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Imported machines in the garden: the *kyŏngun'gi* (power tiller) and agricultural mechanization in South Korea

Hyungsub Choi

School of Liberal Arts, Seoul National University of Science and Technology, Seoul, Korea

ABSTRACT

The power tiller was central to the modernization of agricultural practices in East Asia during the latter part of the twentieth century. The small-scale, two-wheeled, walking-type power tiller was adapted from the European garden tractors by Japanese farmer-inventors in the 1920s, and then imported to South Korea in the early 1960s. This article traces the global technology circuit for power tillers, as well as their troublesome entry into the South Korean socioeconomic landscape in the 1960s and 1970s. Once the South Korean manufacturing industry for power tillers established itself, the agricultural machine was embroiled in a controversial political debate over landownership structures, which had profound implications for the very place of agriculture in modern South Korea. In the process of this extended debate, the social meaning of the power tiller itself went through significant change.

KEYWORDS

Power tiller; South Korea; landownership structure; agricultural mechanization

If there is such a thing as an 'East Asian' technology, the power tiller (*kyŏngun'gi* in Korean; $k\overline{o}unki$ in Japanese) is certainly one of the likely candidates. The small-scale, two-wheeled, walking-type tractor was—and still is—an iconic machine of the rural landscape in many parts of East Asia. Adapted from the European 'garden tractor' in the 1920s and 30s by Japanese farmer-inventors and tinkerers, the power tiller was widely produced and distributed across Japan beginning in the 1950s. By 1974, roughly three out of five Japanese farm households owned a total of more than three million power tillers. Soon, the machine spread to Taiwan and South Korea, then to Vietnam and Thailand in the 1960s and 70s. In short, the power tiller's primary habitat was the rice cultivation areas of East Asia in the latter part of the twentieth century. Just as the large tractor has been widely believed to have transformed the American wheat fields earlier in the century, the small power tiller has successfully replaced the oxen as power sources and sparked the modernization of agricultural practices in the Asian rice paddies.

The powerful imagery of agricultural machines transforming the rural landscape was predominant in older historical narratives, which resonated with the proponents of agricultural mechanization around the world. However, more recent studies in agricultural history have problematized the conventional narrative. For example, in a masterful study of American agriculture, economic historians Alan L. Olmstead and Paul W. Rhode contest the standard account that 'mechanization was the dominant source of nineteenth-century agricultural productivity change'. Although machines, such as tractors and reapers, played important roles in some parts of the United States, the numbers suggest that 'biological innovations', including new plant varieties and smaller-scale farming practices, account for the bulk of agricultural productivity growth.¹ The mismatch between imagery and reality was in part a product of the 'emergence of an industrial logic or ideal in agriculture', to borrow Deborah Fitzgerald's phrase.² The idea that more mechanization would lead to increased efficiency and ultimately to the 'modernization' of agriculture was widely accepted by the American farmers and policymakers of the day. The image of choice was the large-scale and heavily mechanized wheat fields of the American Midwest, which, as Olmstead and Rhode point out, were 'not representative of the larger agricultural economy'.³

Made up of both mechanical and biological interventions, the 'industrial ideal in agriculture' became part and parcel of the Cold War ideology of modernization that was injected into underdeveloped Asia by the American development experts.⁴ To them, modernizing agriculture was a central component of defending the 'free world' against the expanding communist bloc in the region. Based on this belief, American advisors recommended the adoption of agricultural machines, alongside other 'scientific' agricultural practices, such as high-yielding varieties of rice and new fertilizers.⁵ Although the South Korean political leaders of the 1960s were generally favorable to American recommendations, the ideology of modernization was inevitably adapted to the particularities of local conditions. For one, smaller power tillers, rather than large tractors and reapers, were the technology of choice in this part of the world. The difference in preference depended on several factors. Most importantly, cultivation area per household was, and still is, vastly smaller in East Asia than in North America. This tendency was reinforced by the postwar land reforms in Japan, Taiwan and South Korea, which emphasized the 'land-to-tillers' principle calling for a redistribution of land to a large number of owner-farmers.⁶ Combined with the widespread cultivation of a common staple crop in the region, namely rice, it is not difficult to understand the popularity of power tillers rather than larger apparatus among East Asian farmers for agricultural mechanization (Figure 1).

This article will tell the story of the introduction and spread of power tillers across South Korea during the early years of the 1960s and the 1970s, not simply as an episode in the universal spread of the American ideal of agricultural mechanization, but as a highly local phenomenon contingent upon political, social and economic conditions of the nation undergoing rapid development. In doing so, I will focus on two themes. The first theme is technology importation. The power tiller was initially imported to South Korea from a Japanese company in 1963, which had designed a unique variation of the Swiss garden tractor to meet the needs of Asian agricultural practice in flooded rice paddies. Thus, the South Korean power tiller manufacturers were part of a global technology circuit, first manufacturing close replicas of the Japanese model, then exporting them to Vietnam in the late 1960s. Although the Korean power tillers could hardly be called an 'innovation' or the 'creation of the new', South Korean businessmen and policymakers still prided themselves on achieving a near-complete 'localization (*kuksanhwa*)' of foreign technology.⁷

The second theme deals with the interface between a novel technological artifact and the socioeconomic milieu within which it enters. Although several South Korean



Figure 1. The *kyŏngun'gi* at work in a flooded rice paddy, 1963. CET0043757 (3-1), National Archives of Korea.

companies began manufacturing power tillers in the early 1960s, it was only in the 1970s that the sales numbers really took off. The 10-year lag, I argue, was largely due to the inability to remove the ceiling on landownership imposed by the Land Reform Law of 1950, which set the cap at approximately 3 hectares per farm household. Bound by the legal restrictions, the small-scale owner-farmers had little incentive to invest in expensive machines. Thus, when the government launched a national campaign to promote agricultural mechanization in the early 1970s, it had to offer substantial financial incentives in order to overcome heavy resistance.

Today, agricultural mechanization in South Korea is remembered as 'one of the most successful cases accomplished in a shorter period of time than in any other country', at least according to a recent Knowledge Sharing Program (KSP) report prepared to present the Korean development experience to underdeveloped countries.⁸ Considering the underlying intent of KSP reports – to underscore the *successful* aspects of Korean development – the assessment is no doubt imbued with some hyperbole and teleology. An examination of the early decades of power tillers in South Korea will reveal that their introduction and spread was full of frustrations, setbacks and serious doubts about whether the imported technology would find a place in the nation's socioeconomic landscape. It was only when the government was confronted with the flight of the rural population to the urban areas (*ich'on hyangdo*), leading to a shortage of rural labor, that it pursued a more comprehensive plan to replace manual labor with machines as a desperate measure. In other words, the wide adoption of the power tiller in South Korea during the 1970s relied as much on the 'industrial ideal' held by the political leaders, that increased mechanization would lead to increased productivity in agriculture.

In what follows, this article will briefly survey the outlines of the global technology circuit for power tillers. Beginning with its origins in Australia and Switzerland, the two-wheeled power tiller made its way to Japan, then to Korea, Taiwan and other parts of Asia. Hence, South Korea's experience with power tillers should be seen as but one episode in this continuous flow of technology around the world. Next, the article will follow the power tillers as they gradually spread through the South Korean landscape in the 1960s and 1970s. As we will see, agricultural mechanization was embroiled in the political debate over landownership structures, which had profound implications for the very place of agriculture in a rapidly industrializing Korea. In the process of the extended debate, the power tiller gradually acquired a different social meaning than it had originally held in South Korea.

The global technology circuit for power tillers

The power tiller had multiple origins. Alongside the American-style tractors, there were a few inventors around the world who thought there may be a market for smaller machines that can mechanize the arduous task of tillage. One of them was an Australian farmer-cum-inventor, Arthur Clifford Howard. Working on his family farm in New South Wales, Howard began experimenting with motorized tillage in 1912. His key innovation was the 'L-shaped blade mounted on widely spaced flanges' designed to prevent lateral soil removal. Soon Howard started a business to manufacture what he called 'rotary hoe cultivators'. By the 1930s, Howard Auto Cultivators was a successful company with branches in New Zealand, the United States, South Africa, as well as several countries in Europe.⁹ Around the same time, Swiss inventor Konrad von Meyenburg made his name for developing a series of machines for 'ploughless tilling'. In 1918, he sold his patents to several companies in Europe, one of which was the Société Industrielle de Machines Agricoles Rotatives (SIMAR). Based on Meyenburg's patents, SIMAR soon began to manufacture small 'walk behind models'.¹⁰ These machines came to be known collectively as 'garden tractors' and gradually spread across Europe and the United States through the 1920s and 1930s.¹¹ Soon the garden tractors occupied a niche market for cultivating small-scale gardens and orchards.

Thus, when the Japanese policymakers were searching for machines to equip their farmers in the 1920s, there were a variety of European and American garden tractors to choose from. What happened next was typical of Japanese technology transfer since the Meiji years – policymakers opted to consider 'multiple exemplars in the West', which were to be selected and assimilated by 'technology gatekeepers'.¹² In the early 1920s, the Ministry of Agriculture served as the gatekeeper for agricultural machines and imported eight different kinds of garden tractors from Europe and the United States.¹³ The ministry sent the tractors to its Tachikawa Agricultural Experimental Station in Tokyo for performance tests, mainly to determine whether the imported machines would function effectively in the Japanese agricultural environment. None of them was entirely satisfactory, although SIMAR tractors scored the highest mark. The main problem was that the garden tractors, originally designed to cultivate dry soil, were simply not effective in the flooded rice paddies of Japan.¹⁴ Clearly, some adaptations to the tractors were necessary for them to function properly.

In the 1920s and 1930s, the task of technical adaptation fell to Japan's farmerinventors. In 1927, Nishizaki Hiroshi of Kojo village, Okayama Prefecture, developed an improved power tiller based on the SIMAR garden tractor. Called the 'Maruni-shiki' power tiller, the new model featured uniquely designed cultivating blades and more powerful engines better suited for the heavy clay soils in Japan's rice fields. Similarly, Hirose Yokichi of Hakusan village, Ishikawa Prefecture, released the crank-type power tiller called 'Hirose S' in 1936. A third-generation blacksmith, Hirose was adept at tinkering with machines from an early age. Apart from developing an improved power tiller, he also obtained patents on a variety of agricultural machines, such as a rotary thresher and rice screen.¹⁵ These early Japanese adaptations were manufactured by dozens of small-scale machine shops with rather modest production capacities of several hundred per year.¹⁶ Despite the relatively small production numbers, some of these new machines were introduced to the colonies within the Japanese empire. For example, in 1938, a newspaper in colonial Korea reported the news of a 'newly invented power tiller' that would 'revolutionize land tillage'. Hirose was interviewed in the article, in which he boasted that his machine was 'easy to use' and could complete the task at less than one fifth the price of horse plowing.¹⁷ Although this does not mean that power tillers were widely used, it indicates that they were at least known throughout the Japanese empire by the late 1930s.

After a brief hiatus during World War II, Japan's production capacity for power tillers displayed a drastic takeoff in the 1950s, the period of the so-called 'power tiller boom' according to Japanese historians of agricultural technology.¹⁸ The key players during this period were the wartime 'munitions companies' that transformed themselves into fully civilian business enterprises.¹⁹ For example, Mitsubishi Heavy Industries, supplier of the infamous Zero Fighters and other war materiel, converted its factory to manufacture power tillers in 1948. Within a few years, the Japanese power tiller market was dominated by five large companies: Kubota, Yanmar, Mitsubishi, Iseki and Sato. As the industrial giants with ample experience and technical capacity in precision mechanics entered the agricultural machinery business, the production figures for power tillers skyrocketed in the 1950s and 1960s, reaching the height of 500,000 units per year in 1968.²⁰ The impact was clearly felt when the American geographer Robert B. Hall visited Kojo village, Okayama Prefecture (home of the Maruni-shiki power tiller), in 1954. Impressed with the proliferation of the 'hand-tractor adapted to the tiny plots that make up a Japanese farm', Hall proceeded to write a short report on the topic. Per his observation, 700 power tillers were roaming the Kojo farm roads, and two-thirds of the village farmers owned 'hand-tractors' in the mid-1950s.²¹

The global technology circuit for power tillers had come a long way from New South Wales, Geneva and Minneapolis to Tokyo, and eventually to Japan's rice bowl in Okayama Prefecture. During the interwar period, Japan's amateur inventors made some emendations to the European garden tractors to suit their own needs. In the postwar decades, Japanese manufacturers with high technical capabilities entered the power tiller business, which led to the rapid proliferation of the machine throughout the Japanese archipelago. Thus, the power tiller found a fertile environment to bloom in Japan during the 1950s and 1960s. However, the extension of the global technology circuit would not stop in Japan, but continue to extend into its neighbors with similar needs. As Hall noted in the late 1950s, the Japanese power tiller 'offer[ed] the promise

of expanding exports', especially to Asian nations with similar agricultural practices. 'There has been a good deal of interest shown by visitors from India, Pakistan, [and] Burma', he continued, and '[t]here is much that Japan can teach the rest of Asia about the use of farm machinery'.²² The student that would learn most from Japan in the 1960s was South Korea.

Extending the global technology circuit to South Korea and beyond

In 1960, as Japan was going through the early phases of the 'power tiller boom', South Korea was in deep turmoil. President Rhee Syngman, who had been in power since 1948, was ousted from office by popular revolt in April of that year. The economic situation was dire as well. Reconstruction after the Korean War (1950-1953) had relied heavily on economic aid from the United States, which decreased steeply after 1957. Chang Myŏn, the Prime Minister of the Second Republic that was established after the April Revolution, charged the Ministry of Reconstruction with formulating a 5-year plan for economic development.²³ Among the foreign advisors invited by the Korean government to help draft the plan was the American geographer Forrest R. Pitts, who arrived in Seoul in May 1960 as 'advisor in agricultural economics to the Economic Development Council'. During his short stay, Pitts traveled extensively to the rural areas, interviewing farmers and technical experts. Based on his prior knowledge of Japan's agricultural mechanization, he recommended a 'small pilot program of hand tractor introduction and testing' with a modest budget of \$38,000.24 For this and his subsequent work on the study of South Korean agriculture, he is sometimes known as the 'father of the hand tractor' in Korea.²⁵

Despite Pitts's recommendation, there was no guarantee that South Korea would launch into an earnest program for agricultural mechanization in 1960. At the time, South Korea was virtually a blank slate in terms of power tillers. As Pitts observed in his report, 'it was apparent that the anti-Japanese bias of the recently departed President Syngman Rhee had insured that almost no Japanese hand tractors were to be found within South Korea', save for a few units 'that had somehow escaped the eyes of the customs officer'.²⁶ Moreover, policymakers and economists were divided on the merits of agricultural mechanization. Consider the newspaper column in August 1960 by the Korea University economics professor Yi Chang-yŏl. Entitled 'The Starting Point of Freedom from Poverty', the column stressed the importance of empowering the rural population as the first step in launching economic development. South Korean farmers needed to raise their productivity, Yi opined, by 'driving tractors like the United States or power tillers like Japan'. As a good economist, however, he continued: 'On the other hand, there are opinions that Korean farmers should not drive tractors [or power tillers]. Given the excess population and widespread unemployment [in the rural areas], the mobilization of machine power will drive the remaining population away from their livelihoods.²⁷ The ambivalent attitude toward power tillers derived from the perception that the South Korean rural communities circa 1960 were in a vulnerable state.

Thus, it was somewhat unexpected when, 18 months later, General Park Chung Hee publicly brought up the issue of agricultural mechanization. Park had risen to power through a *coup d'état* that overthrew Chang's Second Republic on 16 May 1961. The following year, in February 1962, Park made an inspection tour of the southwestern

provinces of Chölla as chairman of the Supreme Council for National Reconstruction. His destination was Chŏnju, the capital of Korea's rice bowl. When the reporters surrounded him at the train station, he announced, 'Since Honam [southwest Korea] is largely a plains region, it is necessary to mechanize agriculture swiftly. For that purpose, we should introduce a large number of power tillers [*kyŏngun'gi*].²⁸ Obviously, Park was trying to woo his rural supporters, who comprised more than two-thirds of the total population. Indeed, one of the first items on the agenda for Park's military junta was to free the farmers from usurious loans. The proposed introduction of power tillers was partly an act of populism, but also reflected Park's belief that 'agricultural development [was] a prerequisite of industrialization'.²⁹

Were Park's remarks carefully thought out? Most likely, they were not. Nevertheless, his statement provided a concrete direction for future development. Unlike his predecessor, whose 'anti-Japanese bias' had forbidden Japanese 'hand tractors' on South Korean soil, Park specifically singled out the 'power tiller' – as opposed to the American tractor – as the technology that would mechanize Korean farms. Thus, Park's remarks served as an open invitation for businessmen to pursue technology importation from Japan. Perhaps this was no surprise for a political leader with ample experience in the Imperial Japanese Army during the colonial period, and who would later go on, despite strong opposition, to normalize diplomatic relations with Korea's former colonial ruler in 1965.³⁰ At any rate, the military dictator effectively gave a clear signal for aspiring manufacturers of power tillers in Korea to approach their counterparts in Japan. The door was now open for the global technology circuit to extend into South Korea.

By 1962 several Korean businessmen were already in discussions with Japanese power tiller manufacturers, all of which were former munitions companies that had turned to the agricultural machinery business in the postwar years. Foremost among the Korean firms was Taedong Industries, a Chinju-based company specializing in agricultural equipment. Founded in 1947 by Kim Sam-man, who had learned the trade by apprenticing in Japanese-owned foundries at an early age, Taedong started out as a maker and repairer of small portable engines. Its opportunity for growth came in 1958, when it received a \$333,084 loan from the U.S. International Cooperation Administration (ICA). Using ICA funds, Kim could purchase various machine tools from West Germany, such as an air hammer, electric furnace and boring machine.³¹ With the renewed technical capacity, Taedong was able to establish itself as one of the major manufacturers of engines and power threshers in South Korea. By 1961, the company had six different models on the market, out of which the 5.5 horsepower kerosene engine was the most popular among its rural customer base.³² It was around this time that Kim set his eyes on power tillers.

A quick survey of the field made it clear that Kim should approach the large Japanese manufacturers, such as Mitsubishi, Yanmar and Kubota. The negotiation process for technology importation, however, was neither easy nor straightforward. Kim's first contact with the Japanese companies was in June 1961, soon after the May *coup*. In March of that year, he had the opportunity to tour 10 European countries for 3 months at the invitation of the West German machinery company with which he had business relations. Kim was impressed by the grandiose and sophisticated machinery used by the European farmers, but he was far more interested in the Japanese machines of a smaller scale.³³ On his trip back home from Europe, Kim made a detour to spend 15 days in

Tokyo and set up meetings with Japanese power tiller manufacturers. His first target, Yanmar Diesel, flatly declined Taedong's request for a technology cooperation agreement. Unnerved, Kim then approached Mitsubishi Heavy Industries, which, after several dogged attempts, eventually promised to sign the document if and when they could figure out the proper procedures.³⁴ The reluctance of the Japanese companies was understandable given the lack of formal diplomatic ties between South Korea and Japan at the time.

Thus, Park's remarks in February 1962 must have helped Taedong to seal the deal with Mitsubishi. In preparation for the negotiation, Kim purchased one power tiller from Mitsubishi and brought it back to Chinju. Then, he had his engineers and technicians disassemble it completely to figure out how it was assembled, as well as to distinguish between the parts that needed to be imported and the ones that could be made domestically. Once the preparatory reverse engineering was complete, Taedong and Mitsubishi formally signed a technology licensing agreement on 10 December 1962. According to the agreement, 70 percent of the parts would be imported from Mitsubishi and the rest were to be supplied from domestic sources. Taedong would then assemble these components in its Chinju factory. A team of Mitsubishi engineers would be dispatched to Chinju to assist in the initial stages of setting up the manufacturing process.³⁵ In return, Taedong was to pay a fixed-rate premium of \$16,000 for 3 years, plus a 2 percent royalty for each domestically manufactured part.³⁶ Within 3 months, the binational team managed to assemble 150 six-horsepower power tillers, of the H6E-CT83 type, based on the Japanese design (Figure 2).³⁷ These were the first power tillers 'made in Korea'. Soon Taedong added 8- and 10-horsepower models to its product line.³⁸

Although the technology transfer from Japan to South Korea was considered a success, the process was by no means frictionless. Since Taedong aimed to make its power tillers based on Mitsubishi's design, using largely Mitsubishi's parts, it would be natural to expect that the Korean company made exact replicas of the Japanese original. However, the two machines showed subtle differences, as was revealed in a performance



Figure 2. 'The Way to Increase Yield!' Mitsubishi's advertisement featured the CT-83, which was the model Taedong Industries began to produce in 1963 with Mitsubishi's technical assistance. *Tonga ilbo*, 17 June 1962.

test conducted a few years later by the Agricultural Engineering Utilization Institute (AEUI). For comparative purposes, AEUI tested two CT-83 models, one made by Mitsubishi and the other by Taedong. The results were revealing. For example, the net weight of the Taedong power tiller was 348 kilograms, whereas the Japanese machine came to just 320 kilograms. The disparity in weight, the AEUI engineers noted, arose from the different 'cast thickness' of the iron plates. This implied that these iron plates were not imported parts, but were domestically sourced. There were also discrepancies in traction (80 percent of own weight for Mitsubishi versus 67.5 percent for Taedong) and fuel consumption (331 grams per hour for Mitsubishi versus 337 grams for Taedong). Overall, both Korean and Japanese power tillers passed the minimum quality requirement and were deemed 'acceptable' by AEUI.³⁹ Judging from the test results, the technology transfer between Taedong and Mitsubishi was more or less successful, albeit with some deterioration of quality due to differences in the underlying technological capabilities of the two countries.

By the mid-1960s, then, the global technology circuit for power tillers had clearly extended its reach to South Korea. Soon, the circuit would further extend from Korea to other parts of Asia. An opportunity for Taedong to export 'Korean' power tillers would come as early as 1967 with Korea's participation in the Vietnam War. South Korea's decision to enter the war in Indochina was shaped not only by ideological and military considerations, but also economic concerns. The South Korean government made it clear that it was expecting concessions from the United States in return for dispatching two combat divisions to Vietnam. The result was what historian Gregg Brazinsky calls an 'economic bonanza' for South Korea some \$402 million worth of exports of industrial goods to Vietnam.⁴⁰ Taedong and its power tillers were part of this package.⁴¹ In August 1967, the South Korean company successfully shipped 100 power tillers, both kerosene and diesel types, to South Vietnam for \$204,000.42 The transaction gave Taedong a critical foothold in the Southeast Asian market, as well as valuable experience in overseas operation. The initial shipment of Taedong power tillers to Saigon tended to malfunction, which the technicians diagnosed as due to thermal expansion of parts in the tropical climate. The problem was quickly fixed and faulty products replaced.⁴³ It was through these kinds of early experiences in Vietnam that prepared Taedong for a more serious foray of Thai-Taedong in the late 1970s, a \$2.7 million joint venture with the Siam Farming Company.⁴⁴

By 1967, the South Korean power tiller industry established itself as an important node in the global technology circuit, connecting Geneva and Tokyo to Chinju and Saigon. Taedong's production figures had increased substantially since the initial introduction of parts and technology from Mitsubishi in 1962–1963. After a few years of producing several hundred units per year, the number surpassed 2000 in 1967 and came close to 4500 in 1968.⁴⁵ The thousands of power tillers manufactured by Taedong and other South Korean companies were released to the South Korean rural communities. How the Korean farmers would use them – or even *whether* they would – was still an open question. The existing socioeconomic fabric would not necessarily adjust to the new technology. It is to this issue that we now turn in the following sections.

Power tillers in the South Korean landscape

By any measure, the South Korean farmers in the 1960s must have been a difficult group of consumers to whom to sell big-ticket industrial products. They were poor, much more so than their urban counterparts, and for that reason not only lacking in disposable income, but also possibly resistant to taking the risks that any change in farming methods might entail. These would have been tough hurdles to overcome for the budding power tiller manufacturers as they made initial forays into the South Korean market. More importantly, however, there were structural reasons for the Korean farmers' lack of interest in agricultural machines. As briefly noted in the introduction, the landownership structure at the time was regulated by the Land Reform Act of 1950. According to the act, farmers who owned more than 3 hectares of land were mandated to sell the remainder to the government for a set price; and the government, in turn, would resell the land to aspiring owner-farmers at '30 percent of average annual yield over a five-year period'. The result was a redistribution of land to a larger number of households owning smaller plots. As of 1953, 79.1 percent of the farm households owned less than 1 hectare, with the ceiling for landownership set at 3 hectares.⁴⁶ This was the general state of affairs in the mid-1960s when Taedong was searching for potential customers in the South Korean countryside.

The increasing proportion of small-scale owner-farmers in the 1950s posed serious obstacles to the dissemination of power tillers in the 1960s. The problem was the fundamental mismatch between the machines' cultivating capacity and South Korea's pattern of landownership. In the concluding remarks of the AEUI performance test in 1966, the engineers estimated that a CT-83 power tiller working in flooded rice paddies could cultivate approximately 300-400 acres, or approximately 120-160 hectares.⁴⁷ Of course, no one would have seriously expected the farmers to use the power tillers at full capacity. Nevertheless, it was undeniable that the power tillers were still incredibly powerful machines in a society where the average cultivation acreage per household was only 0.86 hectare in 1963.⁴⁸ Compounding this problem was the relatively high price of the machines. In 1966, a six-horsepower Taedong power tiller sold for 220,000 won, which well exceeded the annual income per rural household that year. As a newspaper article noted, the power tiller was an 'object of envy' and a 'pie in the sky' for many farmers just scraping by for the most basic necessities.⁴⁹ Considering the machine's excessive capacity and exorbitant price, the decision to invest in a power tiller was a difficult one to make for the average South Korean farmer in the 1960s.

Given the circumstances, the successful dissemination of power tillers would depend on some form of financial support for prospective buyers, and support arrived in two forms. First, the Ministry of Agriculture and Forestry (MAF) wrangled for public monies to subsidize the purchase of power tillers. In 1965, the budget for agricultural mechanization was increased to 417.3 million won, more than an eightfold raise from the previous year's budget of 47.6 million. Although the budget MAF managed to procure fluctuated year by year, the government could maintain the subsidy rate at around 40 percent for several thousand potential buyers during the next few years.⁵⁰ Second, low-interest loans were provided through the National Agricultural Cooperative Federation (NACF). Interest was set below the market rate, and the farmers were to repay the full amount over several years. Taken together, the MAF subsidies and NACF loans allowed rural customers to procure power tillers at approximately half or even one-third of the listed price.⁵¹ Without doubt, financial support had some impact in raising the sales figures. In 1966, the number of farmers owning a power tiller was 1555; in 1967, the number shot up to 3819.⁵² At this rate, however, it would take more than a thousand years (!) to equip more than two million rural households in South Korea with power tillers.

Financial measures slightly alleviated one side of the problem – the relatively high price of power tillers vis-à-vis rural household income. The other side of the problem - the excessive machine capacity vis-à-vis landownership patterns - required a more drastic solution. For most farmers, the level to which the machines exceeded farmers' needed tilling capacity made even the most discounted price still seem like an unnecessary expense. Policymakers were aware of the underlying structural dilemma. One way out of this dilemma was to abolish the landownership ceiling imposed by the Land Reform Act of 1950, allowing enterprising farmers to expand their farmlands as they saw fit. Not only would this measure help increase productivity by encouraging profit-maximizing behavior in the agricultural sector; it would also help the farmers to efficiently utilize the power tillers that were available in ever greater numbers in South Korea. Indeed, as early as 1965, the ruling Democratic Republican Party (DRP) publicly made this argument in a policy report on the proposed Framework Act on Agriculture. In effect, DRP policymakers called for the promotion of capitalistic 'corporate farms (kiŏmnong)'.53 Soon, several major newspapers were making similar arguments through their editorials and columns.⁵⁴ However, the proposal led to a severe backlash from the opposition parties. At stake was the 'land-totillers' principle that lay at the foundation of the Land Reform Act of 1950. Overturning this principle was no easy task, especially when memories as tenant farmers under the Japanese colonial rule were still fresh on the farmers' minds.

The argument for agricultural mechanization was closely associated with the debate over landownership patterns, and by extension with the very character of agriculture in South Korea. Abolishing the legal limitation on landownership came to be seen as the prerequisite for the success of agricultural mechanization. In order to fully utilize the capacity possessed by the power tillers, Korean farmers needed to break loose from the widespread practice of petty farming and transform themselves into profit-seeking businessmen. 'A power tiller's annual work capacity is five hectares', a newspaper article pointed out in 1969. Given the current landownership ceiling of 3 hectares, 'there is no need for individual rural households to purchase power tillers'. Moreover, it continued, 'the rural population is shrinking and rural wages are rising at a furious tempo. Therefore, there is an urgent need to replace human labor with mechanical labor, which in turn requires the enlargement of farm sizes.'⁵⁵ By the late 1960s, then, the dissemination of power tillers was enlisted as the hinge around which the broader political debate over landownership turned in South Korea.

The intricate connection between agricultural mechanization and landownership patterns was apparent in the landmark study that laid out the future vision of Korea. In 1970, the Korea Institute of Science and Technology (KIST) and the newly established Korean Society for Future Studies conducted a study utilizing cutting-edge Delphi methods to forecast the long-term future of 'Korea in the Year 2000'. One section of the final report contained a 'description of national life in 2000 A.D.' divided into two subsections of urban and rural life. According to the report, the two keywords that would characterize rural life of Korea in the Year 2000 would be 'mechanization' and 'large-scale'. During the next three decades, 'around 70% of the nation's farms would be mechanized. Considering the mountainous terrain of our country, this means full-scale mechanization of virtually all agriculture'. In realizing this vision, the report continued, '[r]eorganization of land would be *inevitable*. Farmland will be made as large-scale as possible'. Another important change to come would be the 'corporatization of agriculture. Just like the manufacturing sectors, management and capital would be introduced to the agricultural sector. Agricultural productivity would rise to be on par with that of manufacturing.⁵⁶ There is little doubt that the KIST researchers who conducted the study were influenced by the powerful policymakers at the time. Indeed, their forecast reflected the policymakers' future vision for South Korean agriculture circa 1970.

Strong support from those in power did not ensure the realization of the vision of large-scale corporate farms. The negotiation to abolish the landownership ceiling ended up in a political cul-de-sac. The attempt to reach consensus in the late 1960s resulted in a stripped-down version of the Farmland Act, which required special permission from the government for those who wished to own more than 3 hectares of land. Even this version was met with fierce opposition from the farmers. In the end, the bill never made it to the regular session of the National Assembly and was eventually disposed of in 1971.⁵⁷ President Park and the ruling DRP were powerful, but they would not achieve their aims in the landownership debate without doing serious harm to their rural support base. Rather than risking a political disaster in the upcoming presidential election, President Park decided to compromise. As it turned out, the basic outlines of the landownership pattern in South Korea would remain intact well into the 1980s, despite repeated attempts at legal revision.

As efforts to address the structural dilemma of landownership stalled, power tillers nonetheless found an unexpected constituency outside their intended markets, among non-farmers who were able to take advantage of government incentives. Reactions to these users are telling. In 1967, a daily newspaper published a photograph of a power tiller delivering a heavy load of coal briquettes on an urban street. The short article that followed criticized the owner for misusing the power tiller, when he should have been using it for its original purpose of land tilling.⁵⁸ The issue was raised in the National Assembly in the following year by Kim Jae-kwang, lawmaker of the opposing New Democratic Party. Discerning an underlying problem, Kim pointed out that 'power tillers are too expensive for the regular farmers'. Therefore, he continued, they 'are being used mostly by factory owners and merchants as transportation devices'.⁵⁹ A few years later, a 1971 MAF report on agricultural mechanization raised a similar problem. Due to NACF loans with interests set well below the inflation rate, the 'license to purchase power tillers has become a kind of concession'. This incentivized the 'crafty village leaders' or urban businessmen to acquire power tillers through illegal routes, depriving opportunities for the regular farmers who needed them the most.⁶⁰ The fuss over runaway power tillers in the late 1960s and the early 1970s shows that the new and powerful machines encountered significant difficulties finding a comfortable space within the socioeconomic landscape of South Korea (Figure 3).

By 1971, around 16,000 power tillers were disseminated in South Korea, far from the representation that proponents had hoped for. After nearly 10 years since initial introduction, the power tillers were still not fully integrated into the agricultural practice of Korean farmers. The key problem was the incompatibility between the machine's work



아직 실감없는 농촌기계화 논방을 감기하로 농촌에등장장 동력경운기。 눈방을 감기보다는 전차로 더걸 이용되어 농민에게는 근대화의 영농기술이 실감이가지 않는다。 [李武在기자찍음]

Figure 3. 'Farmers are yet to feel the impact of modern agricultural technology', the caption reads. The owner of this power tiller was using it as a makeshift truck. *Kyŏnghyang sinmun*, 2 February 1970, 4.

capacity and price, on one hand, and the legal environment governing the nation's landownership structure, on the other. When this underlying dilemma remained unresolved due to political impasse, the new technology, which was made available in increasingly greater numbers, appeared in places not intended by the manufacturers or the policymakers. The impasse would not last long, however. The successful industrialization of the 1960s soon induced a mass migration of people away from the rural areas in search for jobs in the cities by the end of the decade, leading to a perceived crisis of labor shortage in the farms. Now, the government was hard-pressed to actively search for ways to overcome the resistance and force-feed the power tillers to the rural populace.

The agricultural mechanization plan

On 24 May 1971, two cabinet-level ministers – Kim Po-hyŏn of MAF and Yi Nak-sŏn of the Ministry of Commerce and Industry – submitted a proposal titled 'Agricultural Mechanization Plan' to the Economic Ministers' Meeting. In order to implement the 5-year plan, the two ministers requested the allocation of 18.5 billion won to support the wider dissemination of power tillers and other agricultural machines. In the executive

summary, they outlined the background for the sudden change of pace. That year, the second Five-Year Economic Development Plan was concluded successfully, which led to substantial industrial development of the nation. A by-product of industrial growth was the increasing outflow of population from the rural to the urban areas. In 1968, the rural population began to decrease in absolute numbers for the first time since 1945. In the following year, more than 300,000 people migrated from the countryside to the cities in search of new opportunities in the growing manufacturing sectors. By 1971, the shortage of labor was gradually emerging as a serious problem.⁶¹ The government's renewed interest in agricultural mechanization was a desperate attempt to deal with the problems associated with the mass exodus.

As such, the 1971 plan was decidedly focused on the problem of labor shortage. The primary purposes of the plan, quite likely in the order of importance, were listed as follows:

- (1) Replace decreasing human labor with machines.
- (2) Increase productivity per man-hour.
- (3) Increase yield through timely cultivation.
- (4) Enhance utilization of land.
- (5) Improve soil quality.

The solution to all of the above, in the eyes of the proponents, was more power tillers. The plan would provide heavy financial assistance to both manufacturers and consumers, with the 5-year target figure of 43,740 machines by 1976. The total budget of 18.5 billion won would come from the government funds as well as international loans. These funds were to be funneled into a special NACF account, which would then be allocated to the beneficiaries across the country. The ultimate goal of the plan was to 'mechanize 450,000 hectares by 1976', which was more than one-third the total acreage of rice paddies at the time.⁶² The ambitious plan was immediately put into motion. The plan grew even more ambitious as it was being implemented. In November 1973, the First Secretary to the President for Economic Affairs reported the progress to the president. In this report, the target was raised to 100,000 power tillers by 1976, with the NACF providing a 225,000 won loan per machine at 9 percent interest to be repaid over 7 years.

In order to justify the concentrated public support on power tillers, the secretary effectively flipped the structural dilemma of power tillers on its head, relying on the Cold War sentiment of the early 1970s. Expressed in tabular form, he made the association of power tillers with optimized South Korean political and economic land-scape absolutely unmistakable. In the table, the agricultural mechanization efforts of South Korea, Japan and Taiwan were contrasted to those of North Korea. The former group of countries, where free farmers enjoyed private ownership of small plots of land in the free economy system, utilized the power tiller as the 'pivotal machine [*chungch'u kigye*]'. In North Korea, where farmers suffered from their serf-like status working in large-scale collectivized farms, the tractor was the technology of choice.⁶³ In this formulation, the dilemma was now characterized as an integral component of the 'free economy' system with small-scale farmers. The North Korean model may be effective for agricultural mechanization, but no sensible South Korean farmer would

			Pivotal machine		_
	Economic system	Land system	Machine	Ownership	Status of farmers
South Korea Japan Taiwan	Free economy	Private ownership (small-scale, cooperative)	Power tiller	Private ownership	Free farmers
North Korea	Controlled economy	State ownership (large-scale cultivation)	Tractor	State ownership	Serfdom (state-owned farms)

Table 1. Power tiller as 'pivotal machine' in South Korean agricultural mechanization.

Kyŏngje che-1, 'Nongch'on kigyehwa kyehoek [Rural Mechanization Plan],' November 1973, EA0005589 (1), National Archives of Korea.

want to fall into 'serf status' in a 'controlled economy', even if it promised an easy path for increased productivity. The inefficient use of powerful machines was a price that Korean farmers had to pay for maintaining the 'free economy' system and resisting the spread of communism (Table 1).

Despite the South Korean government's concerted effort to reframe the power tiller as a signature technology of modern, free societies, the farmers' 'utilization rate' of power tillers remained a prominent problem throughout the 1970s, as unprecedented numbers of them were released into the countryside but not purchased with any regularity by small farmers. In 1974, a newspaper editorial assessed that the government's agricultural mechanization program seemed to have 'hit a wall' - that the number of power tillers were nowhere close to the expected figures projected by the plan. The key problem was the low utilization rate of agricultural machines, leading to financial losses to the farmers who had faithfully followed the government's policy direction. According to the NACF report cited in the editorial, the 'appropriate acreage' for an eight-horsepower power tiller was 5.26 hectares, much higher than the ownership ceiling.⁶⁴ The government's hasty program of subsidized loans incentivized the small farmers to purchase power tillers. However, 'many of them [were] used much more for transportation' than for land tillage. This was the only way farmers could justify their investment on power tillers.⁶⁵ The tendency continued into the late 1970s, as revealed in a report prepared by the Agricultural Mechanization Research Institute in 1980. The researchers asked 278 sample farms across the country to record the daily use of power tillers for 1 year from April 1979 to March 1980. Through the survey, they discovered that the South Korean farmers used power tillers, on average, for 'only three hours' per workday. 'The low oprating [sic] hours are due to the increased number of power tiller [s] in the rural area', thanks to the government's efforts since 1971. Moreover, with the 'improved transportation system' in the countryside, their 'operating hours for transportation' have been reduced as well. The report recommended that manufacturers should produce more power tillers with smaller capacities.⁶⁶

By the end of the 1970s, then, the social and political meaning of the power tiller in South Korea had gone through another subtle change. During the first decade of its introduction, policymakers and commentators perceived it as an expensive piece of equipment that needed to be used to its full capacity. Anything less than that would be a gross waste of investment and was regarded as a problem to be fixed. Using power tillers for purposes other than land tillage would have been seen as heresy, subject to severe condemnation in the media and even on the floors of the National Assembly. By the end of the decade, however, the relatively sparse usage of power tillers for directly agricultural purposes came to be seen as somewhat problematic, but nonetheless acceptable. Their usage as transportation devices was acknowledged as a matter of fact, even in official reports. It was only through relaxing the expected role to be played by power tillers in agricultural practice that policymakers and farmers could justify their wider dissemination, as was promoted by the government, within the South Korean socioeconomic landscape in the 1970s. Therefore, the gradual shift in the meaning of technology was not merely due to the increased availability of the power tillers within the South Korean landscape; it was also a product of justifying the government's crash program for agricultural mechanization.

Concluding remarks

The Agricultural Mechanization Plan proposed in 1971 successfully catalyzed the use of power tillers by South Korean farmers. By the end of its campaign in 1976, there were 122,000 power tillers roaming the Korean countryside. The number continued to grow until as late as 1998, when it began to decline as power tillers were gradually replaced by tractors. In the process, power tillers came to occupy a special place in the Korean popular sentiment. Many Koreans fondly remember riding in the trailer of a power tiller rattling along narrow farm roads in the 1980s and 1990s. 'If one is poor', wrote the poet Kim Chong-hwan in his first collection of poems published in 1982, 'it is possible to meet this way. Riding on a rattling power tiller [kyŏngun'gi]. You from there, I from here. The burst of longing rushing across your deep wrinkles. The roll of dust dividing us like the 38th parallel.⁶⁷ The young poet, then in his late 20s, was using the power tiller as a metaphor to describe the caprice of youthful lovers. The usual components of the experience with the machine are evident: the loud noise and rattle of the engine, the imagery of the plowed rice paddies ('deep wrinkles') and the dust from the unpaved farm road on which it ran. Titled 'Riding the kyŏngun'gi', the poem nicely captures the growing popularity of the machine, as well as its acceptance as partly a transportation device (Figure 4).



Figure 4. Dissemination of power tillers in South Korea, 1961–2015. Source: Statistics Korea Portal.

The case of the power tiller in South Korea provides an opportunity to tell the history of technology from a non-innovation-centric perspective. As David Edgerton forcefully points out in The Shock of the Old, 'most places have no history of technology' if one only focuses on innovation and novelty.⁶⁸ The history of technology is much more than coming up with new things. Indeed, the story of the power tiller in East Asia was a continuous tale of adaptation, reverse engineering and tinkering to make technologies work under diverse environmental conditions as the global technology circuit gradually extended to traverse broader geographical areas. Similarly, the story of the power tiller in South Korea cannot be captured by the simplified narrative of linear development 'from imitation to innovation'.⁶⁹ The South Korean power tillers employed, and still employ, the basic design adopted from the Mitsubishi CT-83, which was adapted from the work of Japan's prewar farmer-inventors, who in turn tweaked the SIMAR garden tractor to suit their needs. Still, Taedong engineers were rightfully proud of their achievements when they managed to assemble the first 'Korean power tillers' in 1963 and export them to Vietnam in 1967. Through an examination of a relatively mundane technology in the periphery as it went through the latter part of its technological life cycle, we begin to recognize the formation of global connections as technologies move around the world.

A still broader historical question surrounds the use of power tillers in South Korea – that of the appropriate meaning of this technology. What uses would count as 'appropriate' reflects ideas held by those in charge of planning national agricultural and economic strategies, authorities committed to mechanization as an indicator of a free and progressive nation. Once power tillers were made widely available in South Korea, they had to fit into that vision – physically, rhetorically and culturally. This vision was not one necessarily shared by the intended end users of the tiller – these were smaller farmers accustomed to managing small holdings without the need to invest in cutting-edge machinery. Government proponents of modernization and mechanization ultimately found themselves accepting the adaptive, and often unintended, uses of the power tiller, to keep up the façade, if not the practices, of national modernization.

Sometimes new technologies turn out to be a natural fit with the socioeconomic landscape within which they enter. In other cases, they encounter difficulties and require some degree of mutual adjustment. For the power tiller, South Korea in the early 1960s provided a rather hostile environment - to consumers on the ground, at least. Nevertheless, policymakers of the Park regime, who had embraced the ideology of Cold War development, enlisted the power tillers as a symbolic ally for agricultural modernization as they attempted to transform the character of South Korean agriculture in the mid-1960s. In this way, technology and social reform came to form a circular logic: agricultural mechanization justified the necessity of land reform; and in turn, land reform served as a precondition for the efficient utilization of agricultural machines. Within this context, accepted notions of what a power tiller is and what it should do changed over time within the socioeconomic landscape of South Korea. Through extended negotiations among manufacturers, policymakers, and farmers, the power tiller gradually acquired its solid symbolic meaning in the South Korean psyche. In retrospect, we may call the South Korean experience of agricultural mechanization a success (as in the KSP report cited in the introduction), but it would be important to remember that retrospective labels may hide complex processes.

Notes

- 1. Olmstead and Rhode, Creating Abundance; idem, 'Reshaping the Landscape.'
- 2. Fitzgerald, *Every Farm a Factory*, 3. For a more succinct exposition, see idem, 'Beyond Tractors.'
- 3. Olmstead and Rhode, Creating Abundance, 8.
- 4. Latham, Modernization as Ideology; Cullather, The Hungry World.
- 5. Kim, Tae-ho. 'Making Miracle Rice.'
- 6. *Kyŏnghyang sinmun*, 11 October 1962; Shin, 'Land Reform in Korea'; Jang, 'Land Reform and Capitalist Development in Korea.'
- 7. This is a theme developed in Choi, 'The Social Construction of Imported Technologies.' For the usage of the term 'innovation' as 'creation of the new' in the earlier stages of technological life cycles, see Russell and Vinsel, 'After Innovation, Turn to Maintenance,' 4.
- 8. Yun and Kim, 2012 Modularization of Korea's Development Experience, 181–182. For an analysis of the Knowledge Sharing Program, see Doucette and Müller, 'Exporting the Saemaul Spirit.'
- 9. Langmore, 'Howard, Arthur Clifford (1893-1971).'
- 10. Hooijberg, 'Konrad von Meyenburg'; Pitts and Park, 'Effects of Rototiller Adoption,' 2, copy courtesy of David Nemeth.
- 11. In the United States, the most well-known models included the Midwest Utilitor (Midwest Engine Company, Indianapolis) and Beeman (New Beeman Tractor Company, Minneapolis). 'Old Iron Garden Tractors.'
- 12. Matsumoto, Technology Gatekeepers for War and Peace, 16–19; Lynn, How Japan Innovates.
- 13. Note that the Japan's Ministry of Agriculture did not consider the Fordson tractor, which was already quite popular not only in the United States, but also in England and the Soviet Union.
- 14. Kako, 'Development of the Farm Machinery Industry in Japan,' 157; Wada, *Kōunki tanjo*, 69–107.
- 15. Hirose is regarded as a kind of folk hero in his hometown of Hakusan. Hakusan City, 'Hirose Yokichi.'
- 16. Kako, 'Development of the Farm Machinery Industry in Japan,' 158, 164.
- 17. Tonga ilbo, 4 February 1938, 6.
- 18. Horio, 'Nōgyō, ringyō, gyogyō,' 322.
- 19. Takashi Nishiyama, Engineering War and Peace in Modern Japan, 1868-1964.
- 20. Kako, 'Development of the Farm Machinery Industry in Japan,' 164-166.
- 21. Hall, 'Hand-Tractors in Japanese Paddy Fields.'
- 22. Ibid, 320.
- 23. Pak, Wönhyönggwa pyönyong.
- 24. Pitts and Park, 'Effects of Rototiller Adoption,' 2-3.
- 25. Pitts, 'Sliding Sideways into Geography,' 269. For more details on the activities of Pitts in Japan and South Korea, see Fujihara, *Torakutā no sekaishi*, 197–199; Sensui, 'Amerikajin chirigakusha ni yoru reisenki Higashi Ajia no firudo chōsa.'
- 26. Pitts and Park, 'Effects of Rototiller Adoption,' 1.
- 27. Tonga ilbo, 20 August 1960, 2.
- 28. Kyŏnghyang sinmun, 15 February 1962, 1; Tonga ilbo, 16 February 1962.
- 29. Lee, 'The Countryside,' 347.
- 30. Eckert, Park Chung Hee and Modern Korea.
- 31. Taedong samsibonyŏnsa p'yŏnch'an wiwŏnhoe ed., *Taedong samsibonyŏnsa*, 137, 151. (Hereafter cited as *Taedong samsibonyŏnsa*.)
- 32. Ibid, 149.
- 33. Kim, Kigongilsaeng, 100-101.
- 34. *Taedong samsibonyŏnsa*, 157–158, 277. Mitsubishi was also initially reluctant to entertain Taedong's request, citing the lack of formal diplomatic ties between South Korea and

Japan as an excuse. According to the official company history, Kim roared to the Mitsubishi representative: 'How can a great company like Mitsubishi not see that the normalization of diplomatic relations between South Korea and Japan is imminent? You need to have foresight!'.

- 35. Ibid, 183–185. The Mitsubishi-Taedong agreement was reported in *Tonga ilbo*, 3 January 1963. The article claims that only 60 percent of the total number of parts would be imported.
- 36. Nongsusanbu, Han'guk nongŏpkigyehwa paltal kwajŏng, 160–162. (Hereafter cited as Han'guk nongŏpkigyehwa.)
- 37. Mitsubishi began to place advertisements for its power tillers in South Korean newspapers as early as June 1962, around the time when it was beginning to negotiate the technology licensing agreement with Taedong, with the catchphrase 'The Way to Increase Yield!' The ad listed Sin Asea Corporation as Mitsubishi's local sales agent. *Tonga ilbo*, 17 June 1962. After the release of the first Taedong products in March 1963, Taedong Industries was listed prominently as Mitsubishi's partner. *Tonga ilbo*, 25 May 1963.
- 38. Taedong samsibonyŏnsa, 191.
- 39. Han'guk nongŏpkigyehwa, 163-165.
- 40. Brazinsky, 'From Pupil to Model,' 109-110.
- 41. In May 1966, the Vietnamese embassy in South Korea sent a request to the Korea Ministry of Commerce and Industry for information on production capacities, specifications, and prices of power tillers, power sprayers, and water pumps. *Maeil kyŏngje*, 9 May 1967, 4.
- 42. Maeil kyŏngje, 4 August 1967, 4.
- 43. *Taedong samsibonyŏnsa*, 180. Taedong was not entering a blank slate in South Vietnam. As historian David Biggs points out, there was a 'post-1960 explosion in the use of small motors,' some of which were power tillers imported from Japan. See Biggs, 'Small Machines in the Garden.'
- 44. Taedong samsibonyŏnsa, 474-484.
- 45. Ibid, 191.
- 46. According to the sociologist Yong-Ha Shin, the Land Reform Act of 1950 'fundamentally changed the whole structure of Korean rural community' by abolishing the 'land tenure system and parasitic absentee landlords.' Shin, 'Land Reform in Korea,' 27–28.
- 47. Han'guk nongŏpkigyehwa, 165.
- 48. Ibid, 327.
- 49. *Maeil kyŏngje*, 20 June 1966, 4; *Han'guk nongŏpkigyehwa*, 253. Annual income per rural household in 1967 was 149,500 won. The gap between the power tiller price and annual household income would shrink during the next few years, and income would eventually catch up with the price in 1972.
- 50. Kyönghyang sinmun, 15 February 1965, 2; Han'guk nongŏpkigyehwa, 187.
- 51. Taedong samsibonyŏnsa, 255.
- 52. Han'guk nongŏpkigyehwa, 260–261.
- 53. Cho, '1960yŏndae nongŏpkujo kaehyŏngnonŭiwa kŭ hamŭi.'
- 54. See, for example, *Kyŏnghyang sinmun*, 2 May 1966, 2; *Tonga ilbo*, 25 December 1968, 2; *Maeil kyŏngje*, 28 October 1969, 3.
- 55. *Maeil kyŏngje*, 28 October 1969, 3. Note that the estimated work capacity of power tillers have shrunk significantly from the 120–160 hectares figure assessed by the AEUI engineers in 1966. The order-of-magnitude discrepancy speaks volumes to the inherent arbitrariness of determining the proper 'work capacity' of power tillers. Nevertheless, it is noteworthy that both figures are well above the 3 hectares landownership ceiling.
- 56. Han'guk kwahakkisul yŏn'guso, Sŏgi 2000yŏnŭi Han'guge kwanhan chosa yŏn'gu, 31. Emphasis added.
- 57. Cho and Hwang, 'Nongŏpkujojojŏngŭi chwajŏlgwa sodŭkchŏngch'aegŭroŭi chŏnhwan.'
- 58. Kyŏnghyang sinmun, 1 June 1967, 4.
- 59. *Kyŏnghyang sinmun*, 22 June 1968, 1. As Ronald Kline and Trevor Pinch have shown, users of technologies frequently appropriate technologies for purposes not intended by their

producers. Although in the case of the power tiller, users were not involved in 'shap[ing] the artifact or system itself.' See Kline and Pinch, 'Users as Agents of Technological Change.'

- 60. Nongnimbu Nongŏp kyŏngyŏng yŏn'guso, 'Nongŏpkigyehwae kwanhan yŏn'gu,' 65. See also *Tonga ilbo*, 26 March 1971, 3, in which the journalist noted that 'a portion of the power tillers flowed into the hands of coal briquette dealers or cement businessmen through brokers.'
- 61. 'Nongŏp kigyehwa kyehoek.'
- 62. Ibid.
- 63. Kyŏngje che-1, 'Nongch'on kigyehwa kyehoek.'
- 64. Maeil kyŏngje, 26 March 1974, 3.
- 65. Maeil kyŏngje, 21 June 1974, 7.
- 66. Nongop kigyehwa yon'guso, 'Tongnyok kyongun'gi iyonge kwanhan chosa yon'gu,' 94.
- 67. Kim Chŏng-hwan, 'Kyŏngun'girŭl t'ago.'
- 68. Edgerton, The Shock of the Old, xiii.
- 69. The classic account is Kim, Imitation to Innovation.

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ORCID

Hyungsub Choi D http://orcid.org/0000-0002-0664-7097

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Development Model in the 1950s-60s], edited by Kong J.-U. and Cho S.-K., 259–298. Paju: Hanul, 2005.

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