
From Standards Adopter to Standards Author: The Case of the Republic of Korea

Heejin Lee and Mi-jin Kim*

Abstract

This study examines the Republic of Korea's development from a rarely investigated perspective: standards. Korea has transformed itself from an adopter of standards to an author of standards. The study describes how Korea has developed its national standards systems to contribute to its development, examines the evolution of national quality systems, discusses challenges for further development, and suggests lessons for developing countries. It divides the lessons into those for standards adopters and those for would-be standards authors. For standards adopters, the study highlights strategic planning, prioritized resource allocation for standardization, and policy makers' awareness and sustained support for the role of standards in industrialization. For would-be standards authors, the study emphasizes that countries concentrate in areas of specialization and tighten links between R&D and standardization. The study also discusses implications for development cooperation, notably legitimacy for increasing official development assistance (ODA) to support developing countries' efforts at standardization and a need to devise and support diverse modes to build capabilities in standardization.

Keywords: Standards, National quality infrastructure, National standards system

* Heejin Lee is a professor at the Graduate School of International Studies at Yonsei University. email: heejinmelb@yonsei.ac.kr. Mi-jin Kim is a research fellow at the Graduate School of International Studies at Yonsei University. email: mjkim32@yonsei.ac.kr. This paper serves as a background paper to the *World Development Report 2025: Standards for Development*. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

Introduction

The Republic of Korea's development has been examined from a variety of perspectives. The 2024 *World Development Report* highlights Korea as a success story because the country did not fall into the so-called middle-income trap (World Bank 2024). This study revisits the Korean story from a rarely investigated perspective: standards. A few studies link standards to national economic growth through the total factor productivity (TFP) model in which standards are one component of TFP that contribute to economic growth (ISO 2021). However, there is little research that explores the link with narratives other than macroeconomic modelling.¹ This case study of Korea on the evolution of national standards systems throughout its path of economic development can help researchers and policy makers in the areas of both development and standardization identify mechanisms linking the relationship between standards and development and thereby suggest practical recommendations for developing countries.

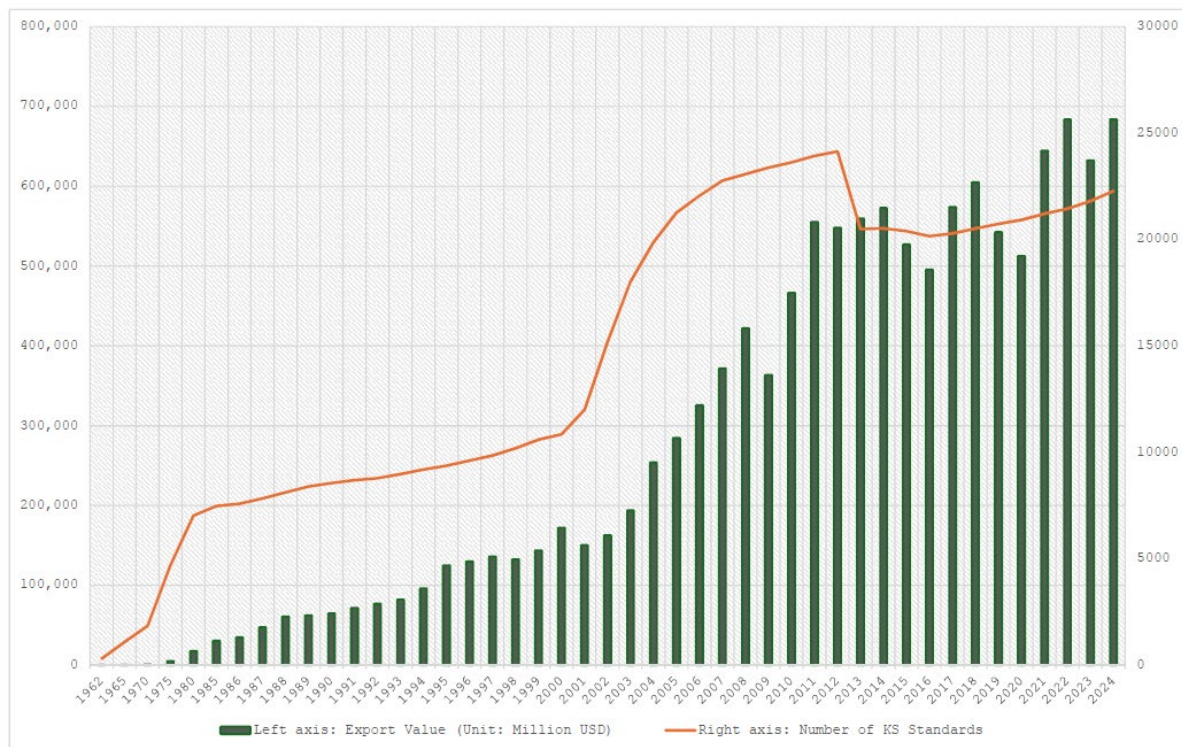
Standards provide businesses with internal operational efficiency by making parts and processes consistent and compatible in both manufacturing and service provision. Standards also help improve the general level of product/service quality. Beyond corporate boundaries, standards serve as an essential part of trade, both domestic and international, by providing interoperability and shared guidelines in such areas as safety.

Standards for international trade function like grammar in language. Without knowing and getting accustomed to the grammar, we cannot communicate; similarly, in the area of trade, we cannot make products that meet the requirements imposed by companies and/or authorities of importing countries. Simply put, we cannot sell. Standards have played an important role in globalizing the world economy. This aspect of standards is particularly important for developing countries when they want to participate in global value chains.

Korea presents a good example showing that economic development is accompanied by the growth of standards (refer to figure 1). For its economic development strategy, Korea adopted export-driven industrialization. To export products, manufacturers had to meet minimum quality and safety requirements, which are usually defined and ruled by standards. Success in these markets requires standardization of parts, products, and processes, which leads to productivity increases across a whole range of industry sectors.

Standards were a foundation of Korea's exports and therefore its economic development— particularly in its early stages, when exporting companies were learning how to make products that satisfy the standards imposed by companies and/or government agencies of importing countries. Related Korean government agencies helped Korean manufacturers by offering programs that promote standardization.

Figure 1. Korea's export increases have been accompanied by the growth of Korean Industrial Standards (KS)



Source: Data on exports are from K-Stat Trade Statistics, Korea International Trade Association (KITA). Data on KS are from the Korean Agency for Technology and Standards (KATS).

Note: KS = Korean Industrial Standards.

Starting in the late 1990s, as technological capabilities advanced and the awareness of significance of standards as well as intellectual property rights increased, the Korean government and leading companies began to turn their attention to participating in the process of developing standards, rather than simply adopting the standards made by advanced countries. This approach was notable in the international standardization of information and communications technology. ICT became a growth engine for the Korean economy from the late-1990s. Now Korea is a significant player in various international standards development organizations (SDOs). Korea has made the transition from a standards adopter to a standards author. Korea has submitted an increasing number of New Work Item Proposals (NWIPs), which begin the process of international standards development (refer to table 1). And Korean experts are filling an increasing number of leadership roles in SDOs (refer to table 2).²

Currently Korea is seeking a leading role in standardization of critical and emerging technologies (CETs). In 2024, a Korean expert became a chair of the ISO/IEC JTC 3, which was established in the same year to deal with the development of standards in quantum technologies. In March 2025, two Korean experts were appointed as chair of the 3GPP Technical Specification Group (TSG) Radio Access Network (RAN) and vice-chair of TSG Service and System Aspects (SA), respectively (HelloDD 2025).³ The appointments are considered to be recognitions of Korea's contributions and leadership in the standardization of mobile communication.

Table 1. The number of New Work Item Proposals (NWIPs)^a submitted by Korea has been increasing

Year	ISO (including JTC1)^b	IEC	Total	Cumulative total
~2002	19	5	24	24
2003	7	2	9	33
2004	12	8	20	53
2005	22	5	27	80
2006	39	6	45	125
2007	51	10	61	186
2008	51	12	63	249
2009	48	30	78	327
2010	44	19	63	390
2011	42	18	60	450
2012	43	15	58	508
2013	39	16	55	563
2014	40	12	52	615
2015	44	21	65	680
2016	52	18	70	750
2017	71	14	85	835
2018	68	13	81	916
2019	56	22	78	994
2020	60	19	79	1,073
2021	61	19	80	1,153
2022	71	10	81	1,234
2023	66	16	82	1,316
2024	72	21	93	1,409

Source: Korean Agency for Technology and Standards (KATS).

a. The process of standards-setting begins with the submission of NWIPs. This includes the scope of the proposed standards, justification for the need, and the relevant stakeholders, and so on. Refer to <https://committee.iso.org/sites/tc211/home/resolutions/isotc-211-good-practices/--proposal-stage---new-work-item.html>

b. JTC1 is the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) Joint Technical Committee for information technology.

These achievements illustrate that Korea has evolved from standard adopter to standard author. They raise several questions, among them: How has Korea developed its national standards systems through the path of its economic growth? What factors contributed to the success of its national quality systems that in turn contributed to its economic development? What challenges will Korea face on the way forward? What can other countries, particularly developing countries, learn from Korea's experiences? While answering these questions, this study aims first, to examine the evolution of Korea's national quality/standards systems; second, to identify the challenges Korea faced that need to be addressed for further development; and third, to provide lessons for developing countries.

Table 2. Korea's leadership roles^a in ISO and IEC (including JTC1 and JTC3)^b have been increasing

Year	Chair	Secretariat	Convener	Total
2000	1	2	4	7
2001	2	6	5	13
2002	3	7	8	18
2003	4	7	10	21
2004	7	12	18	37
2005	11	14	21	46
2006	13	15	25	53
2007	14	15	34	63
2008	18	16	47	81
2009	19	18	58	95
2010	16	19	72	107
2011	15	21	76	112
2012	15	21	86	122
2013	15	21	104	140
2014	15	22	123	160
2015	16	22	130	168
2016	16	25	139	180
2017	20	35	141	196
2018	18	29	160	207
2019	20	29	167	216
2020	20	28	189	237
2021	23	30	190	243
2022	24	30	196	250
2023	25	30	208	263
2024	26	31	220	277

Source: Korean Agency for Technology and Standards (KATS).

a. A TC (technical committee) consists of subcommittees or working groups. The leader of a TC is usually called "chair"; that of a Subcommittee (SC) or a Working Group (WG) is called "convener." The secretariat of a TC provides administrative and organizational support for the TC's operations. The national standards body of a member country serves as the secretariat.

b. JTC1 is the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) Joint Technical Committee for information technology. JTC3 is the ISO and IEC Joint Technical Committee for quantum technologies.

The research for this study was conducted in two steps. In the first step, the authors collected information by examining the few previous studies that exist and white papers and histories of related agencies. Through these reviews, the authors identified the stages Korea has followed to develop its national quality infrastructure (NQI). To supplement the document analysis and address some questions that were raised during the first step and by the reviewers of the first draft, the authors conducted a series of interviews with experts and former government officers in the area of NQI in April to May 2025. The three main interviewees have served in the field for 20 to 40 years as high-level officers and researchers.

The next section depicts the evolution of NQI. This is followed by a discussion of the challenges facing Korea's standards systems. The final section concludes by providing lessons for developing countries.

Evolution of national standards systems

The national standards system is part of NQI, which consists of metrology, standardization, conformity assessment, and accreditation. NQI is an institutional framework that administers and implements the practice of those four activities. This section uses the NQI framework to describe the Korean systems while focusing on standardization.

The evolution of NQI in Korea has passed through four stages (Choi and Choi 2019). Each stage is identified by the main agency in charge of standardization during that stage. Key characteristics of each stage are summarized in table 3.

Stage 1: Founding (1961~1972)

In the early 1960s, Korea adopted export-driven industrialization as a strategy for economic growth. In doing so, the importance of a rigorous national standards system was recognized in order to enhance product quality, productivity, and competitiveness in exports. From 1961 to 1972, the focus was on laying the foundation for its NQI, establishing key institutions, enacting core legislation, and introducing standardization policies.

Metrology

The reliability and consistency of measurements are foundational to maintaining trust in trade and ensuring the quality of products in the market. Without reliable measurement systems, both domestic and international commercial trade is unstable. To promote trustworthy trade and foster industrial development, Korea enacted the Metrology Act in 1961, which established a legal framework for measurement standardization. The government also set up the Central Bureau of Weights and Measures under the Ministry of Commerce and Industry. This agency was tasked with managing and overseeing metrological activities to ensure that measurements used in commercial transactions were accurate and trustworthy. In 1963, Korea implemented the metric system.

Standardization

Industrial standardization through the use of standardized parts and standardized processes was necessary to increase the efficiency of production and enhance the quality of products, which would in turn foster trust and competitiveness. Recognizing the importance of industrial standards in facilitating trade and enhancing product quality, Korea introduced legislative measures such as the Industrial Standardization Act in 1961. The Bureau of Standards under the Ministry of Commerce and Industry was established in 1961 to develop and oversee national standards policies and activities.

In early years, specifications were developed for necessities like light bulbs. In 1962, the first set of 43 Korean Industrial Standards (KS) for textiles, mining, cosmetic soaps, and others was issued (KATS 2011). The Korean Standards Association (KSA) was founded to promote the adoption and dissemination of KS and to conduct educational and promotional activities related to industrial standardization.

Table 3. Korea's national quality infrastructure has developed through four stages

Stage	Founding (1961~1972)	Growing (1973~1995)	Upgrading (1996~2014)	Expanding (2015~present)
Agency	Bureau of Standards, Ministry of Commerce and Industry	Industrial Advancement Administration	Korean Agency for Technology and Standards (KATS)	KATS
Characteristics of each stage	• Export-driven industrialization • Promotion of industrial standardization for export	• “Standards” included in the Constitution	• Framework Act on National Standards in 1999 • Participation in international standardization • Linking R&D with standardization • ICT standardization	• Pan-government Participation Standards System in 2015
Metrology	• Metrology Act in 1961 • Central Bureau of Weights and Measures	• Korea Standards Research Institute (KSRI) in 1975; later Korea Research Institute of Standards and Science (KRISS) in 1991	• KRISS became the National Metrology Institute (NMI) in 2004	
Standardization	• Industrial Standardization Act in 1961 • Ten-year industrial standardization plan (1971–1980) • KS Mark in 1963	• Korea Standards Research Institute (KSRI) • Two five-year plans for industrial standardization (launched in 1988 and 1993)	• 1st–3rd National Standard Development Plans • Harmonization with international standards • National Standardization Capacity Enhancement Program in 2007 • Cooperating Organization for Standards Development (COSD) in 2008 • ICT Standardization: Standard Research Center (SRC) within Electronics and Telecommunications Research Institute (ETRI)	• 4th–5th National Standard Development Plans • Transferred standardization responsibilities to other ministries • National Standardization Strategy for High Tech Industry (2024)
Conformity Assessment	• Export Inspection Act in 1962	• KS Mark Order in 1977	• KS Mark System from approval to certification by Korean Standards Association (KSA) in 1998	• KS certification by Korea Testing Certification Institute (KTC), Korea Testing and Research Institute (KTR), and Korea Conformity Laboratories (KCL) as well as KSA from 2015
Accreditation		• Korean Calibration Laboratory Accreditation Scheme in 1992 • Korea Accreditation Board (KAB) in 1995	• Korea Accreditation System (KAS) in 2001 • Korea Laboratory Accreditation Scheme (KOLAS) in 2007	

Source: Original research for the *World Development Report 2025*.

Note: ICT = information and communication technology; KS = Korean Industrial Standards; R&D = research and development.

The KS Mark was introduced as a key element of Korea's standards systems in 1963. Public sector entities gave priority to products with the KS Mark in their procurement. This encouraged businesses to adopt KS, and the Mark became widespread. During this period, about 200 standards were issued annually and the total number reached about 1,540 at the end of 1968 (KATS 2011, 56). KS was actively promoted not only among businesses but also to the general public. For example, a short movie titled "Industrial Standardization" was screened in all the film theaters in the country before the main movie began. It helped enhance public awareness of the importance of standards and establish the perception of "KS marked goods = good quality" (KATS 2011).

An amendment to the Industrial Standardization Act in 1971 required factories that produced products with the KS mark to hire qualified personnel in the area of quality control to strengthen standardization practices. To foster quality experts, KSA was designated as an education institution for quality control qualification in 1971 (KATS 2011).

To systematically advance standardization efforts, the government formulated a ten-year plan for industrial standardization (1971–1980), which was implemented in the next stage. In 1963, Korea joined ISO and IEC.

Conformity Assessment

As mentioned, the KS Mark system was started in 1963. Companies are allowed to label their products with the KS Mark only after production conditions including manufacturing and testing facilities, test procedures, quality control and quality assurance have been assessed.

To ensure the quality of export products and enhance international trade credibility, in 1962 the government enacted the Export Inspection Act. One of its mandates was quality inspections for export goods. At first, a government agency conducted the export inspection. As the export volume grew and the number of complaints on exported goods due to unsatisfactory quality increased, the need for strict inspection arose. In 1964, 15 private inspection agencies were designated as official export inspection bodies. They came to play a key role in the systematic evaluation and certification of export products. Some of them developed into conformity assessment (CA) organizations in relevant industries, such as KTR (Korea Testing and Research Institute), KTC (Korea Testing Certification Institute), and KCL (Korea Conformity Laboratories) (Seo, Bahng, and So 2013, 92–93).

Accreditation

At this stage, no noticeable accreditation system was present.

Stage 2: Growing (1973~1995)

From 1973 to 1995, Korea's national standards system experienced significant institutional growth and consolidation. As roles and responsibilities of standards expanded, the Bureau of Standards could not cover them as a unit within a ministry. The Industrial Advancement Administration was created in 1973 to integrate functions scattered around other ministries and agencies. It consisted of four divisions: quality control, standards, inspection, and technical instruction. As those division names imply, the term "industrial advancement" meant standards development and quality management, including inspections of manufactured products for export. And the economy progressed from light industries to heavy and chemical industries through late 1970s and 1980s, standards were developed in machinery, automobile parts, electric/electronic products and electronics, and chemical products. These industries demanded highly precise and consistent measurements, which led to the development of metrology in this period.

Key institutions such as the Korea Standards Research Institute (KSRI) were established and the national metrology framework was restructured. A unique characteristic of the Korea's national standards systems was formalized in 1980 when the Constitution was amended. It includes the provision that "the State shall establish a national standards system," thus formally recognizing the importance of national standards. In this stage, as the Korean economy became increasingly integrated into the world economy, a need arose to strengthen its conformity assessment and accreditation systems to align with global practices. There was a sharp increase in the number of Korean Industrial Standards (KS). For example, by the end of 1970s when the ten-year industrial standardization plan (1971–1980) was completed, there were about 6,700 KS, with about 500 issued annually (KATS 2011, 78).⁴

Metrology

As the economy moved to heavy, chemical, and electric/electronic industries, the need for accurate measurement systems increased. For apparel industries, inaccurate measurements for shirts and shoes are merely an issue of low quality; for heavy and chemical industries, accurate measurements are a matter of safety and life.

In 1974, the government commissioned a study by US consulting company to consider the national standards systems. Recommendations included strengthening national capabilities for measurements to develop advanced industries (KATS 2011, 89).

So the Korea Standards Research Institute (KSRI) was established under the Industrial Advancement Administration in 1975, with technical support from the U.S. National Bureau of Standards (NBS). A loan from the United States Agency for International Development (USAID) was utilized to modernize Korea's measurement systems.⁵ The main objectives were upgrading the level of national metrology as a foundation for development of heavy and chemical industry to the level of developed countries, and enhancing the international competitiveness of Korean industries by modernizing national industrial standards systems. To further enhance its measurement capabilities, KSRI engaged in international cooperation with Germany's National Metrology Institute from 1979 to the late-1990s. Recognizing the growing importance of metrology in both scientific and industrial progress, KSRI was renamed the Korea Research Institute of Standards and Science (KRISS) in 1991.

Korea joined the International Organization of Legal Metrology (OIML) in 1978 and enacted the Law on Weights and Measures in 1992. The Korea Association of Standards and Testing Organizations (KASTO) was established as a nonprofit organization to promote and disseminate legal metrology.

Standardization

The government continued to refine standardization systems, revising the Industrial Standardization Act, which was renamed the Industrial Standards Law in the early 1990s. KSRI played a role to bridge industrial standards with measurement standards, particularly because heavy, chemical, and electric/electronic industries could not develop without the support of accurate measurement systems. Two five-year industrial standardization plans were launched, in 1988 and 1993, respectively.

In 1977, the KS Mark Order system was implemented. It stipulated that to protect consumers and enhance public safety, all the products in the designated categories (such as lightning, electric wires, building materials, and pressure vessels) should have KS Mark; that is, in those categories, any product cannot be produced and sold without a KS Mark.

Conformity Assessment

The conformity assessment system was strengthened during this period to ensure product quality and public safety. The KS Mark Order system promoted the production of high-quality industrial goods and became a symbol of quality assurance. KS-marked products were prioritized in public procurement. To further encourage compliance with standards, the government established an award system to recognize outstanding KS Mark manufacturers. The hiring of qualified personnel for quality control continued in factories making products with the KS Mark .

Accreditation

To align with international conformity assessment practices, Korea established the Korean Calibration Laboratory Accreditation Scheme (KOLAS) in 1992. KOLAS is the governmental accreditation body administered by the Korean Agency for Technology and Standards (KATS). It is responsible for accreditation of the laboratories that conduct testing and calibration and inspection bodies. For the accreditation of management system certification bodies, the Korea Accreditation Board (KAB) was founded in 1995 as a nonprofit organization. KAB was entrusted with environmental management system (ISO 14001) accreditation work in 1996 and quality management system (ISO 9001) accreditation work in 1997. Its source of revenue is service charges for its accreditation services.

Stage 3: Upgrading (1996~2014)

In this stage, national standards strategies and policies were promoted not just as a tool of quality control for export; the government and businesses began to realize and share the idea that those who set standards dominate the market. This realization accelerated standardization efforts. Korea's national standards system underwent significant upgrades. KATS replaced the Industrial Advancement Administration in 1999, following the enactment of the Framework Act on National Standards. Korea became actively engaged in international standards development organizations, moving from passive participation to pursuing leadership roles. The government also introduced policies to enhance private sector involvement and to link research and development (R&D) and standardization.

Most of all, as ICT became a key growth engine for the Korean economy starting in the 1990s, enormous efforts were made for standardization in ICT because standards were considered a critical factor for success in digital, multimedia sectors, as well as in future advanced industries.

Metrology

The Framework Act on National Standards included provisions for metrology standards, reinforcing the legal foundation for measurement activities. The Korea Research Institute of Standards and Science (KRISS) was restructured into the Ministry of Science and Technology in 2004 to serve as the National Metrology Institute (NMI). Its main functions include the establishment, maintenance, and improvement of national measurement standards for length, time, and weight; the development of new metrology and assessment technologies necessary for advanced industries; the calibration and testing of industrial measuring instruments; and the dissemination of certified reference materials (CRM) (Choi 2013, 23).

KRISS provided measurement services to many businesses. It helped them to reduce defect rates, and to save time and costs required to secure certification for calibration and traceability (Seo Bahng, and So 2013, 94–95 and 107–113). Beneficiaries included large firms. For example, KRISS improved the accuracy of torque measurement standards, which helped reduce the defect rate in the assembly of automobiles by Hyundai Motors. By joining the International Committee of Weights and Measures

(CIPM)-Mutual Recognition Arrangement on the Equivalence of National Measurement Standards (MRA) (CIPM-MRA),⁶ KRISS provided certification for equivalence to Korean businesses doing overseas projects. Through the provision of accurate metrology services and CIPM-MRA, KRISS contributed to the industrial development.

Standardization

The legal framework for standardization was further strengthened by the Framework Act on National Standards in 1999, which mandated the development of national standardization plans. Three National Standard Development Plans (2001–2005, 2006–2010, and 2011–2015) were implemented. The main achievement of the 1st Plan was setting the foundation of national standards systems; of the 2nd Plan was harmonization with international standards; and of the 3rd Plan was active participation in international standardization with domestic technology (KATS 2022).

Cooperating Organization for Standards Development (COSD)

The COSD system was established in 2008. During the five previous decades of national standardization efforts, the number of national standards had grown to more than 15,000, and standardization went beyond the sole responsibility of the government. The global practices and trend in standards management and certifications were led by the private sector. In order to encourage and enable private organizations to develop standards, the government set up the COSD system. Its objective was to transfer government responsibility in standards development and management to representative industry organizations and trade associations with technology expertise, with the government focusing on policy and planning (Choi 2013, 13). COSDs are provided to some extent with budget and information support by the government. They conduct surveys on necessary standards and plan for standards development. They also run relevant mirror committees. While 14 COSDs were designated in the first year (2008), there were 69 COSDs in charge of 81 Technical Committees/Subcommittees as of 2023. They include Korea Iron & Steel Association (KOSA), Korean Society of Automotive Engineers (KSAE), Korea Standards Association, Korea Testing Certification Institute (KTC), and Korea Testing & Research Institute (KTR) (KATS 2024, 122–23).

Harmonization of KS with international standards

The harmonization with international standards had been stepped up since the WTO Agreement on Technical Barriers to Trade (TBT) came into force in 1995. To align domestic standards with international ones, ISO and IEC standards were adopted, which contributed to the rapid increase of KS from the late 1990s through the 2010s. The consistency rate (the rate at which KS correspond to parallel ISO and IEC standards) grew from about 60 percent as of 2001 to almost 100 percent in 2011 (refer to table 4).⁷ One of the COSDs' tasks was to monitor international standards and update KS for harmonization.

Table 4. Korean Industrial Standards (KS) became consistent with international standards

Year	Total number of KS	Number of KS with corresponding international standards (A)	Degree of correspondence			Not equivalent	Consistency rate (%) (B/A)
			Equivalent		Sum of equivalent standards (B)		
			Identical	Modified			
2001	12,006	5,469	2,378	1,075	3,453	2,016	63.1
2002	15,176	7,515	5,520	1,528	7,048	467	93.8
2003	18,014	9,856	8,227	1,557	9,784	72	99.3
2004	19,865	11,535	10,073	1,415	11,488	47	99.6
2005	21,251	12,691	11,262	1,407	12,669	22	99.8
2006	22,058	12,978	11,623	1,342	12,965	13	99.9
2007	22,760	13,969	12,714	1,243	13,957	12	99.9
2008	23,062	14,171	12,937	1,223	14,160	11	99.9
2009	23,372	14,675	13,397	1,264	14,661	14	99.9
2010	23,622	14,177	12,849	1,308	14,157	20	99.9
2011	23,923	15,384	14,225	1,140	15,365	19	99.9

Source: Seo, Bahng, and So 2013, 41.

While the number of KS increased rapidly due to the adoption of ISO and IEC international standards, a need arose to abolish unused and unnecessary standards. Some standards become useless because relevant products are not sold any more in the market or technological innovation has made some existing standards meaningless. As a result, KATS decided to abolish unused and unnecessary standards and hence, the total number of KS was reduced in early 2010s.

National Standardization Capacity Enhancement Program

A significant scheme for Korea becoming a standards author started in 2007. The National Standardization Capacity Enhancement Program is a government-funded R&D initiative that promotes the international competitiveness of Korea's industries in standardization. It is designed to ensure that the outcomes of national R&D programs are effectively translated into technical standards, linking R&D, standardization, commercialization, and certification. One of the aims is to promote international standardization (refer to table 5). Participants are chosen through an annual competitive selection process. It is a key national policy tool that supports industries for international competitiveness in standardization.

Table 5. The National Standardization Capability Enhancement Program contributes to international standardization

Year	Budget (₩ 100 million) ^a	Budget (US\$ million) ^b	International standards proposed (number)	International standards newly adopted (number)
2007	179	19.3	--	--
2008	169	15.3	41	21
2009	175	13.7	42	25
2010	205	17.7	52	28
2011	185	16.7	58	25
2012	225	20.0	60	28
2013	207	18.9	79	28
2014	226	21.5	54	28
2015	241	21.3	53	27
2016	260	22.4	-	-
2017	259	22.9	50	46
2018	245	22.3	53	47
2019	263	22.6	52	36
2020	305	25.8	49	35
2021	374	32.7	51	40
2022	403	31.2	54	43
2023	433	33.1	57	43

Sources: National Standards White Paper by KATS for each year.

a. Budget amounts are in 100 million Korean won.

b. US dollar conversions are based on the average exchange rate of each year.

As indicated, it was part of a vision to link national R&D with standardization. During the formulation of the 2nd National Standard Development Plan (2006–2010), concerns were raised that standardization outcomes remained insufficient despite substantial R&D investments. In response, key ministries in charge of science & technology, industry, and ICT jointly developed a strategy to link R&D programs with standardization. The R&D-standardization linkage policy refers to the integration of standardization considerations from the early planning stages of R&D by involving standardization experts to jointly identify and pursue opportunities for standardization. The analysis of standardization trends was mandated at the R&D planning stage, and evaluation guidelines were revised to include standardization performance.

Against this background, the National Standard Coordinator System was implemented in 2011. For each key technology field, a coordinator who has expertise in both standardization and the technology concerned is appointed from the private sector to help strengthen the link between R&D and standardization. In 2011, eight coordinators were appointed in smart grid, electric vehicles, nuclear energy, 3D industry, cloud computing, smart media, smart logistics, and smart medical information (KATS 2012).⁸

The 2000s marked a turning point in ICT standardization, with the implementation of the IT839 Strategy in 2004, a national initiative designed to accelerate the development of Korea's ICT ecosystem. The strategy selected eight key services (including WiBro, DMB, and VoIP); three core infrastructures (Broadband Convergence Network, Ubiquitous Sensor Network and IPv6); and nine new information technology (IT) growth engines (including next-generation mobile communication, telematics, and

intelligent robots). By integrating standardization efforts with national R&D priorities, the strategy aimed to facilitate the commercialization of emerging technologies and strengthen Korea's global competitiveness. Korea played a significant role in shaping international standards in WiBro and DMB. Building on these achievements, ICT standardization was further developed in the 2010s through the Future Growth Engine Implementation Plan (2014), which emphasized ICT convergence and securing standard-essential patents (SEPs) in emerging technologies.

The Electronics and Telecommunications Research Institute (ETRI) played a key role in this ICT standardization. It set up the Protocol Engineering Center (PEC) as early as in 1989, which developed into the Standards Research Center (SRC) in 2008. The center played the role of a control tower for ICT standardization not only within ETRI but also across ICT industries. Along with it, the Telecommunications Technology Association (TTA) expanded its role in ICT standardization. TTA was established in 1988 to promote industry/private-led standardization activities. TTA makes and promotes its own association standards, and represents Korea in private SDOs such as 3GPP (for telecommunications) and oneM2M (for machine-to-machine and Internet of Things technologies). ETRI and TTA work closely to increase Korea's participation and leadership in key technical committees in SDOs and coordinate collaboration among industry, government, R&D institutes, and academia. They contribute to strengthen Korea's position in shaping international ICT standards.

During this period, Korea significantly expanded its role in international standardization, evolving from a participant to a contributor and leader in international SDOs. Korean experts began to take on leadership roles. Additionally, Korea actively contributed to ISO governance bodies, including the ISO Council, Technical Management Board (TMB), Committee on Consumer Policy (COPOLCO), and Committee for Conformity Assessment (CASCO), as well as IEC policy committees. These developments reinforced Korea's position as a global standardization contributor, indicating its potential as a standard author at the following stage.

Korea also launched a program to enhance the awareness of standards among the young generation as well as the general public. Since 2006, KATS and KSA have been holding the Standards Olympiad to facilitate an understanding of standards among the next generation.⁹ Students from middle and high school levels contest to solve social problems by suggesting new standards. The Olympiad became international in 2014.

Conformity Assessment

In 1998, the KS Mark was changed from an approval system to a certification system managed by the Korean Standards Association (KSA). To promote the utilization of KS, the priority system for KS-marked products continued. Public agencies and companies financed by national and local self-governing bodies give priority to the KS-certified companies in their procurement of materials and services, including facilities construction (Choi 2013, 11).

Accreditation

The Korea Accreditation System (KAS) was established in 2001 as a national accreditation body working within KATS. KAS provides accreditation for product certification bodies in the fields of electric apparatus, gas appliances, renewable energy equipment, metals, ceramics, chemicals, and plastics. The main mission of KAS is to improve the accreditation system in order to ensure qualitative growth and competitiveness of the accreditation service; to guarantee the compliance of international standards and enhance accreditation service; to respond properly to demands by stakeholders in the accreditation service and improve the reliability and value of accreditation service; and to implement

an effective and reliable accreditation service and train personnel (Choi 2013, 18–19).

Additionally, in 2007, the Korean Calibration Laboratory Accreditation Scheme was renamed the Korea Laboratory Accreditation Scheme (KOLAS) to ensure compliance with international accreditation standards. It enhanced Korea's credibility in global conformity assessment frameworks.

Stage 4: Expanding (2015~present)

During this stage, Korea undertook a significant reform called the Pan-government Participation Standards System. Due to converging industries and expanding service industries, new types of issues and challenges surfaced and they could not be properly dealt with by the traditional standardization systems, which were based on manufacturing. Under this new system, launched in 2015, standardization responsibilities were delegated to relevant ministries to promote specialization. ICT standardization was further strengthened in international domains and expanded to include critical and emerging technologies (CETs).

Metrology

KRISS continues to play a key role in metrology and further in CETs. KRISS is a leading institution for developing quantum technologies and standards.

Standardization

The 4th and 5th National Standard Development Plans (2016–2020, and 2021–2025) were implemented. The main achievement of the 4th Plan was upgrading the national standards systems; and of the 5th Plan was standardization of future innovative technologies for digital transformation (KATS 2022).

The Pan-government Participation Standards System was developed to address the increasing diversification of industries including services. There were three reasons for the reform (KATS 2024).

First, there were often overlaps between industrial standards (KS) and broadcasting/communications standards (KICS). As ICT grew and a variety of products and services came out to the market, domestic broadcasting/communication standards were formulated. As convergence progressed in ICT and conventional manufacturing, industry boundaries became blurred, which often led to a question of which standard system under which ministry is in charge of which area. For example, two separate standards were developed for mobile web, one by KS and the other by KICS. This caused much confusion for related businesses such as mobile operations and mobile application developers. There were 31 such occurrences of separate standards (KATS 2024).

Second, while there was an increasing demand for standards development in various areas, standards were not developed at the right time, which caused huge social costs. For example, each city and regional government developed its own traffic card system. There were many complaints from citizens about incompatibility. Even though the national standardized traffic card system was put in place later, a huge amount of taxpayers' money had to be paid to change readers across the country. Such costs could have been saved if a relevant agency was able to identify the need for a national standard, and make one.

Last but not least, there were incoherence between standards and technical regulations. In some cases, separate KS and technical regulations existed for one product. For example, test items for electric water heaters differed between the KS certification and the product safety certification (technical regulations), which imposed additional costs to businesses. In principle, when new technical

regulations were made, ministries were required to refer to relevant existing KS and/or international standards. However, they were not familiar with standardization procedures and often thought that using KS put them under the realm of the other agency.

To address these problems, the Pan-government Participation Standards System was implemented in 2015. Standardization responsibilities were delegated to other ministries, allowing specialized agencies to manage standards relevant to their respective domains. The reform aimed to enhance expertise and efficiency in standard development while adapting to technological convergence and mitigating the negative impacts of overlapping standards and technical regulations. The revision of the Industrial Standardization Act in 2015 enabled relevant agencies to issue and amend KS.

Under the Pan-government Participation Standards System, as of June 2023, standardization tasks were entrusted to 10 ministries administering 4,015 standards (18.6 percent out of the total number of KS) and 147 TCs (refer to table 6). Because ICT is administered by the Ministry of Science and IT, MSIT takes care of the largest number of KS (1,139), with 32 TC/SC (KATS 2024).

Table 6. Standards activities are entrusted to other ministries/agencies (as of June 2023)

Agency	KS	TC/SC
Ministry of Science & ICT	1,139	32
Ministry of Agriculture, Food and Rural Affairs	531	18
Ministry of Environment	620	29
Ministry of Employment & Labor	37	1
Ministry of Land, Infrastructure & Transport	238	11
Ministry of Oceans and Fisheries	42	0
Food & Drug Safety	937	40
Korea Forest Service	449	13
Korea Meteorological Administration	11	2
Rural Development Administration	11	1
Total	4,015	147

Source: KATS 2024.

Note: ICT = information and communications technology; KS = Korea Industrial Standard; SC = subcommittee; TC = technical committee.

In response to the growing importance of standards in ICT, ETRI upgraded its standards unit to the Standards Research Division in 2019. A national technology strategy titled ‘Measures to Promote National Strategic Technology: 12 National Strategic Technologies, announced in 2022, emphasized international cooperation on standards development. For AI and 6G technologies, the government was keen to cooperate with other advanced economies, with the goal to promote Korean experts to take up leadership positions in international SDOs and various technical and policy committees. As part of medium- to long-term plans up to 2028, the government expressed its intention to provide support for international standards development for AI, 6G, and quantum technologies (Lee et al. 2023). These efforts have yielded good results. Korea is the third most active player in ITU in terms of number of contributions¹⁰, following China and the United States (refer to table 7).

Table 7. Korea is the third biggest contributor to the International Telecommunications Union

1	2	3	4		
China	United States	Korea, Rep.	Japan	Europe	Others
17.1% ^a	9.6%	9.2% ^b	6.2%	16.7%	41.2%

Source: TTA (Telecommunications Technology Association).

Note: ITU = International Telecommunications Union.

a. The percentage of the country's contributions out of the whole contributions made to ITU from 2005 to 2024.

b. The total number of contributions (9,296) from Korea from 2005 to 2024.

As the geopolitical rivalry between the United States and China over critical and emerging technologies (CETs) and related standards intensifies, Korea has developed its own strategies for CET standards. In May 2024, KATS announced the Korean Government National Standardization Strategy for High Tech Industry. TTA published ICT Standardization Strategy Ver.2025 (TTA 2024) under the guidance of MSIT (Lee et al. forthcoming). Through these efforts, Korea seeks to become a global standards author in the ICT sector, and is increasingly considered as such.

Korea has hosted key global standardization events, such as the ISO General Assembly in Seoul (2015) and the IEC General Assembly in Busan (2018). To foster young experts, postgraduate programs on standardization started in 2019.

Conformity Assessment

Following the reform, responsibilities for KS certification, which were previously handled by the Korean Standards Association (KSA), were transferred in 2015 to multiple certification bodies such as the Korea Testing Certification Institute (KTC), Korea Testing and Research Institute (KTR), and Korea Conformity Laboratories (KCL).

Accreditation

No significant changes were observed during this stage.

Challenges

In its journey from a standards adopter to a standards author, Korea has faced some challenges that it needs to address in order to remain a significant player and advance further.

Private sector participation

Although Korea has actively participated in international standardization, a substantial portion of the participants and leaders come from universities and R&D institutes. Out of 263 standards experts who hold leadership positions in ISO and IEC, only 24 (9.1 percent) came from industry as of 2023 (Ministry of Industry, Trade and Energy 2024). There is a widely shared perception that more participation is needed from private firms.

Repeated appearances of the goal of “strengthening the private sector’s capabilities and roles for standardization” in a series of national strategies demonstrate that this aspiration has yet to be achieved. Korea’s standards system has been a state-led system, particularly in its early stages, though it has been trying to give more active roles to the private sector through various initiatives. The main explanation lies in Korea’s modern history of industrialization, which was characterized by strong government leadership (Choi 2013, 1). This view is all shared by the interviewees who have worked in

Korea's standards systems for decades. The strong government role was inevitable during the stages of a standards adopter when there were no or little capabilities of the private sector for standardization.

As Korea turned into a standards author, several initiatives were launched to improve engagement and participation of the private sector. Some, such as the COSD program, had an impact. COSDs were in charge of more than 80 percent of standards development and management as of 2023 (KATS 2024, 122–23). While the government still undertakes initiatives, efforts continue to engage the private sector and enhance its capabilities and the transition toward a private-sector-driven system takes hold (Yoo 2019, 10).

Yet some issues remain. Standards experts from private firms who are active in standardization often complain that they are not well supported by their companies and not properly rewarded for their efforts and time. This may be because firms tend to consider standardization activities as a cost center due to its nature of sharing, compared to that of patents as a profit center. This lack of rewards also curtails younger standards experts from entering the field.

A similar concern comes from academics and researchers who are actively participating in standardization. In response, a new evaluation scheme in which contributions to standardization are considered as a factor of performance evaluations like patents and academic papers is being implemented in universities and R&D institutes.

Stakeholder inclusiveness and agenda setting

Other types of stakeholders whose participation needs to be encouraged are those who can bring the voices of the under-represented to the processes of developing standards. They include consumer groups and civil society organizations. As standards affect every aspect of modern life and every corner of society, the principle of inclusiveness has been generally accepted as a guideline for standards setting, meaning that diverse social groups participate in standardization. Particularly as digital technologies bring risks of violating fundamental human rights, their engagement in standardization is increasingly important, as the United Nations Office of the High Commissioner for Human Rights emphasized in a recent report (OHCHR 2023). As a standard author, Korea needs to lead not only in technical aspects but also in discourses on values and agenda setting by proactively engaging diverse stakeholders in standardization activities, both domestic and international.

Cooperation with developing countries is an approach to take from this perspective too. Developing countries need to be “digital deciders” in digital standards and digital trade in the future (Bergsen et al. 2022), though at present many of them lack sufficient capabilities and resources to participate extensively in international standardization. Assisting developing countries in standardization will be an asset in the future in leading agenda setting.

Geopolitical circumstances surrounding standardization

Geopolitical competition brings new challenges. The rivalry between the United States and China surrounding CETs and their standardization adds complexities in dealing with standardization challenges. Think tanks in some advanced countries deal with the issue of standardization as part of their national and international strategies (Fägersten and Rühlig 2019; Seaman 2020; Teleanu 2021; Voo and Creemers 2021). Standardization has become a geopolitical issue (Kim, Eom, and Lee 2023).

Korea is not an exception. The Indo-Pacific strategy Korea announced in 2022 highlights standardization in CETs and collaboration in technology standards with digitally advanced nations (Government of the Republic of Korea December 2022). Korea repeated that message in the National Security Strategy of 2023, stating that “we will drive standard-setting for critical and emerging technologies by actively participating in technology-related international organizations...” (Government of the Republic of Korea 2023, 126). The issue of standards has become a matter of national security.

The technology and standards confrontation between the two powers could cause the decoupling of the global technology governance systems such as the international standardization systems, some observers have suggested (Timmers and Serentschy 2024). That means that there could be two separate standardization systems including conformity assessment and certification, one for US-led markets and the other for China-led markets. Although this is a hypothetical scenario,¹¹ it is, if realized, a serious problem for countries like Korea that rely on exports, as well as many other countries that have to trade with both markets.

To avoid such decoupling of the international standardization systems and to mitigate negative impacts of the confrontation, continued collaboration is needed among other leading countries of technology and standards such as Germany, the United Kingdom, and Japan, as well as the European Union as a whole, among others. Bilateral and multilateral cooperation can mitigate the risk of such impacts and help keep the international standardization systems from being dominated by either of the two powers or overwhelmed by the confrontation between the two (Lee 2022). Cooperation with developing countries is also necessary.

Lessons for Developing Countries

Korea’s trajectory from standards adopter to standards author provides useful and valuable lessons for developing countries. The discussion that follows divides these lessons into those that are drawn from the stages while Korea was a standards adopter and those from the stages it became a standards author. The former is useful to those countries that are in early stages of their NQI development; the latter is more relevant for those that aim to become an author.

For standards adopters

Standardization from areas in need

Although standards are necessary in every corner of society and industry, developing countries have limited resources and capabilities. They need to identify the areas of priority for sustaining the economy and for their development orientation. In the case of Korea at its beginning stage of industrial standardization in 1960s, these areas included the production of necessities like electric bulbs and light industries like apparel for export. Later the focus moved to heavy, chemical, and electric/electronic industries as the need from the economy changed. For a developing country, the priority, for example, could be agribusiness.

Quality control and the KS Mark

From its early years of export-driven industrialization, Korea strongly emphasized quality control for export. Industrial standards (that is, KS) were used for that purpose. Goods to be shipped for export underwent export inspection. The core idea of the inspection is the same as that of certification and conformity assessment. Those agencies that conducted the inspection evolved into organizations related to conformity assessment.

The KS Mark scheme provided the companies with KS-marked products with an additional “seal of approval” that government agencies and public organizations took into account in their procurement decisions. This preferential procurement system for KS products, according to one interviewee, was one of the critical success factors for making companies adopt KS. And KS was highly promoted to the general public. This strengthened the perception that “KS products mean good quality,” which further encouraged firms to adopt them.

Systematic planning for standardization

An outstanding feature of Korea’s case has been a succession of explicit plans and strategies for national standardization made by the leading agency and backed by high-level leadership. In the initial stage (Founding), Korea pursued a ten-year industrial standardization plan (1971–1980). In stage two (Growing), it undertook two successive five-year plans for industrial standardization (launched in 1988 and 1993, respectively). Through stages three (Upgrading) to four (Expanding), it implemented five Five-year National Standard Development Plans. Preparation for the sixth is underway. These plans are mandated by the Framework Act on National Standards, enacted in 1999.

In other words, Korea has benefited from guiding directions for standardization that have been documented in those strategic plans. The mandatory planning for standardization indicates that the spirit of the Constitutional provision on standardization is followed in practice.

Prioritized resource allocation for standardization

Resources from international aid and loans were allocated to the establishment of standards and quality infrastructure including metrology, in early stages of economic development. Technical cooperation from donors was utilized to build and strengthen capacity in standardization. The Korea Standards Research Institute (KSRI, later KRISS) was founded for modern measurement systems in 1975 with funding from a USAID loan and another loan from ADB. Korea received technical assistance from the U.S. National Bureau of Standards (NBS) and the German National Metrology Institute from 1970s to the 1990s. They became a foundation for later development. KRISS, the national metrology institution, benefited from international aid as one of its building blocks.

The use of resources from foreign aid provides an implication for international development cooperation communities. Development organizations and donor agencies need to refresh their awareness of the significance of NQI and/or national standards systems for the development of an economy. They need to increase ODA resources allocated to assistance for standardization, and develop diverse ways for effective assistance in this area.

Policy makers’ determination to pursue standardization

Policy makers displayed farsightedness in allocating resources from international aid and loans to the establishment of NQI in Korea’s early stages of economic development, as part of their commitment to promote and increase exports. One of the interviewees strongly argued that it also required considerable courage to spend foreign loans on measurement and metrology infrastructure instead of roads, for example. Standards, as well as measurement systems, are an invisible domain to the general public, while physical infrastructure like roads are highly visible and improvements are easily understood and welcomed. The interviewee emphasized that such a decision-making could not be made without the agreement, or at least awareness, of the highest level of leadership. Indeed, high-level sustained leadership was a key to Korea’s success (refer to box 1).

Box 1. The role of high-level, sustained leadership in developing national quality infrastructure in Korea

Korea's advancement in standardization has been driven by well-articulated strategic planning and even the use of foreign aid. While many developing countries have similarly formulated and enacted such plans—and despite support from international development agencies (including the World Bank) for national quality infrastructure (NQI) and standardization initiatives, these efforts have often yielded limited results. Beyond these elements, “leadership” stands out as a decisive factor in Korea, as frequently cited in assessments of Korea's economic development. The top leadership's awareness of and interest in standards and quality issues provide a clue to explain the development and execution of Korea's national standardization strategies. This leadership effect appears to have arisen from a confluence of fortuitous circumstances and policy actions.

In 1965 President Park Chung-hee visited the United States and reached an agreement on cooperation in science and technology. In the following year, US President Johnson made a return visit. He brought “standard weights and measures” (such as the International Prototypes of the kilogram and the meter) as a gift. They were supplied by the U.S. National Bureau of Standards. Delivered personally to President Park by Johnson's special adviser on science and technology (Hong 2022), the gift served as a clear signal to President Park of the crucial importance of maintaining rigorous technical standards and metrology systems for the development of science and technology as well as industry.

The professional and even personal rapport between President Park and Dr. Zae-Quan Kim, the founding head of the Korea Standards Research Institute (KSRI), also strengthened early efforts (Hong 2022). As a recipient of a German government scholarship during the 1950s, Dr. Kim earned his doctorate in materials & metallurgical engineering and worked at a German steel firm. During President Park's 1964 visit to Germany, Kim handed over a report entitled *Proposal for Development of Iron and Steel Industry in Korea*, which must have left a deep impression on President Park. He was scouted through the overseas-scientist recruiting program and joined the Korea Institute of Science and Technology (KIST) at its inception. Later he served in several high-level government positions for industry and defense. In these roles, he laid a groundwork for Korea's heavy, chemical, and defense industries. As the first head of the Korea Standards Research Institute (KSRI) (currently KRISS), Dr. Kim drew on his German connections to initiate bilateral cooperation and, through his relationship with President Park, elevated the importance of standardization within Korea's top policy-making circles. President Park was registered as the inaugural founder of KSRI (Hong 2022, 90–91; Korean Physical Society 2002).

Finally, Dr. Kim played a pivotal role in adding standards to the revised Constitution of 1980. Amid the political turmoil leading to the 1980 constitutional revision, he was a persistent advocate and channeled his networking with influential politicians (Song 2023). By embedding standardization in the Constitution, the state's duty to develop and sustain the national standards system was unequivocally affirmed. These provisions became the legal foundation for the reforms in standardization systems that followed.

The series of the events and networks surrounding President Park fostered a deep appreciation among Korea's leadership and senior policymakers for the strategic importance of standards, thereby underpinning the formulation and execution of standardization policies and strategies.

This trajectory is supported by the approach that Kevin Rudd, the former Prime Minister of Australia, advocates in his 2022 book, *The Avoidable War* (Rudd 2022). He also served as Foreign Minister and Ambassador to China. As a fluent Chinese speaker and seasoned diplomat, Rudd recounts numerous conversations with China's top leader, Xi Jinping, that afforded him unique insights into Xi's perspectives. Drawing on these encounters, Rudd identifies ten core themes that frame Xi's worldview. Among them, national unity, economic prosperity and environmental sustainability are immediately apparent. Crucially, the tenth theme —“changing the global rules-based order”— includes “determining the global technology standards of the future” as the first task. In other words, the evolution of China's standardization agenda is aligned with the priorities and vision of its leader.

These experiences suggest that any efforts to advance standardization or to strengthen NQI in developing countries should be coupled with initiatives aimed at elevating the recognition and interest of their high-level policy makers in these areas.

For countries that aim to be standards authors

Standardization in specialized areas

As ICT became a powerhouse of Korean economic development beginning in the 1990s, efforts for standardization in this sector were prioritized. ETRI set up the Protocol Engineering Center (PEC) as early as 1989, which developed into the Standards Research Center in 2008. It has played the role of control tower not only within ETRI but also across related ICT fields. It is now closely working with TTA to lead ICT standardization. Korea's focus on ICT standardization indicates that standardization efforts have been made in the area of what the country is good at: that is, its area of specialization.

Countries that aim to become a standards author and are in such a transition stage need to identify industries and businesses in which they have strengths and prioritize them for a focused approach to standardization. Standardization need to and can start in the strong and crucial field of their economy. Starting from an area of specialty and merit can become a spring board to lead the country to become a standards author.

Linking standardization to R&D

To become a meaningful standards author, it is necessary for standardization to be supported by R&D. This is particularly true of digital and emerging technologies. Korea has integrated standardization considerations from the early planning stages of R&D by involving standardization experts to jointly identify and pursue opportunities for standardization. Korea implemented the Standardization Capacity Enhancement Program in 2007 for this purpose. It is designed to link innovations from R&D to standardization, commercialization, and certification. It has yielded productive outcomes in terms of international standardization, along with the National Standards Coordinator System, which taps private sector expertise in specific industries. A would-be standards author can start such programs to promote linkages between R&D and standardization.

Fostering experts

Efforts to foster human resources in standardization continue in Korea. Various programs to enhance public awareness of the significance of standards are offered from the primary and secondary education levels to tertiary education and beyond. The Standards Olympiad is one example. To foster standards experts, postgraduate programs were opened in 2019 with support from KATS. The

Standardization Strategy for High Tech Industry announced in 2024 targets high-level managers to enhance their understanding of standards in business strategies. Although these programs are not directly related to the transition from standards adopter to standards author in terms of sequence or timing, they are efforts to maintain the momentum of the transition and develop it further in the future.

The case of Korea demonstrates how national quality infrastructure—of which standardization is a key component—is a foundation of economic development. The case has implications for development cooperation. It endorses the legitimacy of increasing ODA resources for assistance in standardization and illustrates the need to develop diverse modes for capability building in standardization. The case study on the evolution of Korea’s national standards systems throughout its recent period of economic development can also help researchers and policy makers in both development and standardization identify mechanisms governing the relationship between standards and development and thereby suggest practical recommendations for developing countries.

Notes

¹ One report that examines the role of standards is *National Standards Infrastructure Underpinning the Economic Growth of Korea* (Seo, Bahng, and So 2013); however, its focus is in metrology. While this study covers metrology, it takes a balanced approach by including metrology as one component of national quality infrastructure (NQI) along with standardization.

² International standards are made in formal SDOs like the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and the International Telecommunications Union (ITU) on the one hand, and consortiums and forums that are mainly organized by companies in the related technology and industry. This study focuses on the former, but when relevant, it discusses the latter.

³ 3GPP (3rd Generation Partnership Project) is the world’s largest telecommunication standard development organization where 3G, 5G, and other mobile communication standards were developed and standards for 6G are being discussed. TSG RAN and TSG SA are two of the three top-level units within 3GPP.

⁴ Such a rapid increase during this period is partly attributed to the adoption of JIS (Japanese Industrial Standards).

⁵ A signing ceremony was held in September 1975 for the US\$5 million loan from USAID (KRISS History, <https://www.kriss.re.kr/menu.es?mid=a10106020000>). Because it was not sufficient to procure equipment for advanced metrology, the government arranged a further loan of US\$8 million from the Asia Development Bank (Seo, Bahng, and So 2013, 70). Furthermore, in the mid-1970s, a US\$10 million loan from USAID contributed to building a large apartment complex with about 1,500 unit dwellings in Seoul, and a \$6 million loan from USAID helped to found the Korea Institute of Science and Technology (KIST) (Kim 2025). These two initiatives—the construction of the apartment complex and the establishment of KIST, the leading science and technology institute in Korea—are indicative of the scale and vision of KSRI (later KRISS) at its inception.

⁶ With the advent of World Trade Organization (WTO) systems for world trade, the equivalence of national measurement standards has become an important issue. To reduce any technical barriers caused by differences in metrological systems, CIPM organized MRA in 1999. KRISS has since been a member. It allows the member NMIs to mutually recognize national measurement standards, as well as the calibration and measurement certificates issued by one another. The CIPM-MRA provides transparent, reliable, peer-reviewed and quantitative information on the capabilities of NMIs (KRISS, n.d., <https://www.kriss.re.kr/menu.es?mid=a20105020000>).

⁷ As of December 2017, the consistency rate was 97 percent (14,476 out of 14,044 KS with corresponding international standards). The rate calculated against the total number of KS (20,916 as of December 2020) was 68 percent (KATS 2020, 40).

⁸ In 2024, seven coordinators were in place for carbon neutrality, international standards (in charge of ISO and IEC), artificial intelligence (AI), electric/electronic systems, autonomous vehicles, services and energy.

⁹ <https://www.standardsportal.kr:8441/olympiad/en/>.

¹⁰ “Contributions” refer to documents submitted for discussion during the process of setting standards. In the case of 3GPP, there are various types of contributions: work item, change request (including addition of feature, functional modification of feature, essential correction, correction to an earlier release, and editorial modification), technical report/proposal/study, discussion document, and liaison (Baron 2020).

¹¹ Even now international systems for standards, conformity assessment, and certification are not identical. Each country has its own systems, whose requirements exporters should meet. However, there is a general consensus that all the economies concerned cooperate to make one system for removing barriers and streamlining trade processes. Its spirit is well expressed by the catchphrase “one standard, one test accepted everywhere.” The word “hypothetical” is used here to describe a situation where such a consensus is not supported anymore by key players, and the international trade system is fragmented.

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