

# Development Cooperation in Civil Engineering and Appropriate Technology (AT) in the Global Age

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The Republic of Korea has been the only country in recent history to progress from an impoverished country to an advanced country within 60 years. Many developing countries, including those in Africa, are now implementing national development cooperation programs to learn from the Korean experience.

Korea became a member state of the Development Assistance Committee (DAC) in 2010, and its Official Development Assistance (ODA) to developing countries is rapidly increasing from 0.16% of gross domestic product (2250 billion won) in 2014 to 0.25% in 2015. Development cooperation requires the construction of

large facilities that are mostly distributed in urban areas. However, because such urban infrastructure is usually distributed in only a few developed cities within developing countries, there is a demand for small and medium technology support facilities in local areas. As a customized technology, Appropriate Technology (AT) is now actively being provided in such nonurban areas.

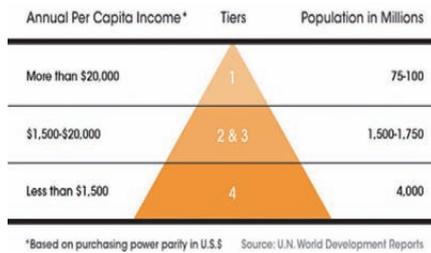
AT is defined as the technology of a local small or medium facility that focuses on the appropriateness of price, local applicability of the technology and sustainability of the management and maintenance of the facility based on the economic

level and conditions of local residents in developing countries. Some existing large aid facilities are well operated; however, because many facilities are located in urban areas, there is limited benefit to most rural areas in which there is little social infrastructure. Therefore, AT is a technology that is supported to increase quality of life and to reduce poverty in underdeveloped countries or low-income areas. Recently, AT has also been considered a low-cost and low-energy fusion technology as a consequence of the development of information technology and transportation. Recently, domestic nongovernment organizations and other



•• Fig. 1 Reservoir of rainwater at the Anawim Elementary School in Davao City, Philippines (Upper left: Water supply before facility; Upper center: Reservoir bed excavation; Upper right: Reservoir of rainwater; Lower left: Linkage of existing rainwater collecting pipe; Lower center Rainwater reserve tower; Lower right: Water supply after facility)

The World Economic Pyramid



•• Fig. 2 Socioeconomic pyramid

organizations have supplied AT to solve problems relating to drinking water in many developing countries. For example, Scientists Without Borders (President: Prof. Yoon Je-yong, Seoul National University) established a water supply facility with storage of rainwater at the Anawim Elementary School in Davao City, Philippines and provided local education along with filtration and disinfection technology (Figure 1). Domestic and foreign organizations and communities are delivering education on the use of technologies as well as providing AT.

The provision of such AT has been selected as one of the tasks of development cooperation employing scientific technology among 140 government tasks of the present Korean government of Park Geun-hye. Thus, Korea Trade-Investment Promotion Agency (KOTRA), Korea Institute of Science and Technology (KIST) and the Ministry of the Environment are promoting many types of AT projects. The 4 billion people (about 72% of the world's population) earning an annual income of less than 3000 US dollars constitute the base of the socioeconomic pyramid (Figure 2) and a market of about 500 billion US dollars. Although people who presently belong to the base of the pyramid have weak purchasing power, they have strong potential power from the perspective of the whole market. The applications

of AT are far wider than just the supply of drinking water, and AT plays a role as the foundation of AT business in the future depending on the local conditions.

There are four considerations for ensuring the sustainability of AT. The first is that AT development should be based on local demands and conditions within developing countries. Before introducing technology to developing countries, it is necessary to conduct a joint survey in advance with local and domestic research institutes on the actual needs and status of local sites.

The second consideration is to conduct research on the localization of technology in cooperation with local education institutions and research institutes. Appropriate technology is based on the localization of technology. Appropriate localization requires the downgrading or retrograding of technology so that it is compliant with local technology in liaison with local colleges and research institutes to secure the continuous stability of the introduced technology. This process also provides opportunities to promote local colleges and to set a foundation for research.

The third consideration is to establish technology education, management and maintenance in liaison with local education and research institutes. It is essential to run an education program targeting local residents, and especially trainees, to secure the sustainability of system maintenance. Recently, as information technology and the Internet have progressed, many residents in developing countries have benefited from effective education through cellular phones and personal computers. It is thus important to operate an education program linked with local colleges and research institutes or to commission education from Korea to

maintain and manage facilities.

The fourth consideration is to secure sustainability through industrialization, which is an important factor in spreading technology continuously. It is necessary to foster local companies and to build a profit structure through these companies to generate markets and spread support for introduced technology. The promotion of industrialization can continuously improve technology and provide maintenance and management only when the industrialization is in liaison with local education and research institutes.

Development cooperation with developing countries should be a win-win process that delivers practical knowledge that was learned during the past 60 years of development in Korea. Appropriate technology is a best-fit technology that makes it possible to efficiently develop local areas where large facilities and infrastructure cannot be provided. It is considered that especially in this global age, AT will become effective and sustainable in civil engineering and harmonize with urban facilities and infrastructure.

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