



Review

Policy dimensions of development and financing of water infrastructure: The cases of China and India



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ARTICLE INFO

Article history:

Received 6 January 2016
 Received in revised form 18 June 2016
 Accepted 5 July 2016
 Available online 26 July 2016

Keywords:

Policy dimensions
 Water resources
 Infrastructure development
 Governance
 Financing
 China
 India

ABSTRACT

The past decades have seen planning and implementation of built infrastructure in all over the developed and developing world growing in large scales. This has been influenced by economic and population growths, urbanization and industrialization, which in turn have put increasing stress in provision of services. The paper reviews the policy dimensions of water infrastructure development and financing in the two largest economies at present, China and India, including planning, implementation and decision-making processes. Findings indicate that main challenges for infrastructure development have been limited sources of financing, but also policies and their implementation. The high levels of investment in water infrastructure in the two countries have been impressive, mainly in China. However, they still have not necessarily addressed efficiency over the long term, supported more inclusive and higher economic growth or improve social and environmental conditions in all cases.

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1. Introduction

Infrastructural development plays a key role in economic growth and poverty reduction all over the world. Properly planned and implemented, it has the potential to contribute to national and regional economic growth, respond to urbanization challenges, contribute to improvements in environmental conditions and encourage and foster social and economic inclusion (ADB, 2013a; Estache, 2008).

In the developed world, infrastructure is mostly in need of rehabilitation and modernization. In the developing world, in addition, substantial new and upgraded infrastructure is needed because the countries need to respond to increasing economic and population growths, urbanization, and changing aspirations of the population for better standards of living.

Investments in numerous construction and modernization projects have been the results of increasing water, energy, and food-related needs as well as climate-related security (Tortajada, 2014; Kenny, 2015). Water infrastructure for domestic, agricultural, energy and environment-related uses (pipes, treatment plants, groundwater recharge and storage, rainwater harvesting, small, medium and large dams, etc.) are essential for developing

countries located in the tropical and subtropical regions compared to countries in temperate zones. This is the case in India and China, where high rainfall inter- and intra-annual fluctuations result in more erratic rainfall patterns making reservoirs essential to store water whenever this is available to use it during the rest of the year (Biswas, 2012). Given that reservoirs are some of the most important buffers against droughts and that one of their most important roles is flood protection, the question arises as to whether construction of new reservoirs should be encouraged or whether small projects should be developed instead. Since new construction may not always be possible for economic, social, environmental or dogmatic reasons, a feasible alternative to new reservoirs is to look into their re-operation that can be more effective under the present, and perhaps also future, conditions. A limitation could be, however, that re-operation of reservoirs requires comprehensive policy, management, governance (formal and informal institutions and decision making processes) and financial considerations that are very complex to realize (Tortajada, 2016).

Globally, the total scale of incremental global investment requirements in infrastructure is in the trillions of dollars. In the case of the developing countries, this has been estimated at approximately \$1 trillion a year (Bhattacharya et al., 2012). This amount includes universal coverage of adequate housing, water, and sanitation, in addition to modern energy and communications technology.

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Traditional overseas development assistance is not expected to be a major new source of financing for infrastructure for developing economies, as they represent around half of global GDP, adjusted for purchasing power, or one-third of GDP at market exchange rates. Therefore, even if all rich countries reached a 0.7% aid target in the foreseeable future, which is highly unlikely, this would represent only 1% of developing countries' GDP. Overseas development assistance can be more valuable in the poorest countries if it can finance public infrastructure (either directly or through guarantees or blended finance, reducing the cost of finance for infrastructure), but not for growing economies (Kenny, 2015).

Infrastructure spending has been the highest in emerging and developing economies, especially in the ones with the highest growth, China and India in particular. These two countries, together with Brazil and Russia, make up the so-called BRICs, which in 2012 produced one-quarter of global GDP. China and India, considered the global rising powers, could become much larger forces in the global economy, mainly if they are able to develop and maintain policies, institutions, and infrastructure that are supportive of growth (Wilson and Purushothaman, 2013).

In both the countries, continued population growth and urbanization have placed increasing stress on built infrastructure and provision of services in all sectors, including water supply, sanitation, electricity, irrigation, railways, roads, and ports. Capital to provide and maintain the infrastructure necessary to provide adequate services and facilities is, and will continue to be, seriously constrained. Development of infrastructure to the level of the G6 nations will represent an enormous challenge in investments needs, and, most important, in policies, laws, regulations, and institutions (UN, 2014).

The present paper discusses infrastructure development and financing in Asia in general, and in China and India in particular, with a focus on the water sector. The paper does not attempt to compare the two countries, as they are not directly comparable. They are at different stages of development, and their policies, decision-making, and political processes, as well as institutional and legal and regulatory frameworks, are dissimilar. Climate, public expectations and culture are also different. The paper explores the status of infrastructure development in both countries, covering planning, implementation, decision-making processes, and investments, as well as challenges that will have to be addressed for the countries to grow sustainably. It argues that policies, management, governance (formal and informal institutions and decision making processes) are essential elements for development of infrastructure, and allocation and reallocation of water resources, as any change will affect the several uses and users.

This paper takes a rather different view from the school that argues that built infrastructure such as large-scale pipelines, treatment plants, and drainage networks exacerbates impacts and erodes the resilience of cities (Ferguson et al., 2013). This paper argues that built infrastructure is needed at present and in the future in order to make countries more resilient if built within an overall framework of development (Muller et al., 2015). In fact, built infrastructure, green and more flexible infrastructure (as harnessing nature to provide critical services for communities such as flood protection, excessive heat, helping to improve air and water quality, etc.), and soft infrastructure (human capital and institutions) play very important roles in building more resilient human and natural environments in the long term (Palmer et al., 2015).

The following analyses are based on assessment of available literature as well as on discussions with scholars and policy makers in both China and India.

2. Infrastructure developments and investments in Asia, with focus on China and India

Asia, home to 4.3 billion people, hosts four of the largest economies of the world: China, Japan, India, and Republic of Korea. Together, they account for nearly 30% of the global GDP. Ten out of 12 economies globally with GDP growth rates of 7% or more over the past 25 years are also in Asia (Bhattacharyay, 2010). Development of infrastructure has facilitated economic growth in all of them, even though there are serious gaps between urban and rural areas in all these countries, with the rural poorest having the lowest access to all services (Straub and Terada-Hagiwara, 2011).

Asia has become the largest producer of energy in the world, with a share of 30% (4,039 million tonnes of oil equivalent) in 2013. In the region, total electricity generation increased 24% from 337.2 TWh in 1973 to 3,400 TWh in 2013. Hydro-production, driven by China, represented 7.2% (93.3 TWh) of the global production in 1973, increasing to 32.3% (1,251 TWh) in 2013 (OECD/IEA, 2015). In the water sector, even though approximately 75% of the population has access to improved sources of water (WHO and UNICEF, 2014), this does not mean that water is safe for drinking. Performance for sanitation is much lower: less than half of the population has improved sanitation as measured by the United Nations (Kuroda et al., 2008).¹

The Asian Development Bank (ADB/ADBI, 2009) estimates that some \$8 trillion in overall national infrastructure, in addition to approximately \$290 billion (in 2008 dollars) in specific regional projects, will be needed in Asia from 2010 to 2020. This is an average overall investment of \$750 billion per annum, with approximately 68% going to new capacity investments and 32% to maintain and replace existing infrastructure. Annual investment needs in transport, electricity, information and communications technology and water are expected to be greater than 6.5% of Asia's estimated GDP for 2010–2020. In the case of China and India, the necessary investments during this period are likely to represent some 53% and 26%, respectively, of the total investment needs in Asia, and 5.39% and 11.12%, respectively, of estimated GDP between 2010 and 2020 (Bhattacharyay, 2010).

Investments for infrastructure projects (both new and upgrades) in Asia are expected to come from domestic savings, the public sector, official development assistance, and/or loans from multilateral development banks. Mobilization of public funds and private investments and development of policy alternatives attractive for investment purposes and revenue generation to cover investment flows represent serious challenges (Jones, 2006). Private-sector contributions are still not significant in the region because of poor policies, absence of reliable legal safeguards, and changing investment conditions, often without consultation with the private-sector groups. With a proper and fair investment regime, and independent and transparent legal processes, investments from the private sector could be realized.

Relative infrastructure quality in the countries in the region is difficult to estimate. However, it is considered to be below world average and to be correlated with the competitiveness of the specific countries (ADB/ADBI, 2009). In 2003, the cost of the necessary infrastructure improvements in China was estimated to be more than \$75 billion per year until 2013, 90% of it from the public sector (Bellier and Zhou, 2003). In India, according to

¹ In Millennium Development Goals monitoring, an improved sanitation facility is defined as one that hygienically separates human excreta from human contact. An improved drinking-water source is defined as one that, by nature of its construction or through active intervention, is protected from outside contamination, in particular from contamination by fecal matter.

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