

International Transfer of Tacit Knowledge: The Transmission of Shipbuilding Skills from Scotland to South Korea in the Early 1970s

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This article analyzes the transfer of tacit knowledge between countries and continents, based on a case from the shipbuilding

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industry. The South Korean shipbuilder Hyundai Heavy Industries (HHI) was established in the early 1970s and had by the late 1980s become the world's leading shipbuilder. Aided by foreign loan capital, HHI acquired technology through foreign licenses and imported equipment. However, shipbuilding is about more than hardware. This article presents and analyzes another important means of knowledge transfer: the acquisition of tacit knowledge in the form of shipbuilding skills, including shipyard processes and operations. This transfer was mainly accomplished through the "import" of foreign managers and the dispatch abroad of South Korean employees. One important element, which we investigate in detail, was the Korean personnel that HHI sent in 1972 to the Scott Lithgow shipyards in Scotland to observe and learn. Based on archival sources and interviews, we detail the manner in which tacit knowledge could be transferred across language and cultural barriers.

Introduction

The aim of this article is to analyze the transfers of tacit knowledge between countries and continents. Using a case study from the shipbuilding industry—the establishment of Hyundai Heavy Industries (HHI), the first internationally competitive shipyard in South Korea—we show the important role of personnel sent abroad. Around 1970 the market for new ships was dominated by Japan and European countries, and the tonnage exported from South Korea was negligible. Fifteen years later, South Korea was the world's largest shipbuilding nation, and HHI the leading shipbuilder. How did South Korean shipyards learn the tricks of the trade so rapidly?

The shift and spread of manufacturing production to and within Asia has been one of the most important developments in the world economy since World War II. Much of the debate about the basis for "the East Asian miracles" has focused on the relative importance of productivity and factor accumulation, as well as the role of industrial policy. The question of how the technological gap was closed has received less attention.¹

Japan and, subsequently, the East Asian "tigers" and China have managed to gain substantial market shares within several manufacturing industry segments: textiles, steel, consumer electronics, and automotive products. However, the first major industry in which the East

1. On the discussion of the East Asian growth "miracles," see World Bank, *The East Asian Miracle*, and the six articles in the special issue of *World Development*, 22, no. 4 (1994): 615–670. Focus for the report was the first- and second-generation "Asian tigers": Hong Kong, Singapore, South Korea, and Taiwan, and Indonesia, Malaysia, and Thailand, respectively.

Asian countries became globally “dominant”—with more than half of the world market—was shipbuilding. This was originally a Japanese, not a “pan-Asian,” endeavor; shipbuilding increased rapidly in Japan in the first postwar decades, and in 1956 the country replaced the United Kingdom as the leading nation in terms of tonnage launched. The country then steadily increased its market share and by 1975 had amassed a 50 percent share of world shipbuilding completions.² Japan’s only serious competitors were South Korea from the 1980s and China after 1990.

Following the oil price hikes of 1973–1974 and the consequent shipping crises of the mid-1970s, the demand for large crude oil tankers temporarily collapsed. As a result, over the next ten years many European yards closed and high-volume shipbuilding practically disappeared from Europe. In 1970 British shipyards produced almost 700 times more tonnage than the small, domestically oriented yards in South Korea. Five years later, after HHI had established South Korea’s first internationally competitive yard in Ulsan and rapidly increased output, production in Great Britain was still three times higher. This was soon to change. By 1985 the tonnage produced in South Korea was fifteen times larger than what British yards produced, while HHI alone completed ten times as much tonnage as all the British shipbuilders put together.³

This picture remains unchanged today. In 2015 South Korea received more than a third of all new shipbuilding contracts, while China and Japan each received slightly less than 30 percent, implying that more than 90 percent of all shipbuilding contracts went to those three countries.⁴ The case of shipbuilding is therefore a good example of the manner in which market shares within manufacturing moved from Europe to Asia.

The aim of this article is to establish how HHI transferred shipbuilding skills from Europe to newly industrializing South Korea in connection with the establishment of the first large-scale shipyard in the country. In 1970, Ulsan was a small inconsequential fishing village and no shipbuilding facilities existed there. However, by the middle of the 1980s, HHI’s Ulsan shipyard had become the world’s largest, a position it still holds. This article presents the early history of HHI, with emphasis on the personnel who traveled to Europe to acquire the technical and practical know-how that was necessary to establish and operate a world-class shipyard.

2. Percentage from Todd, *Industrial Dislocation*, 71.

3. See Figure 1 for sources.

4. Calculated on the basis of deadweight ton data from Clarksons *Shipping Intelligence Network* (<https://sin.clarksons.net>) series 51626, 51635, 51643, and 51645.

The construction arm of the Hyundai conglomerate had long experience in civil engineering projects, such that building a greenfield shipyard was well within its sphere of expertise. However, in the case of shipbuilding, specific knowledge was mostly lacking. HHI partly solved this by bringing in some engineers from South Korea's only shipyard of note, Korea Shipbuilding and Engineering Company (KSEC) at Busan, a yard that had only built comparatively small ships, focusing on the home market.⁵ While KSEC had no experience of projects of this size, it was familiar with some of the technology and processes. To put the scale of the new plans in perspective: Before 1972 the existing shipyards in South Korea had never produced more than 43,000 gross register tons in a single year. From the outset, HHI was designed to produce more than 700,000 gross register tons annually.

Hyundai's founder and entrepreneurial chairman, Chung Ju-yung (1915–2001), realized that Hyundai needed to learn from foreign experience by assimilating bought-in technology and utilizing international expertise. The aim was to avoid many, if not all, of the inevitable pitfalls of “learning by doing,” an iterative process wherein prior mistakes are not repeated. Shipbuilding is a material-intensive assembly industry, and such mistakes would be inherently costly.⁶ Chung Ju-yung was, in many respects, a classic entrepreneur from a poor background who went on, after many trials and tribulations, to establish a world leader conglomerate in construction, engineering, motor cars, and shipbuilding.⁷

Theories on knowledge transfer often make a distinction between codified (explicit) knowledge and tacit knowledge.⁸ The difference between the two types of knowledge is not necessarily clear-cut, and there has been considerable debate about their definition and application.⁹ While codified knowledge typically is easily transferable because it is documented, organized, and accessible, tacit knowledge is mainly

5. A more correct romanization of the name is Daehan Shipbuilding and Engineering Company, but we use KSEC, as that is the initialization that is most commonly used in the international literature.

6. The classic exposition of this is Rapping, “Learning and World War II,” 81–86. The man-hour index for work required to build American Liberty ships to a British design more than halved between December 1941 and December 1944. A notable feat, as 97 percent of labor used had no prior experience of shipbuilding.

7. For this, see, Kirk, *Korean Dynasty*; Steers, *Made in Korea*. Both American authors relied heavily on Chung Ju-Yung's recollections.

8. Refer to the classic works by Michael Polanyi, *Personal Knowledge* and *The Tacit Dimension*. Codified knowledge is sometimes referred to as *explicit* or *formal* knowledge.

9. See, for instance, the debate some fifteen years ago: Cowan, David, and Foray, “The Explicit Economics”; Johnson, Lorenz, and Lundvall, “Why All This Fuss.”

transferred through observation, demonstration, practice, and hands-on experience.

It is evident that Chung was aware of the need to supplement codified knowledge by tacit knowledge when establishing the new shipyard facilities. He realized that it would be virtually impossible to conduct the production work in the shipyard only with the acquisition of codified knowledge, such as design templates and manuals. Although technology and codified knowledge are necessary for building ships, “knowledge in the shipbuilding industry is mostly tacit knowledge and highly based on individuals’ experience and perceptions.”¹⁰

This aspect has important implications for knowledge transfer within shipbuilding. The fact that tacit knowledge tends to be context specific makes it more difficult to diffuse than other types of knowledge. This leads to “stickiness,” as the tacit knowledge must be verbalized within its original context before it can be transferred to other people and, ultimately, other contexts.¹¹ Consequently, with a two-step transfer process, there are more potential barriers or restraints, and thus additional factors that can impede or reduce the quality of the transfer.

A recent case study from the shipbuilding industry suggests that tacit knowledge tends to be “deeply embedded in individuals or companies and is often difficult to articulate, it tends to diffuse slowly, and only with effort and the transfer of people.”¹² This was undoubtedly the case in the early 1970s as well, and international exchange of personnel came to play a key role in the establishment of the Hyundai yard. Foreign managers were transferred to South Korea, and South Korean personnel were sent abroad to learn.

In 1972 two groups of employees from the Hyundai Construction Company traveled to the shipbuilding towns of Greenock and Port Glasgow on the lower Clyde in Scotland, where they would be spending the next twenty-three weeks. The employees came from various backgrounds but had one common aim: to learn how to build oil tankers of 250,000 deadweight tons (dwt) and above, so-called very large crude carriers (VLCCs), and to get a better understanding of how to organize production in a shipyard. Based on archival material from Scotland and South Korea, as well as interviews with some of the Korean and British participants, this article provides information about the personnel who received training in Scotland, the way training was organized, and the means by which the knowledge was transferred back to South Korea.

The South Korean archival sources about the early days of Hyundai yard and the knowledge transfer from the United Kingdom are very

10. Solli-Sæther & Karlsen, “Knowledge Transfer in Shipbuilding Projects,” 257.

11. Rørvik, “Knowledge Transfer as Translation,” 295.

12. McGaughey, Liesch, and Poulson, “An Unconventional Approach,” 14.

limited. Our main primary source has therefore been the Scott Lithgow archives at the Business Archive Centre, University of Glasgow. This archive contains internal and external correspondence with regard to the South Korean visit. The archival information has been complemented by five additional sources. First, the authors have conducted one lengthy interview with Jeong Je Kim, professor emeritus in the Department of Naval Architecture of Ulsan University, who was part of the first cohort to visit Greenock. Second, we have circulated a questionnaire among some of the surviving participants and received four answers. Third, we have used information from a contemporary interview with three of the Korean workers in the Scott Lithgow company magazine, which sheds light on their stay there. Fourth, Hwang's *Let There Be a Yard*—an autobiography by one of the participants—has been used to gather information about the stay in Scotland. Finally, in addition to these South Korean sources, we have used the recollections of five non-Korean observers.

The Korean shipyard workers who went to Scotland were an all-male group, all of whom had completed higher education, usually within engineering. Their backgrounds varied; some had experience from other smaller Korean shipyards, while some had worked on different types of projects in other parts of the Hyundai Construction Company group. After working full days alongside their Scottish colleagues at the Scott Lithgow shipyards and associated marine-engine building works, the Koreans retreated to a rented boarding house in Greenock, where they processed the day's work.¹³ This included preparing documentation and reports for their colleagues who were simultaneously building the shipyard facilities and the first VLCC in South Korea. In addition, a large up-to-date Xerox copying machine was purchased to photocopy technical plans and work schedules daily—a classic example of distribution of codified knowledge.¹⁴ Local management drily joked that such was the copier's overuse that the town's power supply was frequently interrupted.¹⁵

13. For the history of Scott Lithgow, see Johnman and Murphy, *Scott Lithgow*. Before Scott's (Greenock) and Lithgows (Port Glasgow) merged in 1970, Scott's had its own engine works, which built slow-speed main marine diesel engines to Swiss Sulzer designs. Lithgows relied on J. Kincaid of Greenock (in which they had a major shareholding) for their slow-speed main marine diesel engines of Danish Burmeister & Wain design. Hyundai would go on to acquire licenses to produce both of these engine types.

14. Personal communication from Roger Vaughan, APAI, August 18, 2018. The Koreans copied everything.

15. Interview with Roy Metcalfe, naval architect, formerly with British Shipbuilders Plc, October 10, 2016. This is obviously an exaggeration, but it is one of the few instances in which our British interviewees reveal skepticism concerning the work done by the Koreans.

In addition to presenting the workers and the manner in which their learning was organized, we address two elements of knowledge transmission. The first is the practical side: How were the skills transferred between workers who had little common language and thus had potential difficulties communicating? The second is the social side: How was life in Scotland perceived by this somewhat “unusual” group of expats?

Shipbuilding and Economic Development in South Korea

Shipbuilding played a crucial role in the industrialization efforts of Japan, South Korea, and China.¹⁶ The industry’s backward linkages to steel production and easy access to export markets implied that shipbuilding became a favored part of public policy.¹⁷ Shin and Ciccantell refer to steel production and shipbuilding as “generative sectors.”¹⁸ These were at the center of the modernization of South Korea and functioned as models for firms and for state–firm relations in other sectors. When the partly state-owned Pohang Iron & Steel Company (POSCO) steel mill commenced production in 1973, deliveries to shipbuilders were intended to be one way to ensure efficient use of the output.¹⁹

When deciding on Ulsan’s Mipo Bay as the site for the Hyundai yard, “easy access to various raw materials, domestic and imported, especially to Pohang Iron and Steel Company, Limited,” was listed as one of the four main reasons for the location. The other elements were

16. The transformation of the global shipbuilding industry is the twentieth century is eminently discussed in Todd, *Industrial Dislocation*; for a concise update, see Todd, “Going East,” 259–271. For individual country developments, the best contributions in English are Chida and Davies, *The Japanese Shipping and Shipbuilding Industries* (on Japan); Amsden, *Asia’s Next Giant* (on South Korea). Bruno and Tenold, “The Basis for South Korea’s Growth,” provide a concise presentation of the early internationalization of the South Korean industry; Song, “Growth and Technological Development,” gives a basic introduction to the technological development. See also Sohn, Chang, and Song, “Technological Catching-Up”; Murphy, “China, Philippines, Singapore, Taiwan and Vietnam.”

17. See, for instance, Yülek, “On the Middle-Income Trap,” 344. In a full-page advertorial in the *New York Times*, with the heading “Upsurge in Economy Near-Miraculous,” the shipbuilding industry is singled out, with one of the Greek ships being built at the Hyundai yard pictured. *New York Times*, November 4, 1973, 8.

18. Shin and Ciccantell, “The Steel and Shipbuilding Industries,” 171–172.

19. Woronoff, *Asia’s Miracle Economies*, 110. On the development of manufacturing in South Korea, see also Kim, *Imitation to Innovation*, and specifically for a concise discussion of technological learning, Kim, “The Dynamics.” However, HHI had to use Japanese steel plate on its first two VLCCs, as POSCO had not yet come on stream.

favorable climate, the availability of an abundant labor force, and “optimum conditions in terms of harbour, soil and ground.”²⁰

Hyundai purchased the site with its own funds and covered the costs for moving expenses and rehousing of the local citizenry. A quay, dock, fabrication shed, administrative office, and steel stockyard were built in succession. Two building docks with 700,000 dwt capacity each were built, straddled by Goliath cranes, and a 700 meter breakwater to protect the shipyard in inclement weather was begun in March 1973. In addition to construction projects, Hyundai was already involved in the manufacture of motor vehicles and would later incorporate ship repair in 1975 (Hyundai Mipo Dockyard—a joint venture with Kawasaki Heavy Industries) and marine-engine building in 1978 (under foreign license) in tandem with their shipbuilding facilities.

Shipbuilding was one of the strategic industries targeted by the Korean authorities in the third and fourth five-year plans (1972–1976 and 1977–1981). Although this government encouragement was important, for instance, in connection with access to foreign finance, it was far from sufficient for the successful growth and competitiveness of the industry. South Korea’s attempt at penetrating the highly competitive international market for ships depended upon the ability to acquire industry-specific skills in addition to technology and customers. As in other areas of economic development, the Koreans took a leaf out of the Japanese book.

In connection with the build-up of shipbuilding competence and capacity in Japan in the late nineteenth century, missions abroad, whereby Japanese personnel received training, played an important role: “The aim of overseas missions evolved from general inspection of the foreign shipbuilding industry to searching for technologies to import and training in the technologies imported under license agreements.” Such “missions abroad were often sent for the purpose of having engineers and workers trained in technologies being imported”—a practice followed both during the establishment of Japanese shipbuilding in the late nineteenth century and its modernization after World War II.²¹ For Japanese shipbuilders, missions abroad complemented licensing contracts when technology was imported. In the 1970s, South Korean business groups followed the same *modus operandi*, spearheaded by Hyundai for its shipyard facilities in Ulsan.

20. Undated 1976 press release titled “Ulsan Shipyard,” by Hyundai Construction Company, Ltd., Scott Lithgow Papers, GD 323/13/3/14, University of Glasgow, Business Archive Centre (hereafter, UGBAC). See also Choi and Glassman, “A Geopolitical Economy.”

21. Fukasaku, *Technology and Industrial Development*, 55, 73; see also Chida and Davies, *The Japanese Shipping and Shipbuilding Industries*; Arima “The Western Influence.”

Hyundai's renowned founder, Chung Ju-yung, had identified the shipbuilding industry as a sector in which South Korea might have a comparative advantage, particularly due to low labor costs. This coincided well with the overall industrial policies in South Korea but necessitated foreign involvement. In the late 1960s, Chung had discussed possible joint ventures with Japanese and Norwegian shipbuilders, but these discussions came to nothing.²² In 1969 the Akasawa report, written by a team of Japanese experts, recommended that Japanese shipbuilders should refrain from cooperating with South Korean yards, as building large ships in that country would be unlikely to be viable.²³

Chung nevertheless decided to change the manner of technology acquisition from joint ventures, where he would have had less control, to licensing. This was a move that was better aligned with the main political directives for the financing of Korean industrialization.²⁴ He entered into negotiations with a West German yard, A.G. Weser, but their high price for ship design and consultation, combined with a demand for a 5 percent commission on future contracts, scuppered the deal.²⁵ The solution, however, was found in the sunset shipbuilding nation par excellence, the United Kingdom.²⁶

22. The history of the first twenty-five years of HHI was published as *Traditions of Excellence: Hyundai Shipyard, Yesterday and Today, a Quarter Century of Unparalleled Achievement in Shipbuilding* (Ulsan, 1998; rev. ed., 1999). A more extensive version in Korean is *Hyundai Joonggongopsa* [History of Hyundai Heavy Industries] (Ulsan, 1992). For the growth of Ulsan as a manufacturing center and Hyundai's role in this development, see Lim, "Urbanization, Production System and the Labour Movement." On the failed Norwegian and Japanese joint ventures, see Kang et al., "Old Methods Versus New."

23. See O, "Construction of the Shipbuilding Industry," 82, in which it is claimed that the Japanese were willing to help establish yards if the size of the ships that they could build was limited to 50,000–60,000 dwt, but that this was rejected by the Koreans. O provides a very interesting inside view of the many abortive attempts at establishing the industry, the periodic obstruction from Japanese competitors, and the eventual success of South Korean shipbuilding. Wonchol O was chief economic advisor to President Park during the period in question and perhaps the most important bureaucrat in the country.

24. Absorbing and internalizing knowledge by means of foreign licenses combined with foreign personnel became the dominant form in the 1970s, particularly for the strong business groups; see Amsden, *Asia's Next Giant*; Hagemeister, "The Four Largest South Korean Business Groups," 67–68; Wright and Kwon, "Business Crisis and Management Fashion." The number of new licenses for foreign technology in South Korean shipbuilding increased markedly, from 0 (1962–1966) to one (1967–1971) and ten (1972–1976) to twenty-six (1977–1980). As a percentage of all licenses, shipbuilding accounted for 0.35, 2.3, and 2.7 percent, respectively; calculated on the basis of data in Lee, "Technological Dependence," 78.

25. *Hyundai Joonggongopsa* [History of Hyundai Heavy Industries], 362.

26. For the British shipbuilding industry, see Johnman and Murphy, *Scott Lithgow*.

The British Connection

In March 1971 Hyundai established an office in London. Here, Chung met with Charles Brook Longbottom, a former Conservative Party member of Parliament with considerable influence in British shipping circles. One of Longbottom's positions was chairman of the board of A&P Appledore International Ltd. (APAI), a recently formed company specializing in shipyard design and shipbuilding consultancy.²⁷ APAI offered Hyundai a "package" including market research, marketing, project development, design and engineering of a shipyard, development and implementation of production systems, and training of personnel and recruitment of foreign management.²⁸ APAI also secured the rights to exclusive export sales representation for the first twelve Hyundai vessels at a 0.5 percent commission.²⁹

Established in January 1971, APAI did not even have its own office facilities when the discussions with Chung began.³⁰ Moreover, as APAI's skill set was not fully compatible with Hyundai's desire to build VLCCs, management contended that they needed someone to "fill a gap in our expertise."³¹ Only three yards in the United Kingdom—Harland & Wolff in Belfast, Swan Hunter on the Tyne, and Scott Lithgow on the Clyde—had the capacity to build tankers larger than 250,000 dwt. APAI therefore "outsourced" the ship design and personnel training part of the agreement to Scott Lithgow Ltd., and the contract also included the drawings and specifications for a 260,000 dwt VLCC of a kind that was currently under construction in Scotland. Having lost money on similar projects before, the Scottish company was initially apprehensive, but

27. APAI was established in January 1971. The company's name came from two British yards that were indirectly involved on the ownership side: Austin & Pickersgill of Sunderland and Appledore Shipbuilders of Devon. The Court Line conglomerate, which owned Appledore, held half of the company's shares, while London & Overseas Freighters, owners of Austin & Pickersgill, held 45 percent of the shares; see Craggs, Murphy, and Vaughan, "A Shipbuilding Consultancy."

28. Agreement, September 10, 1971, and sales agreement, September 24, 1971, Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

29. The agreement is mentioned in Amsden, *Asia's Next Giant* (276), however, she erroneously refers to A&P Appledore as a Scottish naval architecture firm and refers to the yard as "Scotlithgow." Unfortunately, these mistakes are often repeated in subsequent publications; see for instance Jonsson, *Shipbuilding in South Korea*, 80–81; Golant, "The State, Culture and Organizational Learning," 243.

30. A&P Appledore International Ltd. had a small space in the Court Line office at 9 Thayer Street in London's Marylebone; personal communication from Michael Makin, APAI Company secretary, September 26, 2014.

31. Letter from Anthony Mackesy to Alexander Ross Belch, September 30, 1971, Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

decided to enter a “loose-knit non-binding association” with APAI.³² At that stage, Scott Lithgow had already completed *Gold Star*, a 136,867 dwt oil tanker for the Korean Samyang Navigation Company of Incheon, with a sister vessel, *King Star*, near to launching. The contractual details and negotiations for both had been exhausting and protracted, particularly with respect to legal and payment terms, which explains Scott Lithgow’s initial apprehension.³³

On September 10, 1971, Chung and Longbottom signed the “technical assistance” agreement, with Scott Lithgow’s managing director Alexander Ross Belch as witness. That month, Chung also visited the Scott Lithgow facilities.³⁴ After returning to South Korea, he met with the “government authorities concerned and fully explained to them about the contents” of the agreements, to which the “government authorities expressed an affirmative reaction in general.” The final, formal approval, however, was not as uncomplicated as Chung had anticipated, because the Korean authorities wanted the foreign loan agreements submitted at the same time as the project plans.³⁵

Longbottom and APAI helped to arrange a US\$14.4 million loan from Barclays Bank in the United Kingdom and assisted Hyundai in its negotiations with the British Export Credit Guarantee Department (ECGD).³⁶ This was a crucial part of the agreement, and one that APAI took very seriously. If no publicly guaranteed financing from the United Kingdom was available, there could be no deal, as Chung would not be able to obtain the necessary licenses in South Korea. Based on previous experience, APAI was fully aware that the question of export guarantees could be a deal breaker. The company had previously tried to arrange a similar project with South American interests, but a “remarkable credit deal” from Norway and delays in the ECGD legal department had resulted in the loss of the contract.³⁷

32. Internal memorandum from H. M. Currie to Alexander Ross Belch, May 21, 1971, and letter from Alexander Ross Belch to Anthony Mackesy, June 19, 1971, Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

33. Johnman and Murphy, *Scott Lithgow*, 192. The order had been prematurely announced in May 1967.

34. Letter from Chung Ju-Yung to Alexander Ross Belch, September 30, 1971, Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

35. Chung Ju-Yung to Mackesy & Nash, September 28, 1971 (5818), Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

36. Letter from Joon Shik Kim to Peter Nash of APAI, November 27, 1971, Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

37. Letter from Anthony Mackesy of APAI to Ross Belch, June 1, 1971, Scott Lithgow Papers, GD 323/13/3/17, UGBAC; and letter from Peter Nash of APAI to John Lee of Scott’s Shipbuilding & Engineering Co. Ltd., April 17, 1971, Scott Lithgow Papers, GD 323/13/3/16, UGBAC. Nash referred to the situation as being “pipped on the post in Peru.”

In addition to the British funding, Chung ensured foreign financing by linking purchases of equipment for the shipyard to credit provided in other European countries that were eager to export machinery. In the beginning of December 1971, the 62nd Foreign Capital Inducement Committee approved more than US\$50 million of loan agreements between Hyundai and “lenders of Spain, France, West Germany and the United Kingdom.”³⁸ The committee simultaneously approved the technical assistance agreement between APAI and Hyundai.

By the beginning of 1972, Hyundai had entered into agreements about technical assistance, foreign funding, and shipyard equipment purchases. This last included cranes from West Germany; boilers, pumps, and presses from the United Kingdom; jib cranes and gas cutting machines from France; automatic welding machines and Stal Laval turbines from Sweden; and ordinary welding machines from Spain.³⁹ The company had also managed to sign crucial newbuilding contracts with a Greek shipowner, George Livanos, for two VLCCs of the Scott Lithgow design at a purchase price of US\$30,950,000 each.⁴⁰ The company’s plans were ambitious—the tankers would be more than ten times larger than any ship previously built in South Korea and the shipyard would be constructed at the same time as the first vessels were being built. Moreover, although Hyundai had a “Shipyard Project Department,” the excavation of the shipbuilding facilities and the training of key personnel had not yet begun.

The technology purchased abroad ensured that Hyundai had the technical foundation needed for the establishment of the yard. The technology in some ways embodied the codified knowledge, through technical communication documents such as manuals, user guides, and instructions. However, while the company had been able to obtain the machinery needed to construct ships, the workforce lacked any practical experience in building large vessels. This tacit knowledge was also “imported” to South Korea, partly through the employment

38. Translated copy of letter from the Economic Planning Board of the Republic of Korea, December 20, 1971, Scott Lithgow Papers, GD 323/13/3/17, UGBAC; and Ministry of Finance Files No. BA0148148 on Hyundai Construction Company’s international loans, 1972, National Archives of Korea. Figures are those approved by the Korean government in December 1971. In March 1972 another loan of more than US\$2 million from Sweden was approved. For an overview of the foreign purchases, see Kang et al., “Old Methods Versus New,” 89. McWiggins, “Sunrise in the East” (220) writes about the loan, but misses the point that this was all linked to purchase of equipment; see also Bae, “Shipbuilding Technology Development.”

39. *Traditions of Excellence*, 1999, 51.

40. Memorandum of agreement between Hyundai Construction Company and North Ocean Shipping Co., Ltd., of Monrovia, Liberia, February 2, 1972, Hyundai Museum Archive, Ulsan shipyard.

of foreign expertise, but primarily through the training of South Korean workers abroad.

The Training Program

The original plan, as outlined in the agreement between APAI and Hyundai, was that “two groups of thirty will be trained and each group will be in our establishment [Scott Lithgow] for approximately six months.”⁴¹ Hyundai would cover all expenses in connection with the training, and the instruction would not begin before Hyundai had paid the first installment to Scott Lithgow via APAI.⁴²

In the early spring of 1972, Hyundai rented a guesthouse that could accommodate twenty members of their party plus a female Korean cook; the remainder were put up in hotels and private accommodations around Greenock.⁴³ As late as March 24—the day after ground had been broken at the yard in Ulsan—the Scottish yard did not know when the Koreans would be arriving, only that they had booked the guest house as of April 1.⁴⁴ Twenty Koreans arrived on April 10, 1972, with an additional seven arriving at various times during the next four weeks. The second cohort started progressively from the beginning of October.⁴⁵

The training schedule that Scott Lithgow arranged for the Koreans was originally intended to provide facilities for training twenty middle managers and thirty-four foremen. The training was included as part of the “design package” that the Koreans had bought.⁴⁶ In the end, a training program was developed for sixty Koreans, whereby they would be allocated to specific departments, with each receiving training for up to twenty-six weeks. [Table 1](#) details the areas in which the various employees would work.

41. Internal memorandum from H. M. Currie to managers and all head foremen, January 17, 1972, Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

42. Letter from H. M. Currie to R. C. Abrahams, January 10, 1972, Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

43. Subsequently, the renting of a second boarding house was arranged to accommodate those for whom there was no room in the first; interview with Jeong Je Kim, November 2014.

44. Undated letter from H. M. Currie to R. C. Abrahams, Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

45. There was an element of overlap between the two cohorts, as some for a period worked at the London office to prepare the specifications of the technical documentation and other contracts; Y.H. Kim, answer sheet.

46. Note on telephone conversation with Mr. Nash of APAI, September 6, 1971 (5808), Scott Lithgow Papers, GD 323/13/3/17, UGBAC.

Table 1 Scheduled fields of work

	First cohort		Second cohort	
	Middle managers	Foremen (engineer)	Middle managers	Foremen (engineer)
Management of shipyard	1		1	
Planning and production control	1	1		1
Panel line	1	1	1	2
Steel fabrication	1	2	1	2
Steel assembly	1	1	1	2
Erection	1	1	1	2
Outfitting	1	2	1	2
Engine	1	2	1	1
Electric	1	1		1
Quality control		1	1	1
Material control		2	1	1
Design		2	1	1
Estimating		1	1	1
Instructors		6		
Total	9	23	11	17

Source: Over-sea training programme, undated file, Scott Lithgow Papers, GD 323/13/3/17, UGBAC. Note that the number of participants varies from the number of people who participated in the training, particularly for the second cohort, which had a shortfall in the number of people sent from Korea. Moreover, transfer of personnel between Scotland and the London office makes it difficult to give a precise estimate of the total number of people involved.

The Koreans were distributed across shipyard and engine-building departments according to their previous experience, their knowledge, and their intended duties upon returning to the new yard in South Korea. Regarding the organization of the work, there was partly a system of “job rotation,” with the aim of workers becoming familiar with several parts of the production process. Although the main tasks were determined upon arrival in Scotland, many of the workers, particularly in the second cohort, had received an indication of which kind of work they would be performing before their departure from South Korea. Consequently, there were some who had consulted relevant materials before leaving for Scotland.⁴⁷

The construction of the facilities in South Korea progressed so rapidly (or, alternatively, with such challenges), that it became necessary for some of the first cohort—five instructors—to leave earlier than originally intended.⁴⁸ Their British partners referred to the South

47. Interview (in Korean) with Eung Sup Kim, March 2016.

48. Such impatience is not unique; in the case of the first Japanese steamship, the building commenced before the technicians who had been sent to Holland to learn the technology had returned; Arima, “The Western influence,” 370.

Korean project as “an extremely ambitious production programme”—within the span of two years, the Koreans would build one of the world’s largest shipyards, as well as its first VLCC, *Atlantic Baron*.⁴⁹ The amount of learning involved created a need for close cooperation, and the Koreans in Scotland sent reports more or less daily, both to the London office and to their home country.⁵⁰ At the same time, the early departure of the five instructors shows that the written documentation was insufficient. Priority was clearly given to getting someone with practical experience—tacit knowledge—on the spot in Ulsan.

In addition to daily communication, which often solved short-term problems and answered specific questions, there was the more fundamental knowledge exchange. Every single Friday, except for holidays, a new set of plans, arrangements, and drawings would be transferred to South Korea. In total more than 100 large dispatches were sent in the period from February 1972 to May 1974, and the effect on the recipients in South Korea was overwhelming. They signaled to the Scottish yard that they found the plans “difficult to follow” and simultaneously complained that they would prefer to receive everything at once as soon as possible.⁵¹ However, Scott Lithgow was building an identical ship, although by a different build method, and forwarded the information as it was created.⁵² Given that the production occurred in a parallel manner in the two countries, the Scottish yard was unable to change its manner and timeline of production to speed up the transfer of technical information. Moreover, Korean personnel at Ulsan were unable to read design drawings from overseas, necessitating the hiring of foreign technical consultants proficient in English.⁵³

The builders of the ships in South Korea were not the only ones who were overwhelmed. For the workers who travelled to Greenock, the facilities, particularly the gigantic Goliath crane, 287 feet high, capable of lifting to 225 tons, and straddling an inclined concrete mat (1:24 declivity) at the Glen yard in Port Glasgow, made a big impression: “The scale of the yard, large blocks, Goliath crane, large slipway facilities, skilled workers, design skills were all new to me.”⁵⁴ At Ulsan, HHI purchased two West German–built Goliath cranes, 269 feet high and

49. Letter from A&P Appledore, February 17, 1972, Scott Lithgow Papers, GD 323/13/3/18, UGBAC. Scott Lithgow would over the same period build one-and-a-half ships.

50. Hwang, *Let There Be a Yard*, 15

51. Telex from Hugh Currie, May 16, 1972, Scott Lithgow Papers, GD 323/13/3/16, UGBAC.

52. Kang et al., “Old Methods Versus New.”

53. *Traditions of Excellence*, 1999, 49.

54. Interview (in Korean) with Eung Sup Kim, March 2016. The Goliath crane cost £750,000 and was built by Sir Wm. Arrol and Company in 1971. *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 18.

459 feet in width, each with double the lifting capacity of the Glen yard crane. These were better suited to HHI's building-dock method of construction and its aim of building ultra large crude carriers (ULCCs) up to 550,000 dwt. Both were operational by April 1974.⁵⁵ This expensive purchase showed Hyundai's ambition to be a major player in world shipbuilding; not only could the cranes be used to build ULCCs, they could also be used to construct several smaller vessels simultaneously in building docks if the market required it.

Scott Lithgow had a far greater product mix and technological capability than Hyundai. VLCCs were, in shipbuilding terms, relatively easy to build. However, Scott Lithgow's move into VLCC construction was not without difficulty. Its method of separately building the fore and aft sections of the ship and then welding them together on the water with the aid of a specially constructed cofferdam at the join was technically demanding. Hyundai's building-dock method, wherein prefabricated welded block sections of the ship constructed in adjacent prefabrication sheds were placed in the dock by the Goliath crane and then welded together, was a more efficient method of construction, and in line with modern Japanese methods. Scott Lithgow had considered plans to build a giant covered shipyard on two occasions but found the cost prohibitive, especially as government funding was not forthcoming to cover a substantial part of the cost.⁵⁶

Although they were impressed by the sheer scale of the ship under construction, the equipment, and the operation in general, the Koreans had a more ambiguous attitude toward the shipyard facilities in general. Specifically, several of the participants refer to the Greenock yard as "old-fashioned," using "old methods of ship construction," and relying on "traditional ways of work."⁵⁷ Interestingly, some interviewees—without prompting—suggested that the outdated production system and the fact that "productivity was not high" were the result of strong labor unions.⁵⁸

This link between the backwardness and low productivity at Scott Lithgow and the prominent role of the labor unions might have roots in the South Korean experience. In the South Korean case, unionization was "explicitly banned" until the late 1980s, with the exception of the government-sanctioned unions belonging to the Federation of Korean

55. *Traditions of Excellence*, 1999, 52. Both cranes were built by PHB-Jucho and took eight months to install. At a cost of US\$6.5 million each, they were the costliest items purchased.

56. Johnman and Murphy, *Scott Lithgow*, 240.

57. Interview with Jeong Je Kim, November 2014; and three anonymous answers.

58. Two anonymous answers from participants in the second cohort.

Trade Unions.⁵⁹ As Hwasook Nam has explained, KSEC became the “loser” in the South Korean foray into the shipbuilding industry.⁶⁰ Before Hyundai, KSEC had been the country’s leading shipbuilder (though on a much smaller scale and without an international orientation). Nam suggests that the “militant, democratic and powerful” union at KSEC might have been one of the reasons that it was lagging in terms of productivity and business and never managed to participate when the South Korean shipbuilding venture took off.⁶¹ In fact, several of the workers Hyundai sent to Scott Lithgow had some experience at KSEC.

Management at the Scottish yard was also clearly apprehensive about the labor unions and their influence. In connection with the press release that was sent out when the contract was made public, Scott Lithgow’s managing director Ross Belch specifically asked A&P Appledore “not to use the expression ‘the low labour rates and high productivity in Korea.’” The reason for this was his fear that such an association would create problems in the relationship with the local unions at Scott Lithgow.⁶²

The Greenock Cohort

The Scott Lithgow archives contain detailed information about the background of twenty-seven of the workers. They were all male, spanning in age from twenty-seven to forty-two years with an average age of thirty-three years.⁶³ Eight of the men were single, while nineteen were married. All of the participants had completed higher education in advance. Although we should ideally have had information about all the workers who went to Scott Lithgow, there is no reason to expect that our sample (more than half of the total) differed from the rest of the workers along dimensions such as age, education, and employment background.

Table 2 shows that the educational background varied, though—unsurprisingly—with a bias toward naval architecture and engineering. With one exception, all the workers had completed four-year degrees; the exception was one who held a six-year degree. All had degrees in various types of engineering and naval architecture, except for one, who had a law degree. He had, however, vast and valuable

59. On labor and unionism in South Korea, see Minns, “The Labour Movement.”

60. See Nam, *Building Ships*, for a discussion of KSEC and unionism.

61. Nam, *Building Ships*.

62. Telex from Alexander Ross Belch to Peter Nash, December 3, 1971, Scott Lithgow Papers, GD 323/13/3/16, UGBAC.

63. The average age of the three instructors included in our material was only marginally higher, at 34 years.

Table 2 Korean cohort in Greenock by type of university education

Education	Number (percent)
Naval architecture and marine engineering	8 (30%)
Mechanical engineering	8 (30%)
Naval architecture	4 (15%)
Marine engineering	3 (11%)
Electrical engineering	2 (7%)
Engineering	1 (4%)
Law	1 (4%)

Source: Database compiled based on personnel information in Scott Lithgow Papers, GD 323/13/3/14, UGBAC. Due to rounding, the numbers add up to more than 100 percent.

Table 3 The Greenock worker's education by institution

Education ^a	Number (percent)
Seoul National University	8 (30%)
In-Ha Institute of Technology	8 (30%)
Hanyang University	4 (15%)
ROK Merchant Marine Academy	3 (11%)
Five other universities	4 (15%)

^a The five other universities were Seoul University, Republic of Korea Naval Academy, Dong-A University (Busan), Yonsei University, and Pusan National University.

Source: Database compiled based on personnel information in Scott Lithgow Papers, GD 323/13/3/14, UGBAC. Due to rounding, the sum exceeds 100 percent.

experience in logistics and supply from the Korean army, including a stint of training in the United States. In fact, the proportion of personnel with experience from abroad—eight of the twenty-seven—is surprisingly high.⁶⁴ It is likely that Hyundai actively sought out people with experience from foreign work. They would be less susceptible to “culture shock” and were also likely to have a working level of English.

The workers that Hyundai sent to Scott Lithgow were among the best educated in the corporation, not only in terms of the type of education, but regarding the institutions where they had studied. Table 3 shows that more than half of the workers had been educated at two of the most respected seats of higher learning in South Korea.

Eight of the personnel, almost a third of those about whom we have detailed information, came from Seoul National University—the most prestigious university in South Korea. The Korean–American collaboration, In-Ha [Incheon Hawaii] Institute of Technology, which was awarded university status in 1971, was the second most common alma mater.

64. Three had experience in the United States, and two in Japan. An additional two had worked in Vietnam and Guam, probably in connection with the U.S. military, while one had been a trainee in Cologne, Germany. Before coming to Hyundai, he had also worked for the South Korean government's economic planning board, where he had been “deliberating new projects constructed by foreign capital.”

It has been claimed that Hyundai “enticed” skilled workers from other yards to join the project by offering them higher wages.⁶⁵ The fact that more than half of the workers had shipyard experience—and that Hyundai was new to the shipbuilding industry—suggests that this might be the case. However, a closer look at the information in the Scott Lithgow personnel file suggests that the extent of direct poaching was limited in the case of the Scottish cohorts; only four people came directly from other shipyards to Hyundai Construction Company’s shipbuilding project.

The others—more than three-quarters of those with shipyard experience—had worked in other industries between their shipyard employment and being hired by Hyundai. This reflected the fact that the existing small- and medium-sized South Korean shipyards had difficulties securing work and operated at only around 20 percent of capacity. Of course, the ex-shipyard workers’ education and experience were valuable. However, their interim employment in other sectors suggests that they had been unable to utilize it properly before the construction of the Hyundai yard.

The Hyundai project was in many respects a new start both for the workers and for the city of Ulsan. An article in the *Wall Street Journal* in early 1974 points out that “two years ago a bumpy dirt road meandered through rice paddies to a small fishing village. The road is still there, but the paddies and village have been replaced by a mammoth \$100 million shipyard, capable of producing the biggest and most sophisticated supertankers.”⁶⁶ The workers were part of a great modernization and urbanization project. By the time they went to Scotland, none of them had their main residencies in Ulsan. Four of the twenty-seven workers for whom we have information lived in “nearby” Busan, 45 kilometers away, and another four in other cities and villages in southwestern Korea, while around half the workers were residents of Seoul, more than 300 kilometers from Ulsan.⁶⁷

The theoretical and practical backgrounds of the workers sent to Scotland to learn how to build ships suggests that they were carefully chosen by Hyundai. That all were university graduates was in stark contrast to Scott Lithgow and British shipbuilding generally. Apart from naval architects, many of whom were also managing directors,

65. See Nam, *Building Ships*. According to Amsden, *Asia’s Next Giant* (287), KSEC at Busan, then the leading shipyard in South Korea, claimed that they had lost one-third of their most important engineers to Hyundai.

66. *Wall Street Journal*, February 28, 1974, 34.

67. Regarding place of birth, twenty-one workers were born in Seoul and another three in Incheon, both on the opposite side of South Korea. Two of the workers living in Busan had worked for the Dae-sun shipyard, situated in the city, while the other two had a military background.

graduates were in very short supply in British shipyards. The cult of the practical man (a man hewn from the rock of applied practical experience) still held sway.

The limited role of formal qualifications in the British shipbuilding industry illustrates that tacit knowledge, learned through apprenticeships and via on the job training, clearly was an important means of developing skills within shipbuilding. However, acquiring such knowledge was usually a time-consuming process—Scott Lithgow’s skilled manual workforce had to undertake low-wage, nonunionized apprentice training for four years. The first year of the apprenticeship was spent at a purpose-built training center at the Great Harbour in Greenock, and the last three in on the job training supervised by (five-year) qualified tradesmen and foremen.⁶⁸ The South Koreans, in contrast, would only spend six months at the yard. Moreover, during this period, there were practical challenges. One potential problem was communication.

Communication Challenges

The Korean workers had limited experience with the English language, particularly the spoken kind: “Before we left home we worried about how we would learn—we all spoke English, but we wondered if we would be able to speak it well enough.” Practically all of those interviewed refer to problems—in particular, initially—of understanding the very strong Scottish accent and local dialect. However, none of them saw this as particularly problematic in relation to the actual training: In the “technological” setting, and aided by drawings and materials, the language barriers were overcome. In an interview in the Scott Lithgow company magazine, one of the workers pointed out that “our instructors have been very kind very warm-minded, and they have made it easy for us.”⁶⁹

The extent to which language was a barrier varied among the Koreans. Eung Sup Kim, a member of the second cohort, points out that “since all of us were college graduates we had basic ability in English. As our communication on the job was concerned with things and technical matters there was no major problem in language.”⁷⁰ However, initially, there were some difficulties “in understanding the Scottish

68. The one-year initial training certificate at the Scott Lithgow Training Centre established in 1968 was supervised under Shipbuilding Industry Training Board regulations under the Industry Act 1964.

69. “The View from Korea,” *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 18.

70. Interview (in Korean) with Eung Sup Kim, March 2016.

pronunciation and accent, which would take some time to overcome.”⁷¹ Given that “there were many who had a hard time to understand the Scottish accent,” the second group specifically included a manager who had studied abroad and worked in the company’s London office. “Thanks to his function as a problem-shooter there were no major problems in our communication with the Scots,” according to one member of the second cohort.⁷²

While casual conversation might have been difficult due to the strong West of Scotland accents and dialect, as well as the prevalence of shipyard workers’ slang, this was unproblematic in the more formal setting. Discussions about technical matters were relatively straightforward; “We had no particular problem because our communication on the job was done while looking at materials and drawings.”⁷³ This manner of knowledge transfer illustrates the complementarity between the codified knowledge (documents and manuals) and the tacit knowledge transfer (hands-on supervision and face-to-face exchanges).

Moreover, one ingenious solution to overcome the pronunciation problems was to resort to nonverbal communication. In addition to pointing and “sign language,” the Koreans and the Scots were “writing messages to each other, to better understand,” and this type of communication was widely used. Preparation could also help: “Thanks to my experience in design and production prior to my employment with Hyundai, however, I was able to manage rough communication about matters of concern. [...] When I had difficulties communicating, I tried to use easy words and talk slowly. That helped. In this way we could achieve mutual understanding.”⁷⁴ This is a prime example of the manner in which the Koreans’ preparations and their previous experience facilitated the transfer of tacit knowledge. The criteria for selection (background, education) ensured that there was a good match between the existing and the new knowledge, implying a high “absorptive capacity.”

Although several of the Koreans refer to the language barrier as the one thing that they were most skeptical about before going, it is evident that language learning complemented the technical knowledge transfer. The author of an article in the Scott Lithgow company magazine was indeed impressed by the speed with which the Koreans picked up Scottish phrases and accents.⁷⁵

71. Interview (in Korean) with Eung Sup Kim, March 2016.

72. Interview (in Korean) with Y. H. Kim, March 2016.

73. Interview (in Korean) with Eung Sup Kim, March 2016.

74. Interview (in Korean) with Jin-Yeal Lee (second group), March 2016.

75. *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 21.

All Work and Some Play—The Social Dimension

The experiences in a foreign country undoubtedly played a formative role for the workers that went to Scotland—the fact that several of them still meet regularly is testament to the bonds that were formed, both abroad and when they returned to South Korea to build up the yard. Although they worked long days, there were also some diversions.

When they were in Scotland, the South Korean workers followed their Scottish counterparts and worked at least eight hours a day, six days a week. In addition to the regular “Scottish working week,” after returning home, they would spend around two hours writing reports for South Korea and London. Still, this was not a big burden compared with what they met when they returned to Ulsan, where they would typically work twelve to thirteen hours daily, seven days a week.⁷⁶

In an interview with the Scott Lithgow company magazine, one of the Koreans explained their motivation: “We are trying to do in a few years what western countries took many years to do.”⁷⁷ Similarly, Eung Sup Kim today emphasizes the collective project: “We worked long hours voluntarily without a complaint because we were convinced that it would be impossible to upgrade our technology fast and to meet our production schedule without working such long hours. Probably it was possible as we were all young then.”⁷⁸ The workers were particularly intrigued by the Scottish idea of weekend getaways; “In our country we could not expect our families to go away at the weekends as you do here. ... Weekends must come later ... we are not yet a developed country.”⁷⁹

Although almost a third of the workers in our sample had previous experience outside South Korea, it is evident that there was a culture shock involved when they arrived in Scotland. Originally, the Koreans had a certain curiosity about “the country of Auld Lang Syne” and famous inventors such as the Greenock-born James Watt.⁸⁰ They were impressed by the kindness and welcome of the local people: “You are kind and polite, and the weather is terrible.”⁸¹ And the sentiment was mutual; the Scottish workers refer to their colleagues’ “friendliness, easiness and sense of humour” and also “admired their capacity for work.”⁸²

76. Interview (in Korean) with an unnamed worker from the first cohort, March 2016.

77. *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 18.

78. Interview (in Korean) with Eung Sup Kim, March 2016.

79. Oh Chang Suk and Lee Chung Kil, interviewed in the *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 18

80. Interview (in Korean) with Eung Sup Kim, March 2016.

81. Lee Chung Kil, interviewed in the *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 18

82. *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 20

One Scots engineer said that they reminded him of the work ethic of his father's generation.⁸³

The good relationship and mutual appreciation among the Scots and the South Koreans were not a given. The Scottish shipyard employees worked side-by-side with a group of foreigners who in the future would become competitors, threatening their own jobs. However, an engineering director working at Scott's had a pragmatic attitude to the transfer of skills, stating that "if we did not train them, then someone else would. We were perhaps nevertheless contributing to our own eventual downfall."⁸⁴

The Koreans were fascinated by the foreign customs and culture that they encountered, but "there is one very strange thing about Scotland, this competition that you have between religions, between your Catholics and your Protestants."⁸⁵ Aside from the sectarian issue, another unexpected element was the food; most of the Koreans were vegetarians, more for economic than for health or religious reasons. They were pleased to have pork and beef, and they thought that "your mashed potatoes are very interesting. We had never tasted potatoes before."⁸⁶ They had the high-calorie Scottish breakfast and lunch in the shipyard canteen, but in order to reduce the level of the culture clash, they had brought "a Korean lady" to cook the evening meal.⁸⁷

The relationship between the Scottish and South Korean workers appears to have been extremely amicable. However, it was difficult for the workers from the two countries to socialize on a private basis. Several Scottish workers would have liked to have a closer relationship, but "you couldn't invite one of them to your house in the evening and leave the others."⁸⁸ This was solved by arranging a "Scot's Night" at a local club to give the Koreans a glance of their short-term home country and enable them to socialize with the locals.

In June 1972, the Scott Lithgow directors chartered an airplane, and a group that included all twenty-eight Koreans and more than thirty Scots were flown up to Oban and back to show the visitors the scenic Scottish west coast and western islands. In the evening of that same day, a huge party was arranged in the clubroom of the local Celtic Supporters' Club. Here, the Koreans were "welcomed" by a local band playing bagpipes, before they were treated to food and drinks. After the

83. Interview with Duncan Winning (Kincaid's), October 23, 2016.

84. Johnston Robb, interviewed as part of a history of Scott Lithgow, September 5, 2004.

85. Kim Ok Dae, interviewed in the *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 20.

86. Interview with Jeong Je Kim, November 2014; Oh Chang Suk, interviewed in the *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 18.

87. Interview with Jeong Je Kim, November 2014.

88. *Scott Lithgow Company Magazine*, 1, no. 10 (1972): 20

meal, there was more entertainment, with local youths presenting Highland dancing being one of the highlights.⁸⁹

The Further Training of the Shipbuilding Personnel

The two contingents sent to Greenock played an important part in the acquisition of skills in the initial days of Hyundai's foray into the shipbuilding industry. The sheer scale of the ships and the shipyard in the market segment that Hyundai entered implied that it would be impossible to acquire the skills simply by expanding the local knowledge base. As such, the tacit knowledge acquired by shipyard workers and middle management abroad was a vital component and an important complement to the purchase of foreign equipment and licenses.

In addition to the fifty or so people that were sent to Scotland, Hyundai utilized two other channels of knowledge transfer. First, the top management of the new yard was recruited from Europe. The Dane, Kurt Schou, who at the time was technical director at the Danish VLCC yard, Odense Shipbuilders, became the first president of the new yard. He also brought four colleagues from Denmark, who were given responsibility for four of the most important departments: scheduling, hull production, outfitting, and machinery.⁹⁰ Another three Europeans—two from Great Britain and one from France—were also recruited. Among these were Robert L. Wilson, who was recruited through A&P Appledore, and who became the director of the in-yard vocational training center in September 1972. By the end of 1975, 2,172 personnel had completed full training there, while a further 1464 had completed short courses of training.⁹¹

The rapidity of training at Ulsan was in stark contrast to the training requirements of Scott Lithgow's own personnel, whose apprenticeships lasted for four years. Initially, training in South Korea was complemented by European expertise on the spot. However, the skills, drawings, design, and organization acquired via Scott Lithgow were not intuitively compatible with the experiences of the Danish engineers employed in Ulsan. This paved the way for the second, and ultimately superior in the production sense, channel of knowledge transfer—from Japan to South Korea. Earlier attempts at pan-Asian cooperation had stalled due to the South Korean fear that Japan would limit the type of

89. Interview with Jeong Je Kim, November 2014; *Scott Lithgow Company Magazine*, 1, no. 10 (1972).

90. Hwang, *Let There Be a Yard*, 21.

91. *Traditions of Excellence*, 1999, 50.

ships they could build, as well as lukewarm interest on the Japanese side. In 1973 the contact was reestablished.

The preferred partner became Kawasaki Heavy Industries (KHI). The deal was much the same as the one that Hyundai had with the Europeans. Engineers—including many who had been trained in Scotland—were sent on short trips to the yard in Japan to observe and learn.⁹² Language, in this case, presented less difficulty. Hyundai also bought the design of a 230,000 dwt VLCC, as an alternative to the 260,000 dwt design bought from Scotland. Moreover, as in the Scottish case, a broker agreement was signed, whereby KHI would receive a commission as ships were ordered.⁹³

The most important difference between the Scottish and the Japanese solutions was that KHI stationed engineers in Ulsan to aid production and improve training. These engineers had direct experience with the ships that were built and the methods that were used, as opposed to the Danes, who had to adapt to slightly outdated British ideas. A simple problem can illustrate the disadvantage: while the HHI (and KHI) work and systems were based on metric measures, Scott Lithgow's drawings and instructions were in the imperial system (feet and inches). In tandem with unified systems of measurement and work practices, cultural and language difficulties between Japanese and Koreans were much less than between Scots and Koreans.

The change in the relationship between the South Korea and Japanese shipbuilders can be explained by developments in both countries. From the South Korean side, the need for a more "integrated" solution, with technical assistance on the spot, rather than the piecemeal consulting from the United Kingdom, can explain the arrangement. Japanese shipbuilding, with its early concentration on oil tankers and bulk carriers was in a dominant position, with all major yards using the large building-dock method of construction. This was unlike the British yards, which largely constructed on building berths. As early as 1966, the output of Mitsubishi Heavy Industries' five shipyards exceeded that of the British shipbuilding industry combined.⁹⁴

92. In total, 97 people were sent to KHI in 1972–1973, more than were sent to Scott Lithgow. However, their period of training was usually 4–8 weeks, a substantially shorter time than for those who traveled to Europe; Bae, "A Study of Technology Transfer," 195.

93. This was helped by an order for two such ships from Kawasaki Lines, a sister company of the yard; see Bae, "A Study of Technology Transfer," 190. The production of tankers to two different designs subsequently created friction between APAI and Scott Lithgow, as the latter was unsure about the number of tankers for which it was owed a commission; various letters and telexes between Scott Lithgow and APAI, dated March 8, 1977 to December 14, 1977, Scott Lithgow Papers, GD 323/13/3/14, UGBAC.

94. Johnston and Murphy, "The Newshot Isle Project," 208.

With the involvement of KHI, it became evident to Hyundai that the Scottish yard where the skills had been acquired was lacking in modern methods of work organization and technology, and the aforementioned differences in measurement systems led to additional problems.⁹⁵ As a member of the second Scottish cohort points out: “On our return home many of the second group also went to the Sakaide yard of KHI, where we were highly impressed by the cleanliness and tidiness of the facilities and workers. This was a different kind of work environment and work attitude.”⁹⁶ Consequently, Hyundai realized that cooperation with the Japanese—if possible—would be useful in making the yard more competitive.

From the Japanese side, the timing is important to explain the change in attitude. The deal between Hyundai and the Japanese was signed in April 1973.⁹⁷ By this time, two factors had changed since 1969 when Akasawa and the other Japanese bureaucrats had reported that South Korean shipbuilding would not be viable. The first was that the Koreans had proven that they could acquire the technology, and hence become potential competitors, even without Japanese support. The fear of “creating” a new competitor had outweighed the benefits of Japanese exports to South Korea in 1969. By 1973 the competitor was already a reality, and there was no need to deny the Japanese shipyards and shipyard equipment producers potentially profitable engagements.

The second change was the extreme boom in the shipping market. From 1962 to 1973 the demand for oil transports increased 17 percent annually. The order book for new ships increased tremendously, equaling almost 90 percent of the current tanker fleet at the end of 1973. This implied that the waiting time from order to delivery of newbuildings could exceed three years. The price of a new 210,000 dwt tanker shot up from US\$19 million in 1970 to US\$47 million four years later.⁹⁸ The Japanese willingness to cooperate should therefore be seen independently from the decision by two companies affiliated with KHI—Kawasaki Lines and Japan Line—to order a total of six new VLCCs from Hyundai. By cooperating with the Koreans, the Japanese would then get

95. See Kang et al., “Old Methods Versus New,” for a direct comparison of building methods in the two countries. On one occasion, pipes had to be ordered and dispatched—at great expense—from the United Kingdom, because the dimensions needed did not exist in the Asian market; interview with Jeong Je Kim, November 2014.

96. Interview (in Korean) with Y. H. Kim, March 2016.

97. For a very good introduction to the transfer of skills from Japan, unfortunately only in Korean, see Bae, “A Study of Technology Transfer.”

98. See Tenold, *Tankers in Trouble*, for an introduction to the shipping and shipbuilding boom and the subsequent crisis.

access to valuable ships, while their presence and on-site supervision would ensure the quality of the tonnage.

It is evident that the Koreans regarded the Japanese manner of production more favorably than the skills they had learned in the Scotland. For instance, the Koreans were eager to use some of the production methods and organization learned from the Japanese for the ships built to the Scottish design as well. Scott Lithgow politely declined giving too many details, saying that they considered “this information to be within our commercial confidence” and that they “do not see how our building programme will be of relevance to Kawasaki.”⁹⁹ In the short and long run, however, the KHI method of building was more suitable for the Ulsan yard. Their Scottish experiences had provided the workers with basic knowledge of shipbuilding technology, processes, and methods. Turning to Japan, they acquired more relevant and up-to-date know-how.

Creating a Competitor

Very few records of any substance from the years under consideration survive at Ulsan. Consequently, no viable comparison of productivity can be made between Scott Lithgow and Hyundai during the period of their cooperation. Nonetheless, it is clear that the initial cohort of Koreans at Scott Lithgow did learn much that was of use to them in building their first two VLCCs to the Scottish design. Hyundai’s subsequent cooperation with KHI allowed that cohort to learn alternative shipbuilding techniques more in keeping with their yard layout and product strategy. This, allied with the iterative effects of learning by doing, was beneficial to the company’s future.

Initially, the limited experience of South Korea in the international market for ships meant that foreign shipowners were apprehensive of the quality, both of the ship itself and of the production process. Shipping is an international industry, and regulation is based on a mixture of national, international, and private institutions. HHI used Lloyds Register of Shipping surveyors to monitor the quality of build of their first two VLCCs. All later orders were also subject to scrutiny by the major international classification societies, and the yards subsequently actively sought out International Organization for Standardization quality assurance certificates. As the quality of the South Korean ships became recognized internationally, the country’s shipyards, spearheaded by Hyundai, took large market shares. With the competitive

99. Letter from W. Ferguson of Scott Lithgow to APAL, September 4, 1973, Scott Lithgow Papers, GD 323/13/3/14, UGBAC.

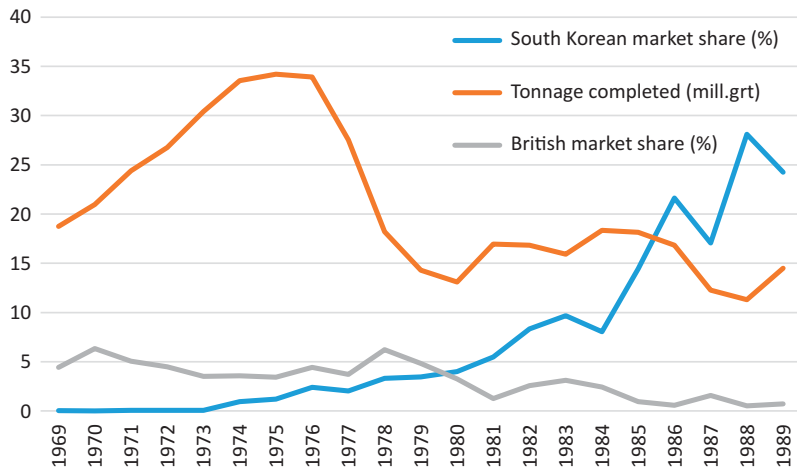


Figure 1 World shipbuilding completions and South Korean and British market shares, 1969–1989.

Source: Calculated on the basis of gross registered tonnage data from Lloyds' Register of Shipping, *Statistical Tables*, various years; and Buxton, Fenton, and Murphy "Measuring Britain's Shipbuilding Output in the Twentieth Century."

advantage of low-cost production, and aided by national policies, the yards were able to expand in a declining market.

Figure 1 shows the manner in which South Korea, during the international shipping recession of the late 1970s and early 1980s, managed to grab an increasingly larger share of the shipbuilding market. At the same time, HHI's old "teacher," Great Britain, was practically wiped out. By 1986 HHI completed almost two million gross tons of new ships, giving the yard an 11.4 percent share of the world market. That year *all* British yards produced less than 100,000 gross tons. The British decline—from a market share of more than 90 percent at the start of the twentieth century—was spectacular.¹⁰⁰

In their early days, HHI specifically made a point of the skills transferred from abroad when promoting its ships. In a 1974 promotional brochure, its president, Kurt Schou, emphasized "the international conglomerate of shipbuilding technology and expertise" when "selling" the HHI to potential customers. He emphasized that the engineers and technicians "were trained at the first-rate overseas shipyards" and are working "under the close supervision of top-notch foreign staffs."¹⁰¹

100. See Tenold, "The Declining Role of Western Europe."

101. Promotional brochure ca. 1975, Scott Lithgow Papers, GD 323/13/3/18, UGBAC.

Conclusion

A large number of factors played crucial roles when HHI, and South Korea, entered the international shipbuilding market. The first contract with a foreign shipowner for two large tankers was the “door opener” needed to start the project. Foreign loans made it possible to finance the imports of plant and equipment, thus ensuring that the technology needed to build ships was in place. The Hyundai conglomerate’s expertise in construction and project management was matched with shipyard consultants from the United Kingdom, and foreigners employed in key management positions were important in the first years of the yard’s existence.

Nevertheless, shipbuilding is a labor-intensive industry and the end product relies on the skills and competence of the workers. The training of workers at yards in Scotland was an important supplement to the imported technology and the codified knowledge acquired from abroad. Hyundai sent personnel with relevant higher education and often with experience from working abroad. Thus it ensured high absorptive capacity by matching initial experience with the tacit knowledge acquired during face-to-face contact. On their return to Ulsan, the workers with experience from Scotland would oversee a massive training program in the new yard facility.

The adroit use of human capital and transfer of tacit knowledge, initially from abroad and subsequently within the yard, is one explanation of how HHI could become the world’s leading shipbuilder.¹⁰² Allied with the drive and vision of Chairman Chung to construct a vast greenfield shipyard in Ulsan, the technology and knowledge transfer enabled the birth of an internationally competitive shipbuilding industry in South Korea. Subsequently, in addition to becoming the world’s leading shipbuilding nation, South Korean shipyards have undertaken substantial foreign direct investments abroad.¹⁰³

The movement of manufacturing production from Western Europe to East Asia is not only a question of wage levels, export promotion, government policies, and technology transfer. We have provided a case study from the early days of South Korean shipbuilding, one of the industries in which Asian countries are world leaders today. Our research shows that the transfer of tacit knowledge, across cultural barriers, from one continent to another, ultimately depends on the people involved, their backgrounds, and their ability to absorb new knowledge through face-to-face contact.

102. This was subsequently developed further when workers were sent to Japan.

103. On the subsequent development of the industry, see, for instance, Hassink and Shin, “Cluster Life Cycles”; Hassink and Shin, “South Korea’s Shipbuilding Industry.”

Bibliography of Works Cited

Books

- Amsden, Alice D. *Asia's Next Giant: South Korea and Late Industrialization*. Oxford: Oxford University Press, 1989.
- Chida, Tomohei, and Peter N. Davies. *The Japanese Shipping and Shipbuilding Industries: A History of their Modern Growth*. London: Athlone, 1990.
- Fukasaku, Yukiko. *Technology and Industrial Development in Pre-war Japan: The Mitsubishi-Nagasaki Shipyard 1884–1934*. London: Routledge, 1992.
- Hwang, Sung Hyuk. *Let There Be a Yard: Memories of a Shipbroker*. 2nd ed. Seoul, Korea: E&B Plus, 1998.
- Johnman, Lewis, and Hugh Murphy. *Scott Lithgow: Déjà vu All Over Again! The Rise and Fall of a Shipbuilding Company*. St. John's: IMEHA [Liverpool University Press], 2005.
- Jonsson, Gabriel. *Shipbuilding in South Korea: A Comparative Study*. Stockholm: East Asian Institute, 1995.
- Kim, Linsu. *Imitation to Innovation: The Dynamics of Korea's Technological Learning*. Cambridge, MA: Harvard Business School Press, 1997.
- Kirk, Donald. *Korean Dynasty: Hyundai and Chung Ju Yung*. New York: Routledge, 1994.
- Krishnan, Navaneetha. *Prosperous Nation Building Through Shipbuilding*. New Delhi: National Maritime Foundation, 2013.
- McCormick, Kevin. *Engineers in Japan and Britain: Education, Training and Employment*. *Routledge Japanese Studies*. London, Nissan Institute, 1999.
- Nam, Hwasook. *Building Ships, Building a Nation: Korea's Democratic Unionism Under Park Chung Hee*. Seattle: University of Washington Press, 2009.
- Polanyi, Michael. *Personal Knowledge: Towards a Post-critical Philosophy*. Chicago: University of Chicago Press, 1962.
- . *The Tacit Dimension*. London: Routledge & Kegan Paul, 1966.
- Steers, Richard M. *Made in Korea. Chung Ju Yung and the Rise of Hyundai*. London: Routledge, 1999.
- Tenold, Stig. *Tankers in Trouble: Norwegian Shipowners and the Crisis of the 1970s and 1980s*. St. John's: IMEHA [Liverpool University Press], 2006.
- Todd, Daniel. *Industrial Dislocation: The Case of Global Shipbuilding*. London: Routledge, 1991.
- World Bank. *The East Asian Miracle Economic Growth and Public Policy*. Washington, DC: World Bank, 1993.
- Woronoff, Jon. *Asia's Miracle Economies*. 2nd ed. New York: M.E. Sharpe, 1992.

Articles, Chapters in Books, White Papers, and Dissertations

- Arima, Seiho. "The Western Influence on Japanese Military Science, Shipbuilding, and Navigation." *Monumenta Nipponica* 19, no. 3/4 (1964): 118–145.
- Bae, Suk-Man. "A Study of Technology Transfer and Its Trajectory in the Initial Phase of the HHI." [In Korean.] *Review of Business History*, 26, no. 3 (2011): 181–214.

- Bae, Yong-Ho. "Shipbuilding Technology Development in Hyundai Heavy Industries Co., Ltd. (HHI)." In *Case Study on Technological Innovation of Korean Firms*, edited by Yong-Ho Bae, Sungsoo Song, Mi-Jung Um, Dae-Hee Lee, and Michael Hobday, 132–155. Seoul: Science & Technology Policy Institute, 2002.
- Bruno, Lars C., and Stig Tenold. "The Basis for South Korea's Growth in the Shipbuilding Industry, 1970–1990." *Mariner's Mirror*, 97, no. 3, (2011): 201–217.
- Buxton, Ian, Roy Fenton, and Hugh Murphy. "Measuring Britain's Shipbuilding Output in the Twentieth Century." *Mariner's Mirror*, 101, no. 3 (2015): 304–322.
- Choi, Young-Jin, and Jim Glassman. "A Geopolitical Economy of Heavy Industrialization and Second Tier City Growth in South Korea: Evidence from the 'Four Core Plants Plan.'" *Critical Sociology*, 44, no. 3 (2018): 405–420.
- Cowan, Robin, Paul A. David, and Dominique Foray. "The Explicit Economics of Knowledge Codification and Tacitness." *Industrial and Corporate Change*, 9, no. 2 (2000): 211–253.
- Craggs, John, Hugh Murphy, and Roger Vaughan. "A Shipbuilding Consultancy Is Born: The Birth, Growth and Subsequent Takeovers of A&P Appledore (International) and the A&P Group, 1971–2017." *International Journal of Maritime History*, 30, no. 1 (2018): 106–130.
- Golant, Benjamin D. "The State, Culture and Organizational Learning in South Korea: The Comparative Case of South Korea and India." *Cambridge Review of International Affairs*, 11, no. 2 (1998): 238–257.
- Hagemeister, Marcus. "The Four Largest South Korean Business Groups and Foreign Technology: Acquisition of Technology and Foreign Direct Investment." *Prometheus: Critical Studies in Innovation*, 17, no. 1 (1999): 59–75.
- Hassink, Robert, and Dong Ho Shin. "South Korea's Shipbuilding Industry: From a couple of Cathedrals in the Desert to an Innovative Cluster." *Asian Journal of Technology Innovation*, 13 (2005): 133–155.
- . "Cluster Life Cycles: The Case of the Shipbuilding Industry Cluster in South Korea." *Regional Studies*, 45, no. 10 (2011): 1387–1402.
- Johnson, Björn, Edward Lorenz, and Bengt-Åke Lundvall. "Why All This Fuss About Codified and Tacit Knowledge?" *Industrial and Corporate Change*, 11, no. 2 (2002): 245–262.
- Johnston, Ian, and Hugh Murphy. "The Newshot Isle Project." *Scottish Geographical Journal*, 117, no. 3 (2001): 207–218.
- Kang, J. Y., Song Kim, Hugh Murphy, and Stig Tenold. "Old Methods Versus New: A Comparison of Very Large Crude Carrier Shipbuilding at Scott Lithgow and Hyundai Heavy Industries, 1970–1977." *Mariner's Mirror*, 101, no. 4 (2015): 426–457.
- Kim, Linsu. "The Dynamics of Technological Learning in Industrialisation." *International Social Science Journal*, 53, no. 168 (2001): 297–308.

- Lee, Changsoo. "Technological Dependence in a Developing Country: The Case of South Korea." Unpublished PhD thesis, University of Chicago, Chicago, IL, 1985.
- Lim, Jungkeun. "Urbanization, Production System, and the Labour Movement in South Korea." Unpublished PhD thesis, Michigan State University, Ann Arbor, 1997.
- McGaughey, Sara L., Peter W. Liesch, and Duncan Poulson. "An Unconventional Approach to Intellectual Property Protection: The Case of an Australian Firm Transferring Shipbuilding Technologies to China." *Journal of World Business*, 35, no. 1 (2000): 1–20.
- McWiggins, Dan Patrick. (2013) "Sunrise in the East, Sunset in the West: How the Korean and British Shipbuilding Industries Changed Places." Unpublished PhD thesis, University of Texas at Austin, Austin.
- Minns, John. "The Labour Movement in South Korea." *Labour History*, 81 (November 2001): 175–195.
- Murphy, Hugh. "China, Philippines, Singapore, Taiwan and Vietnam." In *Shipbuilding and Ship Repair Workers Around the World: Case Studies 1950–2010*, edited by R. Varela, H. Murphy, and M. Van der Linden, 637–656. Amsterdam: Amsterdam University Press/ Chicago University Press, 2017.
- O, Wonchol. "Construction of the Shipbuilding Industry: A Model for Korean Industrialization." *Reference Paper—The Knowledge Partnership Project*. Seoul: Korea Development Institute, 2002.
- Rapping, Leonard. "Learning and World War II Production Functions." *Review of Economics and Statistics*, 47 (1965): 81–86.
- Rørvik, Kjell Arne. "Knowledge Transfer as Translation: Review and Elements of an Instrumental Theory." *International Journal of Management Reviews*, 18 (2016): 290–310.
- Sohn, Eunhee, Sung Yong Chang, and Jaeyong Song. "Technological Catching-Up and Latecomer Strategy: A Case Study of the Asian Shipbuilding Industry." *Seoul Journal of Business*, 15, no. 2 (2009): 25–57.
- Solli-Sæther, Hans, and Jan Terje Karlsen. "Knowledge Transfer in Shipbuilding Projects: A Study of Facilitating Mechanisms." *International Journal of Project Organisation and Management*, 4, no. 3 (2012): 256–271.
- Shin, Kyoung-ho, and Paul S. Ciccantell. "The Steel and Shipbuilding Industries of South Korea: Rising East Asia and Globalization." *Journal of World Systems Research*, 15, no. 2 (2009): 167–192.
- Song, Sungsoo. "Growth and Technological Development of the Korean Shipbuilding Industry." *STI Policy Review*, 2, no. 4 (2011): 55–63.
- Tenold, Stig. "The Declining Role of Western Europe in Shipping and Shipbuilding." In *Shipping and Globalization in the Postwar Era—Contexts, Companies, Connections*, edited by Niels P. Petersson, Stig Tenold, and Nicholas J. White, 9–36. Cham: Palgrave MacMillan, 2019.
- Todd, Daniel. "Going East: Was the Shift in Volume Shipbuilding Capacity from Britain and Continental Europe to the Far East and Elsewhere During the Latter Half of the Twentieth Century Inevitable?" *Mariner's Mirror*, 97, no. 1 (2011): 259–271.

Wright, Christopher, and Seung-Hu Kwon. "Business Crisis and Management Fashion: Korean Companies, Restructuring and Consulting Advice." *Asia-Pacific Business Review*, 12, no. 3 (2007): 355–373.

Yülek, Murat A. "On the Middle-Income Trap, the Industrialization Process and Appropriate Industrial Policy." *Journal of International Competition and Trade*, 17, no. 3 (2017): 325–348.

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