum settlements*: total slum settlement households with an individual connection to the water supply network, as a percentage of total households in all slum settlements 2) *Spatial variations in coverage of water supply connections*: the coefficient of variation of total households connected to the water supply network with an individual service connection, as a percentage of total households 3) *Spatial variations in per capita water*: the coefficient of variation of total treated water supplied to the distribution system, expressed as population served per days of water supplied

Note: SLB = Service Level Benchmarks; PAS = Performance Assessment System.

Mehta and Mehta credit the foregrounding of equity and service to the unserved for their system's widespread adoption. They caution, however, that data on the poor and unserved is scant and unreliable. They call for data collection from both service providers (water utilities) and households, the combination of which, they argue, would more accurately reflect service levels and quality (Mehta, 2011). The PAS team contends that based on their experience of extending services to the poor, citywide strategies are also crucial and that concentrating on utilities alone is not an adequate substitute for a municipality-wide approach (Mehta and Mehta, 2009).

CONCLUSION

This study opened the black box of performance benchmarking in urban water supply to shine a light on those who quantify in the name of transparency. It concludes that benchmarking experts must be counted among the governors of the urban water sector because their metrics are used not just to observe utilities, but also to steer them towards an idealised state. In short, performance benchmarking is urban water supply reform by other means.

As we might expect, experts' indicators coupled with orthodox economic reasoning has furthered the economisation of water utilities. This is a process we have seen quantification advance in other sectors (see, for example, Griffen and Panofsky, 2021; Guter-Sandu and Mennicken, 2021). Accounts of economisation, however, rarely specify what is lost when efficiency is made observable and actionable. This study deduces that equity is sacrificed. More specifically, water utility executives loyal to benchmarking systems' key indicators would prioritise service to existing consumers at the expense of water provision to the unserved. It is a very worthy empirical question to ask how far utility executives internalise performance benchmarks (of efficiency or otherwise) to create "tightly coupled" environments (Sauder and Espeland, 2009), but attempting to answer that question is beyond this study's scope. This case adds instead to a growing body of evidence that shows that experts' stated aim of using economic reasoning and quantification to improve public services could have the unstated effect of exacerbating inequality (Berman, 2022; Carolini, 2010; Cook, 2022; Griffen, 2022).

Mehta and Mehta's experience with the PAS system reveals that emphasising equity through quantification is possible if laborious. They challenged water utilities' economisation by making equitable water supply and consumption visible targets. They even convinced the Ministry of Urban Development of their methods, but stopped short of challenging the paradigm of performance-based water provision.

Supplementing existing performance benchmarking systems with equity indicators could entrench new public management's managerialist approach to urban water supply. As methods that quantify difference, equity indicators can certainly elicit calls to redress inequality, in the same way that early national income accounting prompted international institutions to redirect resources towards addressing global economic inequality (Speich, 2011). Quantifying equity could also, however, transform a situated concept into a universal category, thereby risking prescriptive solutions that are divorced from the elemental conditions that produce specific injustices (Evans, 2004; Prieto, 2021). Even more worrying is that a continued reliance on quantification of inequity can domesticate power relations. When coefficients of variation represent inequity as horizontal distances along a linear metric, they obfuscate the vertical bonds between the dominant and dominated that epitomise inequities (De Leonardis, 2022). Rarefied in this way, equity, like economic efficiency, risks becoming a predetermined outcome of existing power relations and thereby "loses its major value, that is, its ability to become a political driver" (Prieto, 2021).

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REFERENCES

ADB (Asian Development Bank). 1992. *Technical assistance for the preparation of a water utilities data book for the Asian and Pacific region* (Technical Assistance Report No. 26148). Manila: Asian Development Bank.

ADB (Asian Development Bank). 1993. *Water utilities data book: Asian and Pacific region*. Manila: Asian Development Bank.

ADB (Asian Development Bank). 1999. *Technical assistance for performance benchmarking for Pacific power and water utilities.* Manila: Asian Development Bank.

ADB (Asian Development Bank). 2007. *2007 benchmarking and data book of water utilities in India*. Manila: Asian Development Bank.

Alegre, H. 1999. Performance indicators for water supply systems. In Cabrera, E. and García-Serra, J. (Eds), *Drought management planning in water supply systems,* pp. 148-178. Netherlands: Springer.

Alegre, H.; Baptista, J.M.; Cabrera, E.; Cubillo, F.; Duarte, P.; Hirner, W.; Merkel, W. and Parena, R. 2006. *Performance indicators for water supply services*. IWA Publishing.

Andrews, C.T. and Yñiguez, C.E. (Eds). 2004. *Water in Asian cities: Utilities' performance and civil society views*. Manila: Asian Development Bank.

Assies, W. 2003. David versus Goliath in Cochabamba: Water rights, neoliberalism, and the revival of social protest in Bolivia. *Latin American Perspectives* 30(3): 14-36.

Bakker, K. 2003. Archipelagos and networks: Urbanization and water privatization in the South. *The Geographical Journal* 169(4): 328-341.

Bakker, K. 2014. The business of water: Market environmentalism in the water sector. *Annual Review of Environment and Resources* 39: 469-494.

Bayliss, K. 2003. Utility privatisation in sub-Saharan Africa: A case study of water. *The Journal of Modern African Studies* 41(04): 507-531.

Bayliss, K. 2014. The financialization of water. *Review of Radical Political Economics* 46(3): 292-307.

Berg, S. and Marques, R.C. 2011. Quantitative studies of water and sanitation utilities: A benchmarking literature survey. *Water Policy* 13(5): 591-606.

Berman, E.P. 2022. *Thinking like an economist: How efficiency replaced equality in U.S. public policy*. Princeton, NJ, USA: Princeton University Press.

Berman, E.P. and Hirschman, D. 2018. The sociology of quantification: Where are we now? *Contemporary Sociology* 47(3): 257-266.

Boelens, R. and Vos, J. 2012. The danger of naturalizing water policy concepts: Water productivity and efficiency discourses from field irrigation to virtual water trade. *Agricultural Water Management* 108: 16-26.

Broome, A. and Quirk, J. 2015a. Governing the world at a distance: The practice of global benchmarking. *Review of International Studies* 41(5): 819-841.

Broome, A. and Quirk, J. 2015b. The politics of numbers: The normative agendas of global benchmarking. *Review of International Studies* 41(5): 813-818.

Bruijn, H.D. and Dicke, W. 2006. Strategies for safeguarding public values in liberalized utility sectors. *Public Administration* 84(3): 717-735.

Çalışkan, K. and Callon, M. 2010. Economization, part 2: A research programme for the study of markets. *Economy and Society* 39(1): 1-32.

Callon, M. 1998. An essay on framing and overflowing: Economic externalities revisited by sociology. *The Sociological Review* 46(1_suppl): 244-269.

Carolini, G.Y. 2010. The tools of whose trade? How international accounting guidelines are failing governments in the global south. *Third World Quarterly* 31(3): 469-483.

CEPT University. 2010a. *Expert group meeting on universalizing access to water and sanitation for urban poor in Gujarat*. Ahmedabad, India: CEPT University.

CEPT University. 2010b. *Performance measurement for urban water supply and sanitation volume I: Approach and framework*. Ahmedabad, India: CEPT University.

CEPT University. 2010c. *Performance measurement for urban water supply and sanitation volume II: List of indicators and reliability assessment*. Ahmedabad, India: CEPT University.

CEPT University. 2013. *Service level benchmarks (SLB): Moving from measurement to monitoring and improvement*. Ahmedabad, India: CEPT University.

CEPT University. 2019a. *Journey of PAS: Towards data driven governance*. Ahmedabad, India: CEPT University.

CEPT University. 2019b. *Performance assessment system for urban water supply and sanitation*. Ahmedabad, India: CEPT University.

Cook, E. 2022. Efficiently unequal: The global rise of Kaldor-Hicks neoliberalism. *Global Intellectual History* 0(0): 1-23.

Danilenko, A.; van den Berg, C.; Macheve, B. and Moffitt, L.J. 2014. *The IBNET water supply and sanitation blue book 2014: The international benchmarking network for water and sanitation utilities databook*. Washington, DC: World Bank Publications.

Daston, L. 1995. The moral economy of science. *Osiris* 10: 2-24.

Davies, W. 2016. *The limits of neoliberalism: Authority, sovereignty and the logic of competition*. London: SAGE Publications.

Davis, J. 2005. Private-sector participation in the water and sanitation sector. *Annual Review of Environment and Resources* 30(1): 145-183.

Davis, K.; Kingsbury, B. and Merry, S.E. 2012. Indicators as a technology of global governance. *Law & Society Review* 46(1): 71-104.

De Leonardis, O. 2022. Quantifying inequality: From contentious politics to the dream of an indifferent power. In Mennicken, A. and Salais, R. (Eds), *The new politics of numbers*, pp. 135-166. Cham, Switzerland: Palgrave Macmillan.

Demortain, D. 2019. The politics of calculation: Towards a sociology of quantification in governance. *Revue d'Anthropologie des Connaissances* 13(4): 973-990.

Di Fiore, M.; Kuc-Czarnecka, M.; Lo Piano, S.; Maeso, A.P. and Saltelli, A. 2022. The challenge of quantification: An interdisciplinary reading. *Minerva* 61: 53-70.

Dill, B. and Crow, B. 2014. The colonial roots of inequality: Access to water in urban East Africa. *Water International* 39(2): 187-200.

Djerrari, F. and Janssens, J. 1998. *Reforming the water and sanitation sector in Africa: Overview of the institutional framework*. Stockholm: The 8th Stockholm Water Symposium.

Djerrari, F.; Janssens, J.G. and Kalbermatten, J.M. 1998. *Institutional development of water supply and sanitation utilities phase II: 1999-2001* (Report No. 202.2-98IN). Abidjan: Water Utility Partnership.

Espeland, W.N. and Stevens, M.L. 1998. Commensuration as a social process. *Annual Review of Sociology* 24: 313-343.

Espeland, W.N. and Stevens, M.L. 2008. A sociology of quantification. *European Journal of Sociology* 49(3): 401-436.

Evans, P. 2004. Development as institutional change: The pitfalls of monocropping and the potentials of deliberation. *Studies in Comparative International Development* 38: 30-52.

Eyal, G. and Levy, M. 2013. Economic indicators as public interventions. *History of Political Economy* 45(Supplement 1): 220-253.

Griffen, Z. 2022. The 'production' of education: The turn from equity to efficiency in U.S. federal education policy. *Journal of Education Policy* 37(1): 69-87.

Griffen, Z. and Panofsky, A. 2021. Ambivalent economizations: The case of value added modeling in teacher evaluation. *Theory and Society* 50(3): 515-539.

Guter-Sandu, A. and Mennicken, A. 2021. Quantification = economization? Numbers, ratings and rankings in the prison service of England and Wales. In Mennicken, A. and Salais, R. (Eds), The new politics of numbers, pp. 307-336. Cham, Switzerland: Palgrave Macmillan.

GWP (Global Water Partnership). 1998. *Service Provider Benchmarking and Performance* (146.7). Global Water Partnership; Documents and proposals from USNET. Associated programmes. Vol F6.3. Stockholm: Swedish International Development Cooperation Agency.

Haider, H.; Sadiq, R. and Tesfamariam, S. 2014. Performance indicators for small- and medium-sized water supply systems: A review. *Environmental Reviews* 22(1): 1-40.

Hall, D.; Lobina, E. and de la Motte, R. 2005. Public resistance to privatisation in water and energy. *Development in Practice* 15(3-4): 286-301.

Hirschman, D. and Berman, E.P. 2014. Do economists make policies? On the political effects of economics. *Socio-Economic Review* 12(4): 779-811.

Hodgson, B. 2009. Equity. In Peil, J. and van Straveren, I. (Eds), *Handbook of economics and ethics*, pp. 130-137. Cheltenham, UK: Edward Elgar.

Hu, Z.; Chen, Y.; Yao, L.; Wei, C. and Li, C. 2016. Optimal allocation of regional water resources: From a perspective of equity-efficiency tradeoff. *Resources, Conservation and Recycling* 109: 102-113.

Jaladhi, V.; Dhruv, B.; Utkarsha, K. and Mahroof, M. 2016. Online performance assessment system for urban water supply and sanitation services in India. *Aquatic Procedia* 6: 51-63.

Kariuki, M. and Schwartz, J. 2005. *Small-scale private service providers of water supply and electricity: A review of incidence, structure, pricing, and operating characteristics*. Washington, DC, USA: World Bank.

Kiely, R. 2004. The World Bank and "global poverty reduction": Good policies or bad data? *Journal of Contemporary Asia* 34(1): 3-20.

Krause, M.; Cabrera, E.; Cubillo, F.; Díaz, C. and Ducci, J. 2018. Aquarating: An international standard for assessing water and wastewater services. Washington, DC, USA: *Inter-American Development Bank Publications*.

Kumpel, E. and Nelson, K.L. 2013. Comparing microbial water quality in an intermittent and continuous piped water supply. *Water Research* 47(14): 5176-5188.

Kurunmäki, L.; Mennicken, A. and Miller, P. 2016. Quantifying, economising, and marketising: Democratising the social sphere? *Sociologie du Travail* 58(4): 390-402.

Loftus, A.; March, H and Nash, F. 2016. Water infrastructure and the making of financial subjects in the south east of England. *Water Alternatives* 9(2): 319-335.

MacKenzie, D. 2005. Opening the black boxes of global finance. *Review of International Political Economy* 12(4): 555-576.

Marin, P. 2009. *Public-private partnerships for urban water utilities: A review of experiences in developing countries*. Washington, DC, USA: The World Bank.

Marques, R.; Simoes, P. and Pires, J. 2011. Performance benchmarking in utility regulation: The worldwide experience. *Polish Journal of Environmental Studies* 1(20).

Mathur, C. and Mulwafu, W. 2018. Colonialism and its legacies, as reflected in water, incorporating a view from Malawi. *WIREs Water* 5(4): e1287.

McDonald, D.A. 2016. The weight of water: Benchmarking for public water services. *Environment and Planning A: Economy and Space* 48(11): 2181-2200.

McDonald, D.A. and Ruiters, G. 2005. *The age of commodity: Water privatization in Southern Africa*. London, UK: Earthscan.

McInnes, P. 2005. Entrenching inequalities: The impact of corporatization on water injustices in Pretoria. In McDonald, D. A. and Ruiters, G. (Eds), *The age of commodity: Water privatization in Southern Africa*, pp. 99-117. London, UK: Earthscan.

McIntosh, A.C. and Yñiguez, C.E. (Eds). 1997. *Second water utilities data book: Asian and Pacific region*. Manila: Asian Development Bank.

Mehta, M. (2011). *Water supply and sanitation in slums*. World Water Week, Stockholm, Sweden. www.cwas.org.in/resources/file_manager/water_supply_and_sanitation_in_slums-pas.pdf (accessed 15 February 2023).

Mehta, M. and Mehta, D. 2009. *National review meeting of experts: PAS project presentations and discussions*. Ahmedabad, India: CEPT University.

Mehta, M.; Mehta, D. and Immanuel, A. 2011. *Benchmarking in emerging economies: The performance assessment system (PAS) project in India*. www.cwas.org.in/resources/file_manager/benchmarking_in_emerging_economies.pdf (accessed 15 February 2023).

Mehta, M.; Mehta, D. and Immanuel, A. 2013. *A review of performance benchmarking: Urban water supply and sanitation*. Ahmedabad, India: CEPT University.

Mennicken, A. and Espeland, W.N. 2019. What's new with numbers? Sociological approaches to the study of quantification. *Annual Review of Sociology* 45(1): 223-245.

Mennicken, A. and Salais, R. (Eds). 2022. *The new politics of numbers: Utopia, evidence and democracy*. Cham, Switzerland: Palgrave Macmillan.

Merry, S.E. 2016. *The seductions of quantification: Measuring human rights, gender violence, and sex trafficking*. Chicago, IL, USA: University of Chicago Press.

MUD (Ministry of Urban Development). 2008. *Handbook of service level benchmarking*. New Delhi: Ministry of Urban Development.

MUD (Ministry of Urban Development). 2010. *Service level benchmarking databook – Improving service outcomes*. New Delhi: Ministry of Urban Development.

MUD (Ministry of Urban Development) n.d. *Jawaharlal Nehru National Urban Renewal Mission Overview*. New Delhi: Ministry of Urban Development.

Muniesa, F.; Millo, Y. and Callon, M. 2007. An introduction to market devices. *The Sociological Review* 55: 1-12.

National Institute of Urban Affairs. 2005. *Status of water supply, sanitation and solid waste management in urban areas* (Research Studies Series No. 88). New Delhi: National Institute of Urban Affairs.

Neves-Silva, P.; Braga, J.G. and Heller, L. 2023. Different positions in society, differing views of the world: The privatization of water and sanitation services in Minas Gerais, Brazil. *Frontiers in Sustainable Cities* 5: www.frontiersin.org/articles/10.3389/frsc.2023.1165872/full

Okun, A.M. 2015. *Equality and efficiency: The big tradeoff*. Washington, DC, USA: Brookings Institution Press.

Osberg, L. 1995. The equity/efficiency trade-off in retrospect. *Canadian Business Economics* 3(3): 5-19.

Polanyi, K. 1968. *Primitive, archaic, and modern economies: Essays of Karl Polanyi*. New York, NY, USA: Anchor Books.

Population Reference Bureau. 2019. *2019 World Population Data Sheet*. Washington, DC, USA: Population Reference Bureau.

Porter, T.M. 2004. The culture of quantification and the history of public reason. *Journal of the History of Economic Thought* 26(02): 165.

Power, M. 2004. Counting, control and calculation: Reflections on measuring and management. *Human Relations* 57(6): 765-783.

Prasad, N. 2006. Privatisation results: Private sector participation in water services after 15 years. *Development Policy Review* 24(6): 669-692.

Prieto, M. 2021. Equity vs. efficiency and the human right to water. *Water* 13(3): 278.

Prime Minister's Office. 2005. *PM launches Jawaharlal Nehru National Urban Renewal Mission*. www.mohua.gov.in/upload/uploadfiles/files/3Launch%20of%20Mission%20Speech%20of%20Honble%20PM%20English(1).pdf (accessed 3 December 2023).

Ramsey, S. and Mobbs, P. 2001. *African water supply and sanitation utilities 2001: Final report* (Report No. UC3955). Swindon, UK: WRc plc.

Roa-García, M.C. 2014. Equity, efficiency and sustainability in water allocation in the Andes: Trade-offs in a full world. *Water Alternatives* 7(2): 298-319.

Rusca, M. and Schwartz, K. 2018. The paradox of cost recovery in heterogeneous municipal water supply systems: Ensuring inclusiveness or exacerbating inequalities? *Habitat International* 73: 101-108.

Salais, R. 2022. "La donnée n'est pas un donné": Statistics, quantification and democratic choice. In Mennicken, A. and Salais, R. (Eds), *The new politics of numbers: Utopia, evidence and democracy,* pp. 379-415. Cham, Switzerland: Palgrave Macmillan.

Sauder, M. and Espeland, W.N. 2009. The discipline of rankings: Tight coupling and organizational change. *American Sociological Review* 74(1): 63-82.

Smith, L. 2004. The murky waters of the second wave of neoliberalism: Corporatization as a service delivery model in Cape Town. *Geoforum* 35(3): 375-393.

Smith, L. and Hanson, S. 2003. Access to water for the urban poor in Cape Town: Where equity meets cost recovery. *Urban Studies* 40(8): 1517-1548.

Speich, D. 2011. The use of global abstractions: National income accounting in the period of imperial decline. *Journal of Global History* 6(1): 7-28.

Supiot, A. 2017. *Governance by numbers: The making of a legal model of allegiance*. London: Bloomsbury Academic.

Twum, K.O. and Abubakari, M. 2020. Drops in the city: The puzzle of water privatization and consumption deficiencies in urban Ghana. *Water Policy* 22(3): 417-434.

UN-HABITAT. 2001. *Monitoring the millennium development target of "cities without slums"* (30065514, WB IBRD/IDA URB-01). World Bank; The Cities Alliance-Millennium Development Goals [MDG] – Volume 1 Monitoring, Water / Sanitation for Targets, General Correspondence and Habitat Indicators and Workshop – 1999-2003. Washington, DC, USA: World Bank Archives.

van den Berg, C. and Danilenko, A. 2010. *The IBNET water supply and sanitation performance blue book: The international benchmarking network for water and sanitation utilities databook*. Washington, DC, USA: World Bank Publications.

van Straveren, I. 2009. Efficiency. In Peil, J. and van Straveren, I. (Eds), *Handbook of economics and ethics*, pp. 107-114. Cheltenham, UK: Edward Elgar.

Whiteley, J.M.; Ingram, H. and Perry R.W. (Eds). 2008. *Water, place, and equity*. Cambridge, MA, USA: MIT Press.

Williams, D.W. 2004. Evolution of performance measurement until 1930. *Administration & Society* 36(2): 131-165.

World Bank. 1991. *Water management and development policy paper: A draft annotated outline* (1123127, WB IBRD/IDA WBIBRD/IDA_93-02). World Bank; Water Resources Management Policy Paper. Washington, DC, USA: World Bank Archives.

World Bank. 1992a. *Infrastructure policy paper* (1153519, WB IBRD/IDA WBIBRD/IDA_93-01). World Bank; Infrastructure Policy Paper. Washington, DC, USA: World Bank Archives.

World Bank. 1992b. *Report of the portfolio management task force* (30024557, WB IBRD/IDA EXC-12-02-3426S). World Bank; EXC – Portfolio Management Task Force – Draft Report and Executive Summary Reviews and Comments. Washington, DC, USA: World Bank Archives.

World Bank. 1992c. *Water supply and sanitation projects: The Bank's experience – 1967-1989* (Report No. 10789). Washington, DC, USA: World Bank.

World Bank. 1994. *Performance indicators: Transportation, water supply, and urban development* (1543332, WB IBRD/IDA OP). World Bank; Next Steps (NS) – Improving Project Performance Management Performance Monitoring System and Portfolio Management Information System – Performance Monitoring Indicators – Water Sector / Waste Water 1v. Washington, DC, USA: World Bank Archives.

World Bank. 1995. *Sectoral and project performance indicators in bank financed water & waste-water operations* (1543332, WB IBRD/IDA OP). World Bank; Next Steps (NS) – Improving Project Performance Management Performance Monitoring System and Portfolio Management Information System – Performance Monitoring Indicators – Water Sector / Waste Water 1v. Washington, DC, USA: World Bank Archives.

World Bank. 1999. *Benchmarking water and sanitation utilities: A start-up kit*. Washington, DC, USA: World Bank.

WRc plc. 2001. *SPBNET.Afrlca database manual* (UC3955/12393-0). Abidjan: Water Utility Partnership.

Yeatman, A. 1990. Reconstructing public bureaucracies: The residualisation of equity and access. *Australian Journal of Public Administration* 49(1): 17-22.

Yepes, G. 1995. *Reduction of unaccounted for water: The job can be done!* Washington, DC, USA: World Bank.

Yepes, G. and Dianderas, A. 1996. *Water and wastewater utilities indicators: 2nd edition*. Washington, DC, USA: World Bank.