The Social Construction of Imported Technologies: Reflections on the Social History of Technology in Modern Korea

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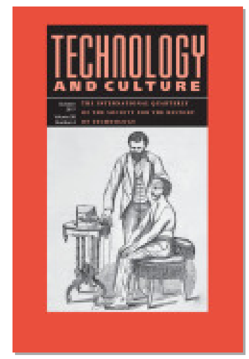

ESSAY

The Social Construction of Imported Technologies

Reflections on the Social History of Technology in Modern Korea

HYUNGSUB CHOI

ABSTRACT: Can imported technologies be socially constructed? Starting from this puzzling question, this essay reflects on the various methodologies with which one can narrate the stories of technology in modern Korea. A focus on technological innovations and how they have been shaped by their societal milieu forces one to leave out a large part of the technological experience, especially when the bulk of the technologies-in-use have been imported from abroad. This poses a serious problem for the history of technology in Korea, a nation that relied heavily on foreign technologies as it went through rapid economic growth in the latter twentieth century.

All technologies are socially constructed. If contemporary historians of technology can agree on anything, this thesis would be one of the likely candidates. Many of us who started out in the field since the 1990s must have been, at some point, attracted to the refreshing notion that technology should not be taken as given but as a reflection of its social conditions. I, for one, still vividly remember my first encounter with the concept. It was during the mid-1990s, in my junior year at a South Korean university. As an engineering major with a strong interest in social reform, I joined a student group where we collectively discussed some of the seminal works in Science and Technology Studies (STS). A widely read article by Trevor J. Pinch and

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Wiebe E. Bijker, among many others, was available in Korean translation, thanks to the effort of pioneering STS scholars in Korea.[1] As young engineering students, we were completely sold. If technologies are socially constructed, we thought, would it not be possible to imbue them with democratic and humane values?

The experience was a critical inflection point in my career trajectory. Upon graduation (and after a brief stint in the military service), I traveled to the United States in the final year of the Clinton administration to begin graduate studies in the history of technology. Thankfully, the "yellow school bus book," edited by Bijker, Thomas P. Hughes, and Pinch, was still very much in vogue.[2] The book contained the key manifestoes and case studies on the social analysis of technological systems. In the leading chapter, Pinch and Bijker laid out the groundwork for the Social Construction of Technology (SCOT) approach. Taking the historical example of bicycle design as an archetypal case, they argued that considerations of "relevant social groups" and their contested negotiations could explain the design changes in technological artifacts. As is well known, Pinch and Bijker took their cue from the sociology of science, a field that had already developed sophisticated methodologies to analyze scientific knowledge.[3]

The SCOT approach was quickly accepted within the history of technology. In the United States, as I quickly discovered, interesting works have been coming out of the University of Pennsylvania. The stream of dissertations supervised by Thomas P. Hughes analyzed a broad array of technological systems, including nuclear power in postwar France, reinforced concrete in the United States, Nazi concentration camps, and the Internet in cold war America.[4] As a group they built on the SCOT approach by paying attention to "how technological change both shapes and is shaped by social change." Known as the "mutual construction" thesis, their approach provided some necessary flexibility in analyzing real-life complex technological systems. Nonetheless, the Penn group undoubtedly saw technological artifacts as embodiments of social and political relations.[5] In other words, "opening the black box" of technology, if done right, would allow us to read social configurations in material objects.

1. Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artifacts." The Korean-language translation of this article was first published as part of Sung Soo Song, ed., *Kwahak kisurŭn sahoejŏgŭro ŏttŏk'e kusŏngdoenŭn'ga*. However, an unofficial manuscript version was in circulation by the mid-1990s.

2. Wiebe E. Bijker, Thomas P. Hughes, and Trevor J. Pinch, eds., *The Social Construction of Technological Systems*.

3. Pinch and Bijker, "Social Construction."

4. Readers familiar with the literature would recognize these dissertations, which were later published as monographs. Gabrielle Hecht, *The Radiance of France*; Amy E. Slaton, *Reinforced Concrete*; Michael Thad Allen, *The Business of Genocide*; Janet Abbate, *Inventing the Internet*.

5. For an overview of the Penn group's approach, see Michael Thad Allen and Gabrielle Hecht, eds., *Technologies of Power*, especially the introduction.

In retrospect, my training in the field was by this generation of scholars—those who had been baptized by SCOT in the late 1980s and '90s, and have taken a step further by conducting empirical studies of technological systems embedded in diverse sociocultural contexts. In the early 2000s, books by Ken Alder and Gabrielle Hecht were considered cutting-edge exemplars of the discipline that should be on the shelf of any serious graduate student in the field.[6] Hecht's *The Radiance of France*, for example, makes a powerful argument for "technopolitical regimes" by juxtaposing two nuclear reactor designs advocated, respectively, by the Commissariat à l'Énergie Atomique (CEA) and Électricité de France (EDF). Both institutions wished to claim the "radiance of France" in the postwar period through nuclear technology, each with its own vision of what constituted true "Frenchness." As a result, the CEA's G2 reactor was designed to effectively produce weapons-grade plutonium, with only minor consideration for electricity generation. In contrast, the EDF, as a nationalized public utility, prioritized efficient production of electricity. By comparing the designs of two different types of reactors, Hecht was able to extract the political visions of scientists and engineers involved in the development of French nuclear technologies during the 1950s and '60s.[7]

Reading into machines is what historians of technology do best. The late Michael S. Mahoney once pointed out that the essence of technology cannot be accessed through "reading great books, but [through] examining great things." Through a close reading of Henry Ford's Model T, he could conclude as follows: "Reading a machine means determining what the artifact says about the people who designed it, the process of its design, the assumptions made about its purposes, the expectations held of its putative users, and the ways it could actually be used."[8] Yes, machines can tell us much about their creators and users as well as their intentions. Yet, as Alder and Hecht have effectively shown, they can also help us tackle questions that the "general" historians have long elided by revealing an underexamined dynamic in the social and political relations of a given time and place.

The basic premise of the SCOT approach was on my mind as I prepared my own dissertation. My research topic was the history of semiconductor technologies in the United States and Japan during the 1950s, with special attention to the circulation of manufacturing knowledge.[9] In observing the industrial developments, I examined the electronic devices made in the two countries in an attempt to "read into" the socioeconomic contexts of cold war America and postwar Japan. As I show in one of the sections (with some help from my colleague Takushi Otani), Japanese engi-

6. Ken Alder, *Engineering the Revolution*; Hecht, *The Radiance of France*.
7. Hecht, *The Radiance of France*, especially chapter 2.
8. Michael S. Mahoney, "Reading a Machine."
9. Hyungsub Choi, "Manufacturing Knowledge in Transit."

neers of the 1950s were singularly focused on developing "novel" devices that would allow them to bypass American-owned patents, in the hopes of alleviating the ballooning royalty payments. This consideration led them to come up with different kinds of devices, compared with those in the United States, some of which were more successful than others.[10] With this kind of close analyses of machines, I had hoped to come up with a historical narrative that would be of interest to the general historians, as the Penn group has so successfully done.

The Dilemma of SCOT and the "China Problem"

In the fall of 2011 I returned to Korea with high hopes of applying this methodology to the context of my home country. Upon repatriation, I spent a hectic couple of years catching up with the Korean-language literature in STS. Soon, it dawned on me that there could be a fundamental mismatch between the cases at hand and the mainstream methodology in the history of technology. Could the SCOT approach be fruitfully applied to modern Korea? This question emerged as I observed many graduate students, who wished to work on the problems of technology in modern Korea, experiencing difficulties finding appropriate research topics. Certainly part of their difficulties arose from the lack of well-organized archives. However, it wasn't just that. Could there be deeper reasons that underlay their difficulties?

As I saw it, a big part of the problem was that the bulk of the technologies used by Koreans since 1945 have been *imported* from elsewhere. If we accept this premise, what can we expect to reveal through close analyses of machines in the context of modern Korea? In other words, does it make sense to adopt the SCOT approach to study the history of Korean technology? Recently, an interesting news report nicely captured this dilemma of SCOT. In October 2016 *TV Chosun*, one of Korea's major broadcasting stations, ran a news report that raised a question about the position of gasoline inlets in Korean automobiles. The reporter pointed out that most domestic vehicles in Korea are designed with their gasoline inlets on their lefthand side, on the same side as the driver's seat. Then, an automobile expert went on to comment that, typically, vehicles are designed with the muffler to the far side of the sidewalk—and the gasoline inlet usually goes on the opposite side of the muffler as a safety precaution. Since vehicles run on the righthand side of the road in Korea, it follows that Korean cars have their gasoline inlets on the "wrong" side. The reason for this mismatch, the report continued, was due to the fact that the basic design templates for Korean vehicles were imported from Japan—where vehicles run

10. This section was later expanded and published as Hyungsub Choi and Takushi Otani, "Failure to Launch."

on the lefthand side of the road—in the early years of Korea's automobile industry.[11] This episode may well serve as a critique of the mindlessness of Korean engineers; it also shows the inconsiderateness of Korean industrialists toward their customers. Apart from raising an important issue of professional ethics, it also indicates the possibility that "reading into" Korean machines may not lead to the social, cultural, and political milieu of their natural habitat.

As such, examples abound where a close examination of technology in Korea points to the context of the technology's original development. Perhaps this is natural for a society that, until very recently, lacked significant experiences in technological innovation. For example, consider Dongoh Park's recent work on the development of computer character codes for the Korean language. In the mid-1980s, there erupted a serious controversy over standard-setting. The debate was fraught with nationalistic symbolism, from the celebration of the Korean character *Hangul* to the evocation of independence from Japanese influence. In the end, however, the settlement of the debate was strongly shaped by foreign actors, such as Microsoft and the international Unicode Consortium. If the Korean character code was socially constructed, the key agents of its construction were those operating outside the country, with relatively minor input from the Korean society.[12] As the examination of automobile design in contemporary Korea leads us to contemplate the transfer of technology from Japan in the 1970s, the analysis of Korean computer character code standards points to the preponderance of multinational tech giants and standard-setting bodies in shaping computer systems—both outside the immediate social context of modern Korea. The graduate students mentioned above seemed to have instinctively sensed the dilemma of SCOT. They were interested in understanding Korean society, but what they were looking for was not to be found in the technical details.

Is this something that cannot be avoided when one is studying the global periphery, where the inception of technical design takes place only rarely? One way of avoiding the dilemma of SCOT is to focus on those technologies that are sufficiently *different* than those found in the center.[13] Consider, for example, Eden Medina's *Cybernetic Revolutionaries*. The book examines the development of the cybernetic computer system, called Cybersyn, in Chile during the 1970s. For Medina, Cybersyn provides an opportunity to observe the relationship between Allende's unique brand of democratic socialism and the computer's technological design. Through

11. *TV Chosun*, 11 October 2016. The full report can be seen at http://news.tvchosun.com/site/data/html_dir/2016/10/11/2016101190213.html (accessed 20 July 2017).

12. Dongoh Park, "The Korean Character Code."

13. Here I use the terms "center" and "periphery" loosely, not in the strict sense used by dependency theorists and world-system theorists, simply to refer to those regions outside the small group of advanced industrial nations.

close examination of the computer system and how it was designed, she expects to "enhance our understanding of a historical moment."[14] Cybersyn was without doubt an imported technology in 1970s Chile; it was based on the theoretical framework of the British cybernetician Stafford Beer, and most of its code was written by a transnational group of programmers-consultants. However, the development of Cybersyn was done in close collaboration with Chilean engineers and politicians, who had ample opportunities to imbue the computer system with their intents and values. These efforts led to the unique design of Cybersyn, which was, as Medina emphasizes, "*different* from those explored by other, more industrialized nations."[15] The identification of difference is critical, since only then is there something to be explained through resorting to contextual factors.

In the technological periphery, following the SCOT approach often leads us to focus on cases like Cybersyn. Choosing to examine a unique technology in the periphery certainly makes for good research topics by opening up the opportunity to discuss the local societal context. Nevertheless, I argue that there is no reason to privilege those special cases in our narratives of technology. A similar point has been raised by my senior colleague Yung Sik Kim, who has identified a comparable difficulty in the history of science and technology (S&T) in traditional Korea. What he calls "the problem of China in the study of the history of Korean science" is caused by the fact that the vast majority of scientific texts and technological artifacts to be found in traditional Korea are identical to those in China. Under these circumstances, Kim asks, how should one treat the "ideas and techniques that were *straightforward importations* from China"? One option would be to sweep them aside as Chinese S&T and ignore them altogether, as many Korean scholars have done, and "study only what is uniquely Korean." The dilemma was that, by doing so, historians were compelled to leave out much of the scientific activities conducted within the geographical confines of the Korean peninsula that lack perceivable differences with those in China.[16]

If we apply the "China problem" to the history of technology in modern Korea, it maps nicely onto the dilemma posed by the SCOT approach, only with China replaced by the United States, Japan, and other industrialized countries from which Korea has imported technologies since 1945. The bulk of the technological artifacts that Koreans have been using in the latter

14. Eden Medina, *Cybernetic Revolutionaries*, 7.

15. Ibid., 5, emphasis added. A similar emphasis on uniqueness can be seen in the dissertation project of Dongoh Park, who was Medina's advisee. In his analysis of Korea's public-key infrastructure (PKI), Park points out that "South Korea represents a unique example of widespread PKI use." He goes on to follow the "social and cultural factors that contributed to the implementation and social adoption of the technology." Park, "Social Life of PKI," 59, emphasis added.

16. Yung Sik Kim, "The 'Problem of China,'" emphasis added. Kim does not offer a clear-cut solution to this dilemma in the article.

twentieth century have been imported from elsewhere. Should we, as Kim asked, ignore the "straightforward importations" and embark upon a painstaking search for the unique technologies that properly reflect the Korean context? Or should we attempt to capture the entirety of the technological experience of modern Korea by being inclusive of the seemingly uninteresting and mundane imported technologies? If we choose to ignore the imported artifacts from our analysis of the history of Korean technology, then we are sure to be left with very few things with which to work. In this sense, the SCOT approach has an inherent affinity to the "innovation-centric account" famously criticized by David Edgerton. "In the innovation-centric account," he quipped, "most places have no history of technology."[17] Hence, we are now confronted with the difficult task of constructing a historical narrative where there is supposedly no history.

Staying Clear of the Dilemma

So far I have argued that adopting the SCOT approach tends to lead scholars, in most regions outside the center of technological innovations, to focus disproportionately on unique technological developments that best reflect the local context. Within the SCOT framework, resisting this tendency is almost futile, for then we are only left with a large number of imported technologies for which no "history of technology" can be written. This, in my view, was the key difficulty of practicing the history of technology in modern Korea and, in particular, constructing narratives that would be of interest to the international scholarly audience. In order to cater to the international community, scholars working on modern Korea felt the need to identify technological aspects that were significantly different than those in the advanced industrial countries.[18]

However, a brief survey of the Korean-language literature on the history of S&T in modern Korea reveals another possible strategy to stay clear of the dilemma of SCOT. The widespread approach is to forgo an analysis of the detailed content and design of scientific knowledge and technological artifacts, and rather deal with the *institutional development* of S&T. Indeed, the standard historiography in Korea has taken this pathway. As a result, the lion's share of the historical work on S&T in modern Korea has been on the establishments and actions—both scientific and policy—of major research institutions, government agencies, and universities relevant to the historical development of S&T. By adopting this strategy, historians could avoid the difficulty of having to confront the relative paucity of novel contributions of science and technology emerging from modern Korea.

17. David Edgerton, *The Shock of the Old*, xiii.

18. Examples in this category are rare. Tae-Ho Kim's work on the Korean "green revolution" and the Korean mechanical typewriter come close to what I have in mind. Tae-Ho Kim, "Miracle Rice for Korea"; Tae-Ho Kim, "From Vulnerability to Originality."

Thus, it is no surprise that the history of Korean S&T has developed largely along this path.

It is worth noting that this historical narrative closely parallels and supports that of national development. As is well known, the South Korean state embarked upon a path toward economic development after the Korean War and especially during the presidency of Park Chung Hee. Although S&T capability was a minor factor in the initial years of national growth, it soon served as the crucial engine. In this account, the story of science and technology typically begins with the establishment of the Korea Institute of Science and Technology (KIST) in 1966. Intended from the beginning as an institution of "applied science and industrial technology," KIST is known to have played an important supporting role for the burgeoning of Korean industry in the late 1960s and '70s.[19] Moreover, KIST researchers, many of them with impressive education and career experiences abroad, went on to occupy key posts in the expanding system of government-supported research institutes in the 1970s and '80s.[20] Therefore, KIST is positioned as the origin point of the government-led transformation of S&T-based economic development that characterized South Korea in the final third of the twentieth century.

Following KIST, new government agencies and institutions were created to effectively coordinate the expanding S&T system. The Ministry of Science and Technology (MOST) was established in 1967 as the "control tower" of science and technology policy. Among other things, MOST was responsible for laying out a scrupulous plan for the integration of S&T into economic activities.[21] When President Park decided to pursue heavy and chemical industrialization in the early 1970s, MOST marched in step to support the policy through a series of specialized government-supported research institutes. When the need for advanced technical personnel arose, the ministry responded by establishing the Korea Advanced Institute of Science in 1971, a graduate-level educational institution.[22] Support for university research grew in the late 1970s with the creation of the Korea Science and Engineering Foundation (KOSEF) in 1977. KOSEF gradually expanded its research grant programs that funded, in large part, "purpose-driven basic research" in the academic sector.[23] The series of institutions established in the 1960s and '70s, then, occupied respective positions within the emerging "national innovation system" or the "triple helix" of university-industry-government in modern Korea.[24]

19. The most comprehensive history of KIST is Manyong Moon, *Han'gugŭi hyŏndaejŏk yŏn'guch'ejeŭi hyŏngsŏng*.

20. Manyong Moon, "KIST."

21. For the path to the establishment of MOST, see Sungjoo Hong, "Han'guk kwahakkisul."

22. Dong-Won Kim and Stuart W. Leslie, "Winning Markets?"

23. Kichun Kang, "Han'guk Kwahak Chaedanŭi."

24. Richard R. Nelson, ed., *National Innovation Systems*; Henry Etzkowitz and Loet Leydesdorff, "Triple Helix."

The brief narrative described above is a bare-bones version of the standard history of science and technology in modern Korea. It conveys a story of a nation gradually developing into the full-blown "science and technology powerhouse" that we see today.[25] Without doubt, this narrative strategy has been shaped by national and international needs. It also provided a convenient means to avoid discussing the detailed contents of technology, which could be quickly swept aside as importation, imitation, or adoption of foreign technologies. In this way, historians of technology in Korea have managed to avert the dilemma of SCOT; they did so by simply not talking about the machines. The institutional or policy-oriented history certainly captures an important portion of the variegated story of science and technology in modern Korea. Nevertheless, much is missed if we simply continue along this path. We need to find a way to confront the dilemma of SCOT and to deal with the panoply of machines that have been in use throughout the history of modern Korea and our everyday lives.

What Is to Be Done?

As a Korean historian of technology trained in the United States, I retain some faith in the position that machines can be windows through which one can observe and analyze the history of modern Korea. A focus on machines is the technology historians' defining trait, something that I share with colleagues around the world. My frustration stems from the fact that, if we adhere to the SCOT approach and attempt to "read" social relations through machines, it is often difficult to identify adequate research topics in the context of modern Korea. As discussed above, adopting the SCOT approach severely limits the range of topics that are deemed worth examining. Faced with this dilemma, Korean historians of technology have largely evaded the problem by choosing to focus on the institutional development of science and technology, rather than "opening the black box" of technology.

In my view, the first step out of this quandary is to recognize that the SCOT approach is not the only way to "read" machines. If "reading" refers to the act of extracting meaning out of technological artifacts, one doesn't always have to "open the bonnet" and take machines apart in order to read them. As Mahoney explained above, it also includes the "ways it could actually be used." In this regard, his position resonates with Edgerton's, who emphasized the need to turn our eyes to "technologies-in-use" rather than the new inventions and innovations. In other words, it is possible to read machines through an analysis of the changes in the broader technological landscape and its interaction with people through time within a specific geographical context and its connections to the world. This approach is akin to the "social history of technology" approach, which is not

25. This is not my assessment but that of *Science* magazine in 2008. See Richard Stone, "South Korea."

entirely new. Indeed, in the "yellow school bus book" itself, Ruth Schwartz Cowan proposed this path with the notion of the "consumption junction." Rather than placing at center stage those who design and develop new technologies, Cowan locked into the consumer to "ascertain how the network [of production and consumption of technology] may have looked when viewed from the inside out."[26] Underlying all of them is an urge to decenter the machines in the history of technology, with added emphasis on society and culture.

More recently, another group of scholars, especially those in Asian Studies, have been producing work along analogous lines of thought. Instead of focusing on the flashy technological innovations, these studies attempt to trace the small-scale mundane technologies—such as bicycles, sewing machines, and gramophones—that spread into South and Southeast Asia around the turn of the twentieth century.[27] In contemplating the place of "everyday machines" in Asian society, they inevitably run into the dilemma of SCOT, namely that "objects of everyday use were neither designed nor manufactured locally and so could not, in their original form, bear the imprint of local society." Instead, they propose to capture how imported technologies "were locally ignored or rejected, were subjected to significant local emendation and reinvention . . . were reworked and reappropriated to conform with local cultural norms and social usages."[28] In other words, they focused on the adoption and adaptation of machines as they were integrated into local societies, without being obsessed with identifying the difference or uniqueness of technical designs. Their prime interest was in how the machines acquired novel meanings in the social and cultural life of colonial and postcolonial Asia.

The "everyday machines" strategy works admirably in most late-colonial and postcolonial contexts. However, I believe that a study of technology and culture in South Korea during the latter twentieth century poses a different set of challenges. Exposed to the Japanese version of modern technology during the colonial period (1910–1945), South Korea after the 1960s and '70s was already reasonably "modern" with a strong nationalistic urge to ascribe nationhood to technology. As new foreign technologies entered South Korea, they were not merely adopted and adapted by Koreans but also reconfigured and reprocessed to such a degree that they sometimes acquired renewed identities as "domestic" (*kuksan*) or "Korean-style" (*han'gukhyŏng*) technologies. This phenomenon may have been due to Korea's middling position—sometimes categorized as "newly industrialized countries"—as it underwent rapid economic and technological transformation during this period.

26. Ruth Schwartz Cowan, "The Consumption Junction."

27. For example, see David Arnold, *Everyday Technology*; Nira Wickramasinghe, *Metallic Modern*. Frank Dikötter's *Things Modern* takes a similar approach for China before 1949.

28. David Arnold and Erich DeWald, "Everyday Technology," 6.

At first sight, the frequent invocation of "Korean-style" technologies may look like a good occasion to apply the SCOT approach. If we take this rhetoric at face value, it appears that Koreans have been devising unique artifacts, quite different from those to be found elsewhere, that one can try to explain by resorting to the local context. Here, however, we need to make a clear distinction between the "local context" invoked by SCOT and the nationalistic imaginary of "Korean-style" technologies. As Sang-Hyun Kim argues, the sociotechnical imaginary of "developmental nationalism" was manifest in Korea for most of the modern period, and the "Korean-style" rhetoric was an integral component of it.[29] In other words, "Korean-style" did not signify the "local Korean context" in SCOT parlance; rather, it referred to those technologies that helped develop and "modernize" the South Korean nation-state. Therefore, uniqueness (or difference) in terms of technological design was largely irrelevant, as long as it could claim its status as being useful to economic development.

With these considerations in mind, I had the opportunity to join a coterie of like-minded scholars in Korea that wrote a series of short articles under the rubric of "Korea Techno-Culture Chronicles" for a Korean weekly magazine.[30] During the six months between January and June 2016, the group published twenty-five articles, each focused on a specific technological artifact—from reinforced concrete and plastic to nuclear power plants and smart phones—in modern Korean history. Some of these were mundane technologies, imported directly from industrialized countries and used by Koreans with minor (if at all) local emendations. Others were originally conceived abroad but went through significant reinventions, both in terms of the technology itself and its cultural import. Still others were novel reconfigurations, albeit an assemblage of imported technological components, but carried strong public perceptions as "domestic" technologies. In the process, South Korean technologies and engineers played varying roles in the adoption, adaptation, and reconfiguration of technology.[31]

Let me illustrate using examples from the series. In the 1980s South Korean rural communities utilized a large number of walking-type power tillers, known as *kyŏngun'gi* (*kōunki* in Japanese). The small-scale agricultural machinery was originally developed—known as the "rotary hoe"—by Australian inventor Arthur Clifford Howard in the 1910s.[32] Howard's invention spread to Europe. (It was not a particularly brilliant invention.) And soon a Swiss company, Société Industrielle de Machines Agricoles Rotatives (Simar), was selling them as "garden tractors." It was Simar that

29. Sang-Hyun Kim, "The Politics of Human Embryonic Stem Cell Research," 297–99.

30. Members of the collective included Taehun Lim (organizer), Young June Lee, Chihyung Jeon, and Young Jin Oh. The full texts of the articles are available—in Korean—on the website of *Chugan Kyŏnghyang* [Weekly Kyŏnghyang]: http://weekly.khan.co.kr/khnm.html?mode=list&s_code=ns080.

31. Kyonghee Han and Gary Lee Downey, *Engineers for Korea*.

32. Diane Langmore, "Howard, Arthur Clifford."

introduced the machine to Japan in 1921. Simar's garden tractors proved rather ineffective within the different environmental and agricultural context of Japan. However, a nimble Japanese inventor, Hirose Yokichi, managed to adapt the machine to better suit local needs. By the late 1930s, he was making several hundred units of the "Hirose S" model per year, some of which were sold to the colonies in Taiwan and Korea.[33] The story of how the power tiller was introduced to Korea reflects the global circulation of technology across national boundaries.

Manufacturing of power tillers in Korea began in 1962 by Daedong Industries, which signed a technology licensing contract with Mitsubishi Heavy Industries. Mitsubishi, of the Zero fighter aircraft fame during World War II, entered the agricultural machinery business after the war as part of its postwar conversion from "swords to plowshares." The Japanese company agreed to provide the parts to Daedong, which would then assemble them into completed machines in its factory in Korea. Korean power tillers in the 1960s, then, had no perceivable difference from the Japanese machines. Indeed, the basic design of the power tiller remains more or less the same today, as it spreads to South and Southeast Asia. Throughout the 1960s and '70s, however, engineers at Daedong did their best to "localize" the power tiller. "Localizing" in this context meant not redesigning the machine to suit local needs but replacing imported parts with ones manufactured domestically. Through these practices, power tillers acquired a new identity as a "domestic" technology, even though they remained virtually the same inside and out. Assisted by heavy government subsidies and loans, South Korean farmers purchased almost one million power tillers between the 1960s and 1990s.

Perhaps a more advanced version of the emergence of "domestic" technologies can be seen in the case of the Kimchi refrigerator.[34] The Kimchi refrigerator was developed by Jae-Kun Chun, a university professor specializing in food science and technology, in the mid-1980s. The effort was integral to the persistent problem of modernizing the fermentation and preservation of Korea's staple side dish. Nevertheless, the components of the Kimchi refrigerators (including the microchip and algorithm that controlled the internal temperature) were imported technologies, although Chun managed to combine these components into a unique configuration targeted to solve a critical local problem. Are Kimchi refrigerators the Cybersyn of South Korea in the 1980s and '90s? Can we "read into" this artifact to identify the social, political, and economic context of its time? Perhaps, at least more so than the mundane power tiller. Indeed, the Kimchi refrigerator is widely known as the representative "Korean-style" technol-

33. Toshiyuki Kako, "Development." The introduction of the Hirose S model to Korea was reported in *Tonga Ilbo*, 6.

34. The following paragraph on the Kimchi refrigerator is drawn from one of my essays in the *Chugan Kyŏnghyang* series.

ogy that reflects the changes in the urban living environment into high-rise apartments (calling for a novel solution to the Kimchi problem) and the economic condition of the rising middle class that had enough disposable income to spend on fancy home appliances. However, we need to keep in mind that there are no inherently "Korean technologies" in the true sense of the term; there are only technologies that happened to circulate through the Korean peninsula, shaping Korean society and taking specific configurations adapted to local conditions.

These brief capsule histories illustrate the need to pay attention to the technologists and engineers in telling the story of technology in modern Korea. Thanks to them, South Korea managed to move beyond the point of passive receptors of imported technologies. But they were also not innovators in the sense Walter Isaacson uses the term in his book *The Innovators*, the geniuses and visionaries who came up with truly novel technologies.[35] They were closer to *tinkerers*, who tweaked in the margins of imported technologies—sometimes taking them apart and putting them together in novel arrangements. In this regard, what I have argued in this essay may look like a tinkered version of the "Maintainers" argument, proposed recently by Andrew Russell and Lee Vinsel.[36] They, along with a host of historians of technology who joined the duo at the first Maintainers conference in April 2016, called for a renewed interest in the maintainers, defined as "those individuals whose work keeps ordinary existence going rather than introducing novel things."[37]

The recent enthusiasm within the Society for the History of Technology community for the Maintainers is based on a widespread critique of excessive "innovation-speak" that extols the innovators prevalent in the contemporary United States. I strongly support the Maintainers' premise and agenda, but for rather different reasons. In writing the history of technology in modern Korea, the key problem is not the dominance of innovators in the existing historical narrative. For my purposes, it is important to create new stories of technology that cut across and move beyond the widely accepted policy-oriented accounts, which would contribute to a richer understanding of Korean modernity, even without the strong presence of the innovators of technology. There is no need to go out of our way to find innovators when they are not easy to find in the first place. Therefore, an emphasis on the maintainers in the context of modern Korea is required not as a warning or antidote against being tantalized by "the otherworldly, glittering future" promised by the innovators.[38] Rather, it is needed to tell a nuanced story of technology in the global periphery where the bulk of the technologies-in-use have been imported from elsewhere.

35. Walter Isaacson, *The Innovators*.

36. Andrew Russell and Lee Vinsel, "Hail the Maintainers."

37. Ibid. For the full program of the Maintainers I conference, see http://themaintainers.org/program.

38. Lee Vinsel, "The Stories We Tell."

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