

Escaping from the Sandcastle: Risk Society, Engineers, and Social Meanings of Measurement in Korea*

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Introduction

South Korea was infamously branded as an “Accident Republic” in the wake of the two major structural failures in Seoul.¹ During the morning rush hour on October 21, 1994, a deck of the Sungsoo Bridge plunged into the Han River. Less than a year, on June 29, 1995, the five-year-old Sampoong Department Store collapsed, leaving more than 1,400 people dead or injured. Both accidents were man-made disasters and indicating that the “Miracle of the Han River” was nothing more than a “sandcastle.”² There was no doubt that Korea had become a “risk society” or the “accident society,” whose disasters were seen as the failure of the same social system that had engineered Korea’s development-centered political regime.³

The collapse of the Sungsoo Bridge and Sampoong Department Store led social scientists to reflect on how corruption and irregularities in South Korea’s democratization led to the disasters and paved the way for passing laws that would make Korea safer. The two accidents seemed to be easily forgotten, and just one year

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¹ “‘Even the Department Store’ Lamenting the Disaster Republic – Collapse of Sampoong, Response from Online Network ‘백화점마저’ 사고공화국 개탄 - 삼풍백화점 붕괴참사 PC 통신 반응,” *Hankyoreh* 한겨레, June 30, 1995.

² “Total Sandcastle 총체적 모래성,” *JuganJoseon* 주간조선, July 13, 1995, 16-17.

³ Jae-Yeol Yee, “Risk Society As a System Failure: Sociological Analysis of Accidents in Korea,” *Korea Journal* 38 (1998), 83-101; Sang-Jin Han, “The Korean Path to Modernization and Risk Society,” *Korea Journal* 38 (1998), 5-27; Seong-Tae Hong, “Collapse Accident and Accident Society: Focusing on the Wawoo Apartment and the Sampoong Department Store 붕괴사고와 사고사회: 와우아파트와 삼풍백화점을 중심으로,” *Society and History* 사회와 역사 87 (2010), 163-189.

after the Sampoong Department Store collapse, South Korea was labeled a “Republic of oblivion.”⁴

However, the sinking of the Sewol ferry on April 16, 2014, immediately brought back painful memories.⁵ The two earlier accidents became an important point of reference for understanding the historical, political, and cultural context of the Sewol disaster. In this process, the Sungsoo Bridge and Sampoong Department Store came to be seen as ongoing disasters, constantly reinterpreted, and once again an object of reflection. Given the tendency of social disasters to repeat themselves, the social responses to the collapses of the Sungsoo Bridge and Sampoong Department Store need to be revisited. This paper, therefore, analyzes the process and significance of the production of science and technology, especially in the interest of safety, after disasters. By examining how the social roles and meanings of science and technology were redefined after the disasters, focusing on disaster prevention technology, this paper examines how risk and society were reflected in Korea's risk society of the late 1990s.

This study started with the question of how Ulrich Beck's theory of the risk society provided an epistemological framework for understanding post-disaster South Korean society. The risk society theory was accepted as a useful theoretical framework and symbolic representation that could best diagnose and explain Korean society in the late 1990s and became popular among researchers and the public. Sociologists sought to diagnose Korean society as a risk society, leading to attempts to understand it in its historical, social, and political context.⁶ According to Sang-Jin Han (1998), Korean society has had several condensed risks in the past few decades, and the collapse of urban structures has been the most symbolic manifestation of these risks.⁷ Furthermore, several sociologists have attempted to define a specifically Korean risk society.⁸ However, some sociologists, such as Jin-Cheol

⁴ Dang Kim, Hee-Sang Jung, “When Can We Rescue Safety from the Underground of Oblivion 저 ‘망각’의 지하에서 ‘안전’은 언제 구조될까,” *Sisa Journal* 시사저널 298, July 13, 1995.

⁵ “20 years after the Sungsoo Bridge collapse...We didn't see it coming ‘성수대교 붕괴’ 20년...그때는 이럴 줄 몰랐다,” *Ohmynews* 오마이뉴스, October 20, 2014; “Sampoong is a carbon copy of Sewol 삼풍, 세월호 ‘판박이,’” *Hangugilbo* 한국일보, June 9, 2014.

⁶ Hak-Sung Kim, “Industrial society and risk society: Ulrich Beck's Risk society theory 산업사회와 위험사회: 울리히 벡의 ‘위험사회’ 론을 중심으로,” *Hwanghaemunhwa* 황해문화 7 (1995), 112-135; Sang-Jin Han, “Why Risk Society? 왜 위험사회인가?,” *Sasang* 사상 38 (1998), 3-25.

⁷ Sang-Jin Han (1998).

⁸ For example, “Dual-Risk Society 이중위험사회”, “Complex Risk Society 복합위험사회”, “Total Risk Society”, “Underdeveloped Risk Society 후진적 위험사회”. Dae-Hwan Kim, “Dual-Risk Society due to the Rush-to Growth 돌진적 성장이 낳은 이중 위험사회,” *Sasang* 사상 38 (1998), 26-45; Kyung-Seop Jang, “Compressed Modernity and Complex Risk Society 압축적 근대성과 복합위험사회,” *Comparative Sociology* 비교사회 2 (1998), 371-414; Kyeong-Ryung Seong, “Unemployment and Social Disintegration: The Emergence of a Total Risk Society 실업과 사회해체: 총체적 위험사회의 등장,” *Sasang* 사상 38 (1998), 247-278; Tae-Seok Jeong, “Beck's

Noh (2004) and Sang-Jin Han (2008), have claimed that it is important to recognize that there are multiple paths to modernity and to pay attention to complexity, heterogeneity, and fluidity of the risks being examined to better apply risk society theory to Korea.⁹

Risk society theory has been useful for social scientists to reflect on Korea's modernization and reveal the structural problems of society. However, this theory invoked a specific way of understanding the causes of man-made disasters by ascribing priority to social dimensions such as corruption over technical aspects, including poor design, construction, and management. Even the problems in construction, architecture, and civil engineering were easily reduced to social problems, such as poor regulation and corruption.¹⁰ As a result, "man-made disasters" were perceived to mean "social disasters" in Korea, and it further led to a skeptical vision of society that even if safety prevention technologies and policies for facility safety are in place, disasters will continue as long as the social problems persist.

The critical limitation of this view is that it has failed to reflect on the risks mediated by science and technology, the risks inherent in science and technology, and the use of science and technology to reveal risks. Instead, science and technology have been black-boxed, and the changes in the science and technology R&D sector have not been analyzed, especially among the social responses in the wake of the disasters. This paper focuses on the "risks" in "risk society" by analyzing the process and meaning of "disaster prevention technology."

This study focuses on disaster prevention technology, which Korea adopted after the structural failures of the Sungsoo Bridge and Sampoong Department Store. The Korean government's response to these disasters has been immediate in the R&D sector. What is intriguing is that the government agency primarily responsible for disaster prevention technologies was the Korea Research Institute of Standards and Science (KRISS), the national metrology institution. The establishment of KRISS's Failure Prevention Research Center (FPRC) was the starting point of measurement, testing, and inspection technologies to measure the safety of Korea's bridges and buildings. This study examines the early history of disaster prevention technology in KRISS and the social implications of measurement technology, which visualizes and controls potential risks through measurement, in Korea's "risk society" of the late 1990s.

Theory of Reflexive Modernization and Dilemma of Individualization 백의 재귀적 현대화 이론과 개인화의 딜레마," *Economy and Society* 경제와 사회 55 (2002), 246-271.

⁹ Dae-Hwan Kim (1998); Jae-Yeol Lee, "Risk Society as a System Failure: An Organizational Sociology Research on Disasters 체계실패로서의 위험사회: 대형사고에 대한 조직사회학적 연구", Korean Sociological Association, Proceedings of the Conference of Sociology 한국사회학회 사회학대회 논문집 (June 1998), 91-99.

¹⁰ For example, Seong-Tae Hong, *Accident Society, Korea: Wawoo, Sampoong, and Sewol Ferry 사고사회* 한국: 와우, 삼풍 그리고 세월호 (Zininzin 진인진, 2017).

Finally, this paper emphasizes that science and technology for disaster prevention is a social construct that contains social reflection and memory of disasters. Several studies have analyzed how disasters are materialized and how collective memories of disasters are created in this process.¹¹ The process of materializing disasters and their memories is highly political and involves reshaping power relations and institutional decisions, and therefore collective and complex.¹² The case of FPRC demonstrates that post-disaster changes in science and technology can be a form of collective, especially materialized memory, of disasters. Only when science and technology are redefined as a site of the collective memory of disasters and not just as a technical resource for predicting, preventing, and responding to disasters, they can become object of reflection.

The Collapse of Infrastructure in Korea

During the 1990s, Korea was the site of several large-scale accidents, all of which were man-made. Eleven of those accidents occurred in Korea within only four years (Table 1). The collapse of the Sungsoo Bridge and the Sampoong Department Store had immense effects on Korean society. The Wawoo Apartment collapse in 1970 had already raised concerns among the public over the collapse of the facilities,¹³ but these two accidents in the 1990s intensified the demand for active social responses to such disasters.

The collapse of Sungsoo Bridge on October 21, 1994, was unlike any other. Other bridges collapsed either while under construction or when there was no traffic. In contrast, the Sungsoo Bridge fell into the Han River during the morning rush hour, the busiest time of the day.¹⁴

¹¹ Antoine le Blanc, "Remembering disasters: The resilience approach," *Journal of Art Theory and Practice* 14 (2012), 217-245.

¹² Charlotte Monteil, Jenni Barclay, Anna Hicks, "Remembering, Forgetting, and Absencing Disasters in the Post-disaster Recovery Process," *International Journal of Disaster Risk Science* 11 (2020), 287-299; Maurice Halbwachs, "Space and the collective memory La mémoire collective et l'espace," in J. Halbwachs Alexandre ed., *The collective memory La mémoire collective* (Paris: Presses Universitaires de France), 83-105; Lewis A. Coser edited and translated, *On collective memory* (Chicago: University of Chicago Press, 1992).

¹³ Seong-Tae Hong (2010).

¹⁴ "Collapse of Paldang Bridge, due to the shoddy construction 팔당대교 붕괴 부실공사 탓," *Hankyoreh* 한겨레, March 28, 1991; "Collapse of Namhae Changsun Bridge: 1 Death 남해 창선대교 붕괴 1명 사망," *Hankyoreh* 한겨레, July 31, 1992; "Suspicion on shoddy construction of new Hangjoo Bridge 신형주대교 부실공사 의혹," *Donga Ilbo* 동아일보, August 1, 1992.

Table 1. List of Major Accidents in the 1990s

Date	Accidents	Casualties	
		Deaths	Injured
92. 7. 30	The Collapse of the Changsun Bridge	1	-
92. 7. 31	The Collapse of the Hangjoo Bridge	-	-
93. 1. 7	The Collapse of the Chungju Woo-am Apartment	28	48
93. 3. 28	Overturning Accident of Mugunghwa Train in Gupo Station	78	140
93. 7. 26	Airplane Crash Accident of Asiana Airlines	66	44
93. 10. 10	Sinking of West Sea Ferry	292	-
94. 10. 21	<i>The Collapse of the Sungsoo Bridge</i>	32	17
94. 10. 24	Fire Accidents on Chungju Cruise Ship	29	38
94. 12. 7	The Explosion in Gas Middle Station in Seoul Ahyundong	12	46
95. 4. 28	The Explosion of Daegu Subway Construction Site	103	148
95. 6. 29	<i>The Collapse of the Sampoong Department Store</i>	502	937

The investigation that followed the collapse of the Sungsoo Bridge revealed that it had been more than a structural failure. The bridge was the eleventh bridge over the Han River and the last to be built under the reign of Park Chung-Hee.¹⁵ Sungsoo Bridge was the first aesthetic bridge on the Han River and was a Gerber truss bridge with a 120-meter span.¹⁶ The bridge, completed in only two and a half years, was hailed as a “new type of modern bridge” and a “major turning point in the history of domestic bridges.”¹⁷ Investigations revealed that the bridge’s truss structure could easily fail if the seams were faulty, but poor welding during the construction, the lack of technology and skill, a rushed construction schedule, and the lack of regular safety inspection and maintenance all contributed to the collapse.¹⁸

After the accident, the city of Seoul tasked the Korean Society of Civil Engineers (KSCE) with creating a bridge inspection team. The KSCE had often conducted safety inspections of major structures and facilities. After concluding its inspection, KSCE blamed a technical failure for the accident. At a KSCE symposi-

¹⁵ Construction of the Sungsoo Bridge began in April 1977 and was completed in October 1979.

¹⁶ Seoul District Prosecutors’ Office 서울지방검찰청, *White Paper of Sungsoo Bridge Collapse Investigation Team* 성수대교 붕괴사고 원인규명감정단 활동백서 (1995), 41; Trussed bridges are constructed by first erecting a concrete and steel structure, and then laying a 48-meter truss in the middle.

¹⁷ Seong-Tae Hong (2017), 48.

¹⁸ Dong-Hyun Kim, “A Comparative Study on Safety Management Failure: Focusing on the Collapse of Sungsoo Bridge and Sampoong Department Store 안전관리 실패사례 비교연구: 성수대교, 삼풍백화점 붕괴를 중심으로” (Master’s thesis, Konkuk University, 2019), 23-31.

um, participants agreed that adopting of foreign technology, such as the truss structures, without a thorough analysis of technical feasibility had led to the collapse.¹⁹ At the same time, the engineers found that the indifference of the Korean construction industry to public safety caused the disasters of the 1990s. With no oversight or accountability in the construction processes, accidents were frequent.²⁰ The engineers insisted on the need to set construction standards, such as permissible deviation on cracks and additional monitoring systems for bridges, in addition to regular inspection.²¹

On June 29, 1995, just eight months after the Sungsoo Bridge collapse, the Sampoong Department Store, a luxury department store in Seoul, collapsed just five years after its completion.²² A total of 502 people were killed, 937 were injured, and six were missing in the collapse, making it the largest loss of life since the Korean War. The Sampoong Department Store was a flat slab structure with columns supporting floor plates without beams; the failure of one column could cause a chain collapse of the entire structure. Therefore, like the Sungsoo Bridge, the Sampoong Department Store required exact design, construction, and maintenance. However, throughout the design, construction, and supervision process, there were unreasonable design changes, poor construction, and change of use, all leading to the accident.²³

In terms of maintenance and management, the Sampoong Department Store underwent three times of extensive facility safety inspections after the collapse of the Sungsoo Bridge, but no abnormalities were identified.²⁴ These facts led to complaints that the government's extensive safety inspections had merely been for show. The occurrence of two disasters within a few months led to the realization

¹⁹ Editorial Board, "Lesson from the Collapse of the Sungsoo Bridge 성수대교 사고의 교훈," *Journal of Korean Society of Civil Engineers* 대한토목학회지 43:10 (1995), 17-20.

²⁰ Editorial Board, "The Causes and Countermeasures of the Collapse of the Sungsoo Bridge 성수대교 붕괴의 원인 및 대책," *Journal of Korean Society of Civil Engineers* 대한토목학회지 42:6 (1994), 6-20.

²¹ "Lesson from the Collapse of the Sungsoo Bridge 성수대교 사고의 교훈" (note 19).

²² The Seoul Metropolis, *White Book of the Sampoong Department Store Collapse Accidents* 삼풍백화점 붕괴사고 백서 (1996); Seong-Tae Hong (2017). This white book said that the Sampoong Department Store was blamed as a symbol of excessive consumption and Hong emphasized that the collapse of the Sampoong Department Store was the collapse of the consumption of Korea.

²³ Dong-Woo Shin, Chan-Sik Lee, and Hong-Gun Park, "Changes in Construction Safety Measures and Tasks to be Solved after the Sampoong Disaster 삼풍 이후 건설안전정책의 변화와 향후 과제," *Journal of Architectural Institute of Korea* 대한건축학회지 49:7 (2005), 30-36.

²⁴ Seong-Tae Hong, "The Collapse of Sampoong Department Store and Corruption-Accident Society 삼풍백화점 붕괴와 비리-사고 사회," *Economy and Society* 경제와 사회 108 (2015), 231-253, 235.

that Korea's dazzling economic growth might have been built on sand. Public anxiety following the accidents raised concerns about the safety of Korea's facilities.²⁵

Attention to Facility Maintenance

After the collapse of the Sungsoo Bridge and the Sampoong Department Store, the safety management of facilities became a major national issue in Korea. On January 5, 1995, the "Special Act on the Safety Control and Maintenance of Establishments" was proposed by the National Assembly and signed into law. The Act aims to "contribute to ensuring public safety and further promoting the welfare of the people by preventing accidents and disasters and improving the utility of establishments through safety inspections and appropriate maintenance of establishments."²⁶ The Act defined "facilities" as structures such as bridges, tunnels, ports, dams, buildings, and others created through construction work; the core content for safety management of facilities is to conduct regular, detailed, and emergency safety inspections and to prepare safety measures based on the findings.

At the time, the Ministry of Home Affairs argued that safety inspection and management should be expanded to include gas, gunpowder, nuclear power, and even private facilities. However, the Ministry of Land, Infrastructure, and Transport narrowed the scope to major long-term facilities.²⁷ On April 19, 1994, the Ministry of Land, Infrastructure, and Transport established the Infrastructure Safety and Technology Corporation (KISTEC) as the government agency responsible for safety diagnosis and maintenance of major critical facilities nationwide.²⁸ KISTEC was responsible for research, development, guidance, dissemination, information construction, education, and consultation on safety inspection and preci-

²⁵ "The Sampoong Syndrome Came to Fierce 삼풍증후군 거세다," *Donga Ilbo* 동아일보, July 14, 1995; "Spread of the Sampoong Syndrome 삼풍신드롬 확산," *Weekly Chosun* 주간조선, July 20, 1995, 26-28.

²⁶ "Special Act on the Safety Control and Maintenance of Establishments," Korea Legislation Research Institute, Korea Law Translation Center, https://elaw.klri.re.kr/kor_service/lawView.do?hseq=56563&lang=ENG (accessed on May 10, 2023)

²⁷ "Implementation of the Special Act on the Safety Control and Maintenance of Establishments is in trouble due to the interdepartmental competition 시설물안전관리특별법시행, 부처이기주의로 난항," *Hangukgyeongje* 한국경제, March 12, 1995.

²⁸ The Korea Institute of Facility Safety and Technology was renamed 'Korea Facility Safety and Technology Corporation' in July 2002, as the 'Korea Facility Safety Corporation' in March 2008. It was then relaunched as the 'Korea Homeland Safety Management Agency' in December of the same year after the promulgation of the 'Homeland Safety Management Agency Act' in June 2020. Currently, the Korea Homeland Safety Management Agency is in charge of the safety management of completed facilities and the safety management of construction sites. See https://www.kalis.or.kr/wpge/m_75/introduce/introduce02.do (accessed on May 12, 2023)

sion safety diagnosis technologies, along with performing precision safety diagnosis.

With the establishment of KISTEC, the urgent social demands for facility maintenance were translated into the need for R&D in disaster prevention technologies, especially diagnostic technologies for safety inspections and measuring standards. As the accidents of the 1990s revealed that poor maintenance could have fatal consequences, research on disaster prevention technology focused on measurement and monitoring for maintenance. Engineers saw the importance of facility maintenance and argued that “buildings would never collapse without warning.”²⁹ At the time, scientific research on man-made disasters and disaster prevention technologies was scarce in Korea and conducted only sporadically at some universities and research institutes.

Some engineers, however, were critical of the growing attention to facility maintenance. According to one engineer, emphasizing maintenance is insufficient due to the differences in the construction environment between Korea and developed countries.³⁰ Without improving the entire construction environment, where shoddy construction practices and designs were commonplace, the Korean government’s attention to facility maintenance was short-sighted.³¹ Despite these criticisms, national research on facility maintenance was urgently needed. While there was a widespread concern in society that corruption and incompetence had resulted in poorly constructed buildings, the policy focus on facility maintenance was perhaps the only good option.

More scientific research on disaster prevention technologies soon followed the emphasis on facility maintenance. In the 1995 National Assembly Plenary Session, experts from the government, academia, and industry were encouraged to cooperate on new measures for disaster prevention.³² The Ministry of Science and Technology (MoST) promoted industry-university-institute collaboration to attract and utilize foreign expertise and to foster research on disaster prevention technology.³³ After the Congressional Inspection in 1995, two projects were launched for disaster

²⁹ “Concrete Buildings never collapse without warning 콘크리트 건물은 말하고 무너진다,” *Sisa Journal* 시사저널 298, July 13, 1995.

³⁰ “Lesson from the Collapse of the Sungsoo Bridge 성수대교 사고의 교훈,” 20 (note 19).

³¹ Ibid.

³² Secretariat of the National Assembly of the Republic of Korea 대한민국국회사무처, “The Minutes of Assembly Plenary Session, 177th Congress 177회 국회본회의 회의록,” September 11, 1995, 37. Available at National Assembly Minutes System, <http://likm.assembly.go.kr/record/index.html> (accessed April 30, 2023).

³³ Secretariat of the National Assembly of the Republic of Korea, “Analysis Reports of the Congressional Inspection of the Administration 1995 1995년 국정감사처리 결과 분석보고서,” September 1996; Secretariat of the National Assembly of the Republic of Korea, “The Processing and Modification after the Parliamentary Inspection of the Administration: The Committee of Communication and Science in Ministry of Science and Technology 국정감사결과 시정 및 처리사항: 과학기술처 통신과학위원회,” 1995, 15.

prevention: the Failure Prevention Research Center (FPRC) project and a national research project to develop failure prevention technologies.³⁴ The FPRC, a central research institution for disaster prevention, was expected to develop technologies for safety control in national and industrial infrastructure and to facilitate their application and dissemination.³⁵

The Establishment of Failure Prevention Research Center in KRISS

On September 30, 1995, the Failure Prevention Research Center (FPRC) was established within KRISS (Korea Research Institute of Standards and Science). The FPRC project was initiated as an indefinite continuation project supported by MoST.³⁶ According to the report, disaster prevention technologies are defined as technologies that minimize the risk of disasters or “collective large-scale damage caused by disasters.” Regarding the broad field and scope of research related to ‘disaster prevention,’ both MoST and KRISS were well aware of the difficulty of assigning all the tasks to one research center.³⁷ In response, MoST designated the FPRC to develop “measurement technologies” for the safety management of facilities while designating other research institutions to oversee different types of disasters.³⁸ Furthermore, MoST was not the only ministry planning R&D projects in disaster prevention technology, but the Ministry of Construction and Transporta-

³⁴ MoST, *Development of Measurement Technology for Failure Prevention* 파손방지 측정기술 개발 (MoST, 1988); MoST, *Failure Prevention Research Center Project 1996* 방재기술연구센터사업 1996 (MoST, 1996). The name of the center in English was “Failure Prevention Research Center (FPRC),” but interpreted as the “Disaster Prevention Technology Research Center” in Korean.

³⁵ KRISS, *Measurement Standards* 측정표준 18:3 (1995), 81.

³⁶ The Failure Prevention Research Center Project, which began in 1995, became a nationwide R&D project in 1998 and was reorganized into the “Development of Man-Made Disaster Prevention Technology,” (Phase 1, 1998-2001, Phase 2, 2001-2003).

³⁷ The report of *Failure Prevention Research Center Project 1996* described that disaster prevention technologies include prevention technologies (forecasting, prediction, monitoring, alarm, repair technologies, etc.) and post-processing technologies (e.g. evacuation, relief, recovery technologies) and a vast range of research fields including information, electronics, telecommunications, machinery, construction, transportation, environment/geosciences, and life sciences. Based on this, the report’s author emphasized that it is inefficient and impossible for one organization to cover all disaster prevention technologies in one project (p.2).

³⁸ *Failure Prevention Research Center Project 1996*, 2-3 (note 34). For example, MoST has assigned the Meteorological Research Institute for meteorological disasters, with the Korea Institute of Mineral Resource focusing on earthquakes, the Korea Institute of Machinery and Materials on marine disasters, and Korea Research Institute for Standards and Science on facility disasters.

tion and the Korea Science and Engineering Foundation also launched projects for disaster prevention.³⁹ Within the rise of simultaneous governmental R&D projects, the FPRC project was primarily focused on supporting the commercialization of core technologies for ‘facility safety management’ developed in various governmental R&D projects so that they could be effectively used in the field.⁴⁰

As the project was a top-down decision reached by the government and MoST, there was no time to expand either staff or research facilities. Nonetheless, on November 9, the signboard-hanging ceremony of FPRC was held at KRISS. The opening remarks of Myoung-Se Chung, the president of KRISS, described the new center’s mission and role in the future of disaster prevention technology.

[...] we at KRISS establish this center to contribute to protecting the life and property of the people through the development and propagation of fundamental technologies for preventing disasters that can occur in national infrastructure and main industrial facilities. Our previous research experiences would be invaluable, and we will further expand application areas for our research. Although we are starting the mission with only 20 or so researchers, the importance of this mission is well-perceived within KRISS. I believe that governmental support for failure prevention technology research will be continuously expanded, and we will strive to accomplish our given task.⁴¹

FPRC was created by moving two research teams from the Center for Materials Evaluation Technology (CMET) to FPRC.⁴² FPRC’s budget was about 18 hundred million won in 1995, which the government planned to increase to more than ten billion won within three or four years.⁴³ As stated in Chung’s opening remarks, FPRC had no research facilities, infrastructure, and staff specialized in disaster prevention technologies. However, by the late 1990s, as the center grew, KRISS planned for new research facilities, such as the Safety Measurement Building and the Structure Test Building, and expanded the workforce.⁴⁴

Despite the FPRC’s limited human and financial resources, its role and mission highlighted not only research on disaster prevention technologies but also the ap-

³⁹ The Korea Science and Engineering Foundation (KOSEF) was merged with the Korea Research Foundation (KRF) and Korea Foundation for International Cooperation of Science and Technology (KICOS). As a result, the National Research Foundation of Korea (NRF) was newly established in 2009, which plans, evaluates, and manages all projects related to academic and R&D activities.

⁴⁰ *Failure Prevention Research Center Project 1996* (note 34).

⁴¹ *Ibid.*, 90.

⁴² KRISS, Annual Report 1995 (1996), 2.

⁴³ “Promoting the National Projects of Disaster Prevention Technology 방재기술 국책사업 추진,” *Maeil Gyungje* 매일경제, July 20, 1995; Measurement Standards 18:3 (note 35); KRISS, Measurement Standards 18:4 (1995), 89.

⁴⁴ KRISS, KRISS (2005), 217-218.

plication and dissemination of technologies. FPRC had six missions: operation of online monitoring systems, reliability management of safety inspections, technical information for structural failure prevention, development of inspection codes, and development and planning of generic technology.⁴⁵ The center also formulated comprehensive plans to ensure infrastructure safety, support technology development, and collaborate with universities, industries, and overseas research institutions. FPRC also set standards for safety technologies and trained experts for disaster prevention.⁴⁶

The establishment of FPRC changed KRISS's organizational structure. The Strength and Nondestructive Inspection research teams under CMET and the Instrumentation Engineering Team under the Division of Technology Services were moved to the newly created center (Table 2).⁴⁷ After this reshuffling, the number of researchers in CMET dropped from forty-three to thirty, and with the addition of the Instrumentation Engineering Team, FPRC had twenty-one researchers in total. Hahn-Gue Moon, director of the department of CMET until 1994, became the first research director of the new center.⁴⁸

Table 2. Organizational Structure Changes of KRISS in 1995

Center for Materials Evaluation Technology (1994)	Failure Prevention Research Center (1995)	Division of Technology Services (1994)
Strength	Materials Strength	Human Engineering
Nondestructive Inspection		Instrumentation Engineering
Durability	Nondestructive Inspection	Data Processing Team
Microstructure		Policy
Crystal Structure	Instrumentation Engineering	Craft Team
Process Properties		Measuring Instrument Team
Surface Analysis		Technologic Economy Survey
Thin Film		Technology Information Team
		Standards and Quality Management Team

Establishing FPRC at the cost of reshuffling departments of CMET reflected urgent safety concerns, but it also revealed the institutional background of KRISS.

⁴⁵ *Failure Prevention Research Center Project 1996*, 3 (note 34).

⁴⁶ *Measurement Standards* 18:3, 81 (note 35).

⁴⁷ *Annual Report 1995*, 2 (note 42).

⁴⁸ KRISS, *Annual Report 1994 (1995)*, 103; *Annual Report 1995*, 114 (note 42).

Hahn-Gue Moon and Se-Kyung Lee were the key figures who had set up research teams on materials and nondestructive inspection technologies at KRISS.⁴⁹ KRISS has long recognized the importance of these two research areas since the 1980s, especially under the leadership of Hahn-Gue Moon.⁵⁰

In 1987, KRISS announced that materials research and failure prevention research need long-term investment and embarked on a Korea-Germany Collaboration Project for the establishment of a research center on failure prevention technology.⁵¹ The advance of industrialization highlighted the importance of failure prevention technology in Korea, for malfunctioning mechanical products or poorly constructed large structures could lead to heavy human and economic losses.⁵² Failure prevention technology was thus fundamental in improving the safety and reliability of mechanical products such as vehicles and plants.⁵³ The Research Director of FPRC, Hahn-Gue Moon, emphasized the implications of research on failure prevention technologies which were critical not only for the industry but also for the public's safety. As a preliminary step of the cooperation project, a team from Germany was sent to Korea for a feasibility study.

At this juncture, Moon pointed out the importance of failure prevention technologies in the institution newsletter, *Measurement Standards*, in 1987:

Establishing various technologies in various measuring fields is important in conducting comprehensive research on failure prevention. Furthermore, the failure of structures is directly related to the safety of the people. This is why standard research institutions in many developed countries actively lead the failure prevention research fields.⁵⁴

However, the German government canceled the technical cooperation project after the 1988 Seoul Olympics.⁵⁵ Although the planned Center for Failure Prevention Technology was abandoned, KRISS continued its research on condition diagnosis technology, defect detection, and life prediction technologies.⁵⁶ KRISS conducted research projects on “Development of Measurement Technology for Failure Pre-

⁴⁹ KRISS, *20-Year History of KRISS* 한국표준과학연구원 20년사 (1995), 323.

⁵⁰ Yong-Hak Huh, Interview by author via e-mail, February 1, 2011.

⁵¹ *20-Year History of KRISS*, 324 (note 49).

⁵² Gun-Woong Bang, “Analysis of Causes of Failure 파손원인분석,” *Measurement Standards* 측정표준 8:4 (1985), 28.

⁵³ *Ibid.*, 29.

⁵⁴ Hahn-Gue Moon, “Trend of Failure Prevention Technology 파손방지기술의 동향,” *Measurement Standards* 측정표준 10:3 (1987), 2-7.

⁵⁵ *20-Year History of KRISS*, 324-325; KRISS assumed that the German government declined the project because the 1988 Olympics convinced the German government that Korea was no longer a developing country.

⁵⁶ Hahn-Gue Moon, “Activities of Failure Prevention Research Center 방재기술연구센터의 활동,” *Measurement Standards* 측정표준 19:3 (1996), 9.

vention” and “Development of Testing and Evaluation Technology: Development of Failure Prevention Technology for High-Temperature Facilities” supported by MoST since 1986.⁵⁷ Researchers who participated in these projects emphasized that “Korea was busy with construction and did not pay attention to the maintenance for failure prevention” and pointed out the importance of reliable maintenance and life prediction to prevent drastic failure.⁵⁸ Their first plan to establish the research center for failure prevention technologies was not realized, but their persistent attention to failure prevention technologies was pivotal in cultivating the internal environment for establishing FPRC in 1995, even though it expanded the scope and scale of their mission and research. Organizational changes in FPRC owed much to the existence of a small yet active team that had worked on failure prevention technologies in KRISS.

What Should One Measure? The Expansion of Areas of Measurement

The creation of FPRC gave rise to a significant expansion of research topics on standards. Researchers on the Strength and the Nondestructive Inspection teams were moved to the new research center and tasked with researching bridges and buildings based on urgent social concerns over their safety. Although failure prevention research had gradually developed since the 1980s, this was a sudden and unexpected shift in their research subjects.

The sudden expansion of KRISS’s research subjects, especially disaster prevention technologies, shows a distinctive characteristic of institutional expansion when we compare KRISS to institutions in other countries. Even though KRISS had internal research capacity on failure prevention technology since the 1970s, this change in research subjects was driven by governmental decisions based on the growing public concern for safety. In the case of NIST (National Institute of Standards and Technology) in the U.S., building fire and structural failure research has forty years of experience, and several teams cooperate under the Disaster and Failure Studies Program.⁵⁹ Furthermore, NIST expanded its responsibility for disaster prevention through lab research and by leading post-event safety inspections under the National Construction Safety Team Act of 2002. Research on disaster prevention is fraught with examples of disasters, but the KRISS case shows a more top-down government strategy within the framework of disaster prevention policy.

⁵⁷ *Measurement Standards* 18:4, 89-90 (note 43).

⁵⁸ *Development of Measurement Technology for Failure Prevention*, 7 (note 34).

⁵⁹ NIST, “Disaster and Failure Studies & Disaster Metrology Studies,” <https://www.nist.gov/programs-projects/disaster-and-failure-studies-disaster-metrology-studies> (accessed on May 20, 2023).

Until 1995, strength measurement and nondestructive test technologies were used for the maintenance of nuclear and thermoelectric power plants, petrochemical plants, and aircraft manufacturing.⁶⁰ Since these facilities had been built during the 1960s, the aging and subsequent damage received primary attention, so inspection and maintenance of nuclear power plants and petrochemical plants were especially emphasized in the 1980s. In response to this industrial demand, research teams at KRISS examined the structures' thinning, cracking, shedding, and materials degradation and provided measuring methods and instruments.⁶¹ However, when FPRC was established, the focus of the Strength and the Nondestructive Inspection teams was expanded to include measurement technologies for bridges and concrete buildings.

Dong-Jin Yoon, who led the development of the generic technology for failure prevention at the time, said that while Korea was quite skilled in the use of nondestructive testing for the maintenance of nuclear power plants or aircraft, nondestructive testing for civil structures such as bridges and buildings was uncharted territory.⁶² In theory, concrete structures have a semi-permanent lifespan, but there are internal defects and damage, which are invisible to the naked eye, caused by natural and man-made factors. The FPRC developed inspection technologies such as nondestructive testing and techniques to detect them.⁶³

Expanding research areas in FPRC did more than apply failure prevention technologies. Researchers had to find a new way to measure based on a clear understanding of the characteristics and compositions of the new research subjects. Even though their research was based on the same technological ground, changing the measurement targets was a challenge, as the team had no experience with concrete structures.⁶⁴ Seong-Seok Lee, an FPRC researcher, pointed out how different the new measuring objects were:

First of all, concrete, a hydrate of cement, becomes a bonding agent with natural aggregate, and there can be many scatterings of physical properties and affected by different methods of emplacement. Furthermore, concrete and steel have different mechanical properties, and their combination to make reinforced concrete (RC) requires nondestructive inspection methods different from those applied to metal plates. In the case of RC structures, cracks do not always imply changes in the bending moment. Lastly, each component of an RC structure is designed

⁶⁰ Seong-Seok Lee, "Nondestructive Inspection Technology in Failure Prevention Research 방재연구에 있어서 비파괴평가기술," *Measurement Standards* 19:3 (1996), 18-27.

⁶¹ Ibid.

⁶² Dong-Jin Yoon, Interview by author, KRISS, Daejeon, May 22, 2023.

⁶³ *Failure Prevention Research Center Project 1996* (1997), 1 (note 34).

⁶⁴ Dong-Jin Yoon, Interview by author, KRISS, Daejeon, November 16, 2010.

and constructed separately, so there can be a significant gap between the calculations of the design and the final structure.⁶⁵

Based on these complicated characteristics of RC structures, researchers in FPRC needed to consider many more factors in measuring their new subjects. To reduce the gaps in measurement that were characteristic of RC structures, they developed new measurement methods, such as sound propagation velocity, rebound hardness, and ultrasonic sound tests to inspect the strength and depth of cracks in reinforced concrete structures.⁶⁶ Along with these new measuring technologies, they also needed to pay attention to the effects of the natural environment on reinforced concrete structures. For example, researchers began considering how concrete buildings experience shrinkage from years of dehydration, freezing, and thawing. Based on this broader range of considerations, they suggested the development of sensors that could be buried or attached to steel beams to reduce the measurement gap between the surface layer and internal tissues and also to track and record the history of concrete structures.⁶⁷

The role of KRISS in testing and calibrating measurement instruments expanded to accommodate the new areas of measurement in 1995. KRISS managed the reliability of the Safety Inspection Instrument Project, a testing and calibration service on nondestructive test equipment. This mission had been enforced as a governmental countermeasure on facility maintenance following the collapse of the Sungsoo Bridge. After enacting the Special Act for the Safety Control of Public and Multi-use Facilities in 1995, thorough safety inspections of infrastructure were carried out, and many construction companies became interested in maintenance management.⁶⁸ The law required facility maintenance management companies to be equipped with nondestructive testers, so many were imported during the late-1990s. KRISS played a significant role in calibrating the equipment used to measure reinforced concrete structures.

Measuring different objects with different perspectives gave KRISS a new mission and role. The goal of measurement for FPRC was the safety of buildings and bridges, which had become a critical social value for the Korean public. Reshaping the failure prevention technology and testing or calibration service through establishing FPRC to prevent disasters was an important transition point for KRISS. In other words, KRISS began to measure what the public saw as a value after a series of preventable disasters. As shown in the KRISS president's opening remarks for FPRC in 1995, KRISS understood measurement as a way to "[protect] people's

⁶⁵ Seong-Seok Lee (1996), 23.

⁶⁶ Ibid., 23-27.

⁶⁷ Ibid.

⁶⁸ Uk Jang, "High Interest of the Construction Company to the Structural Facilities Maintenance Management Business 건설업체 시설물유지관리업 높은 관심," *Maeil Gyungje* 매일경제, August 10, 1995.

lives and property.” Thus for KRISS, measurement was no longer only for economic development, although such motives had been its initial impetus.

When we reflect on the transition point in 1995 to the current research scope of KRISS, the different goals of measuring FPRC were the starting points for expansion into environment, health, and food problems. This is well reflected in the establishment of the Division of Metrology for Quality of Life organized in 2005. The Division was concerned with gas analysis, bio-analysis, analytical chemistry, and ionizing radiation.⁶⁹ The evolutionary path of KRISS shows how technologies and ideas of researchers were re-constructed due to changes in public beliefs and social attitudes toward safety and risks and how “safety” became something for KRISS to measure.

Internal and External Resistance to the Establishment of FPRC

The establishment of the FPRC at KRISS needs to be understood in the broader context of the history of government-funded research institutes in the 1990s. The government-funded research institutes in Korea were established as specialized research institutions based on the 1973 Act on the Development of Specific Research Institutions and were tasked with cultivating technological capabilities necessary for economic development. Regarding the lack of research capacity of companies and universities back in the 1970s, the government ensured the research autonomy of these institutions and secured researchers’ social status. However, the rapid quantitative expansion of researchers in the 1980s and the rapid growth of universities and companies changed the status of these institutes significantly.⁷⁰ In particular, the 1990s was a period in which the role of the government’s “national research institute” was highly emphasized – in other words, the government’s management and control were further strengthened. Related to this, one of the critical changes was the way of financing these research institutes. In the 1990s, government-funded research institutes primarily relied on direct government support by conducting specific R&D projects.⁷¹ Under these circumstances, the newly emerged field of “disaster prevention technology” in response to the social crisis of man-made disasters was a new area of “national R&D project” with strong “national demand.” Hence, the increasing national and social demand on disaster prevention technology was perceived as an important financial opportunity for the

⁶⁹ KRISS, “Organization,” <https://www.kriss.re.kr/orgChart.es?mid=a20104000000&lang=ENG> (accessed on May 2, 2023).

⁷⁰ Jin-Hee Park, “A Study on the Historical Development of Research Community in Korea: Focused on the Government Supported Institutes 연구자 집단의 성장과 변천: 정부 출연 연구 기관을 중심으로,” *Journal of Science & Technology Studies* 과학기술학연구 6:1 (2006), 119-160.

⁷¹ Ibid.

institutions and an opportunity to redefine the social status of researchers.

In this context, broadening KRISS's mission was not a smooth process. The expansion to the reinforced concrete structure was met with fierce internal and external resistance. Even the researchers within FPRC were concerned with their added responsibilities. Many researchers at KRISS and some members of FPRC itself did not agree that a national standards research institution should conduct disaster prevention.⁷² It was mainly because the new research topic of failure prevention technology was much more ambitious and highly focused on application technologies, some researchers doubted they could meet the new requirements.⁷³

External researchers also questioned why KRISS was qualified to conduct disaster prevention research. After the government announced its plan for the establishment of FPRC in KRISS, the Korea Institute of Machinery and Materials (KIMM) and civil engineers in academia voiced their opposition. KIMM was the only Korean institution with a research facility for structure examination, and it had also researched material properties. KIMM accused the government of wasting money on overlapping investments.⁷⁴ Furthermore, as the inchoate FPRC had no civil engineers, other institutions complained about the way in which KRISS was becoming a hub of disaster prevention technology research.⁷⁵

Amid these oppositions, FPRC concentrated on specific research areas for disaster prevention and encouraged other research institutions and researchers to conduct commissioned research as a hub for the National Project of Failure Prevention Research. FPRC's main research areas in KRISS were metrology and structure analysis technology, such as strength and deterioration measurement technologies, fracture detecting technologies, and sensor signal processors.⁷⁶ FPRC was also concerned with developing structure security technology, including constant surveillance technologies, security diagnosis technologies, and life prediction technologies.⁷⁷

As a hub institution of disaster prevention research, FPRC's primary focus on structure safety reveals the social priorities that came with the repeated man-made disasters during the 1990s. In addition, structure safety was incorporated into the disaster prevention research. In Korea, therefore, research on both man-made disasters and natural disasters was carried out in tandem. For example, the National Disaster Management Institute (NDMI) in Korea focuses on natural disasters and man-made disasters, such as gas explosions and the collapse of man-made struc-

⁷² Dong-Jin Yoon (2010).

⁷³ Yong-Hak Huh (2011).

⁷⁴ Dong-Jin Yoon, Interview by author, KRISS, Daejeon, January 12, 2012.

⁷⁵ Ibid.

⁷⁶ Hahn-Gue Moon (1996).

⁷⁷ Ibid.

tures.⁷⁸ By contrast, the Japanese National Research Institute for Earth Science and Disaster Prevention (NIED), the Japanese equivalent of the NDMI, primarily focuses on the studies of natural disasters, such as earthquakes, snow and ice, volcanoes, and marine observation; in this sense, structure safety is closely related to natural disaster occurrences.⁷⁹ In this regard, looking into the FPRC in KRISS in Korean society in the 1990s reflects which risks and concerns were prioritized in Korea and how the evolution of KRISS and the society are linked.

Table 3. Key Technologies of Infrastructure/Equipment Security Management⁸⁰

*Shaded columns: Research areas of KRISS

Technology Accident	Constant Surveillance (Everyday, Regular Examination)	Precise Diagnosis	Repair/ Rehabilitation
Collapse	Structure Status	Structure Safety	Crack Repair Deterioration Prevention
Explosion	Equipment status	Equipment Safety	Leakage Prevention of Explosive Materials
	Explosive materials	Riskiness of Explosion	Explosion-proof Equipment Rehabilitation
Fire	Equipment Status	Equipment Safety	Fire Causes Control
	Fire	Riskiness of Fire	Fire Prevention Equipment Rehabilitation

The FPRC project, which began as an indefinite continuation project in 1995, completed the first phase of the project in 1998, and the second phase, “Facility Safety Instrumentation Technology Development Project,” was carried out for

⁷⁸ National Disaster Management Research Institute (NDMRI) 국립재난안전연구원, <https://www.ndmi.go.kr/eng/main.do> (accessed April 30, 2023). NDMRI is established in 1997 as a national disaster prevention research institute. The primary role of this institute is managing and establishing the plan for disaster and security management-related R&D as a control tower of the national disaster prevention research in Korea.

⁷⁹ National Research Institute for Earth Science and Disaster Resilience, <http://www.bosai.go.jp/e/> (accessed April 30, 2023).

⁸⁰ Ibid.

three years until 2001. And especially in 2001, when the third phase of the project began, its goal and mission was significantly broadened to establish an “integrated disaster prevention technology development system” at the national level. In this project, the principal investigator (PI) was still a researcher at KRISS, but the collaborative work and participation of diverse researchers from government-funded research institutes, universities, and private companies was noticeable.⁸¹ This organization of work is quite different from the earlier projects of MoST back in 1995, which designated each government-funded research institutes a specific type of disaster. It shows that the FPRC project was the backbone for designing and establishing the national integrated system for man-made disaster prevention.

Conclusion

The development of disaster prevention technologies in Korea after the collapse of Sungsoo Bridge in 1994 and Sampoong Department Store in 1995 can be understood as part of the institutional history of responding to social needs. The mid-1990s were a tipping point to KRISS in the wake of the two accidents. The newly established research center led the reorganization of institutional settings and measurement to serve not only industrial needs but also disaster prevention. In so doing, the institution embraced the broadened scope of risks for its research, and its measurement technologies came to encompass “quality of life” by developing measurement standards of risks to the environment and health. Today, the FPRC, renamed the Safety Measurement Institute, continues to respond to contemporary needs including measurement standards for nanotechnology, hydrogen energy, environmental radioactivity, and medical devices.⁸²

This paper also sheds light on the social role of science and technology in making potential risks visible through testing and measurement in Korea’s risk society. Ulrich Beck characterizes the nature of risk in a risk society as “the manufactured uncertainties and emerging dangers that characterize a risk society tend to be imperceptible to our senses, and these dangers can only be known by scientific experimentation and are often latent.”⁸³ In this sense, small cracks in a solid concrete

⁸¹ For example, participants of the project “Development of Man-made Disaster Prevention Technology” were composed of 37 government-funded research institutes, 104 universities, 60 private companies (MoST, *Development of Man-made Disaster Prevention Technology Project* 인위재해방재기술개발사업 (MoST, 2003), 8).

⁸² FPRC changed its name to Safety Measurement Center (안전측정센터) in 2009, and its current name is Safety Measurement Research Center (안전측정연구소). KRISS, “Safety Measurement Research Center,” https://www.kriss.re.kr/departmentWeb/departmentMainView.es?mid=a10206000000&kd1_code=1000006 (accessed on May 6, 2023)

⁸³ Ulrich Beck, “World at Risk: the New Task of Critical Theory 위험에 처한 세계: 비판이론의 새로운 과제,” *Society and Theory* 사회와 이론 12 (2008), 7-36.

structure could only be identified audibly or numerically through instrumentation techniques such as nondestructive testing.

The social meaning of these measurement technologies for facility safety management has expanded through the government's Safety Culture Movement.⁸⁴ The Safety Culture Movement was first proposed in February 1995 with the framework of the "Accident-free Campaign" in manufacturing and construction sites and gained momentum when President Young-Sam Kim made the Safety Culture Movement an vital policy issue after the collapse of the Sampoong Department Store.⁸⁵ What is noteworthy about the Safety Culture Movement is that its core activity was measurement. The government designated the fourth of every month as Safety Inspection Day, and the Korean Occupational Safety and Health Agency (KOSHA)⁸⁶ defined safety activity as checking and measuring potential risks that should be removed and controlled, hence preventing accidents that can cause personal and economic loss.⁸⁷

The Safety Culture Movement significantly broadened the range of public perception of potential risks. Under the slogan of "thorough safety inspection from playgrounds to 50-ton-weight cranes," the government drove public concerns not only to infrastructure and industries but also to hazards at home, schools, and even in streets.⁸⁸ The safety inspection checklists suggested by the Ministry of Labor and Safety Culture Movement Promotion Agency consisted of 353 items in 5 fields: schools, homes, the public sector, manufacturing, and construction.⁸⁹ Safety awareness and responsibilities extended to the public through the measurement of potential risks, and safety measurement became part of their perception of risks.

How can the development of disaster prevention technology in the late 1990s and the Safety Culture Movement centered on measurement be revisited today? How have the risks that became visible through various measurement technologies been dealt with in Korean society since then? What are the limitations of disaster prevention activities centered on safety diagnosis and measurement? If disaster prevention technology can be seen as a materialized memory that reflects social

⁸⁴ Safety Culture Movement was first suggested by a verbal instruction of the Prime Minister during the 6th Cabinet Meeting, right after the fire accident on a ship of Hanjin Heavy Industries and Construction in Busan on February 7, 1995.

⁸⁵ Safety Culture Promotion Agency, *Material for Meeting on Nationwide Safety Culture Promotion to Make Bright and Healthy Society* 밝고 건강한 사회를 만들기 위한 범국민 안전문화 추진 간담회 자료 (Safety Culture Promotion Agency, 1995), 9; KOSHA, *10-Year History of KOSHA 한국산업안전보건공단 10년사* (KOSHA, 1997), 446.

⁸⁶ Korean government created the Safety Culture Promotion Agency (안전문화추진본부) under KOSHA and established committees and headquarters to promote the Safety Culture Movement.

⁸⁷ Ibid., 435.

⁸⁸ "Safety Inspection Day 안전점검의 날," *Maeil Gyungje* 매일경제, April 4, 1996.

⁸⁹ Safety Culture Promotion Agency, *Understanding of Safety Culture Movement 안전문화운동의 이해* (KOSHA, 2004), 32-53.

reflection and memories after a disaster, what kind of disaster prevention technology does Korean society need today?

Considering that the establishment of FPRC was a top-down decision by the government, it would be difficult to say that the R&D projects conducted at the government-funded research center, which was under the direct control and coordination of the government, are exactly reflecting the collective memories of disasters. In addition, further research is needed to analyze how these projects “end” and how the resulted technologies affect society. While the occurrence of disasters could be an important trigger to initiate R&D projects on disaster prevention technologies, it also leaves many questions unanswered, such as what technologies are needed, who determines them and how, how specific technologies affect how we understand and remember disasters, and what reflection should be made on the social roles and responsibilities of these technologies. These questions are helpful to deeply understand the changes in science and technologies after the disasters, and also to redefine science and technology as a materialized memory of the disaster. The case of FPRC clearly shows that “disaster prevention technology” was not only technical resources for predicting, preventing, and responding to disasters but also a social construct onto which specific understandings of disasters and social demands were projected. This reflection on the social meaning of disaster prevention technology can be seen as a task of reconnecting risk and society to live in a risk society.

Abstract

The collapse of the Sungsoo Bridge and Sampoong Department Store in the late 1990s led to the societal recognition that Korea had become a “risk society.” Ulrich Beck’s theory of the risk society was helpful for understanding post-disaster South Korean society. However, it has failed to reflect on the “risk” itself, which is inherent in science and technology and only revealed through the use of science and technology. This paper analyzes the early history of disaster prevention technology at the Failure Prevention Research Center (FPRC) within the Korea Research Institute of Standards and Science (KRISS), a national metrology institution. This paper found that the roles and social meanings of measurement have been largely changed in Korea. The case of FPRC also demonstrates that post-disaster changes in science and technology can be a form of collective and materialized memory of disasters. Redefining science and technology as materialized memories of disasters – in other words, a social construct – would allow us to take science and technology not merely as a technical resource but as an object of reflection to live in a risk society.

Keywords: man-made disasters, risk society, safety, measurement, disaster prevention