

# **Imagining an Astronaut: Space Flight and the Production of Korea's Future**

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## ABSTRACT

This dissertation examines the debates and discourses surrounding the Korean Astronaut Program (KAP) using the concepts of sociotechnical imaginaries, sociotechnical vanguards, and the construction of expertise. Based on documentary analysis and oral interviews, this research considers KAP as an example of how the visions of sociotechnical vanguards conflict and their failure to construct a unified sociotechnical imaginary. Furthermore, it contends that the expertization of the Korean astronaut failed because of the public openness of KAP.

KAP was proposed by the Ministry of Science and Technology (MOST) and run by the Korea Aerospace Research Institute (KARI). These two sociotechnical vanguards, MOST and KARI, provided different visions to the Korean public sphere, which already ascribed to its own image of an astronaut. MOST imagined the future Korea as a science-loving nation in which especially the next generations would have a strong interest in science and technology. Thus, MOST defined KAP as a science popularizing program and the Korean astronaut as a science popularizer. However, imagining a better Korea with better science and technology, KARI defined KAP as a research program that would lead to human space flight technology and considered the Korean astronaut a space expert. However, in the Korean public sphere, the widely shared expectation was a better Korea with a Korean heroic astronaut, because having a hero similar to that in other countries could position Korea on par with other advanced countries. These three visions conflicted in Korean society during KAP, and none of them succeeded in becoming the dominant sociotechnical imaginary. This elicited severe criticism of KAP and the Korean astronaut.

KAP was also a good example of expertization with public openness. Credibility is the most important part of modern scientific practice. Without credibility, scientific experts cannot exercise their authority. Credibility rests on social markers such as academic degrees, track records, and institutional affiliation. However, these social markers are not suddenly assigned to an expert, who spends much time and effort attaining them. Rather, experts are made in a continuous process of improvement. Therefore, this research focuses on the process through which a person becomes an expert in emerging science and proposes the new terminology: expertization. Usually, the expertization process is hidden behind a public image. People do not know how experts obtain social markers, despite believing that these verify expertise. However, when the expertization process open to the public, it could be easily destroyed.

KARI tried to position the Korean astronaut as a space expert. The first Korean astronaut did not become an expert overnight, but emerged as such to the Korean public through a selection process, training, and spaceflight. However, unlike other expertization, all steps comprising KAP were broadcast, and the expertization of Dr. Soyeon Yi, the first Korean astronaut, was open to the public. Consequently, her expertise was questioned each time the public found an element that did not satisfy their expectations.

This research also clarifies the meaning of gender in emerging science. Dr. Soyeon Yi became the first Korean astronaut before any Korean male. In this way, KAP provided an important meaning to women in science, especially in the field of emerging science, which is usually dominated by males.

Through these discussions, this research expands the application of sociotechnical imaginary and expert studies. It also enhances understanding of these discourses in Korean society, and stimulates discussions of the negative consequences of research programs.

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General Audience Abstract

In April 2008, the first Korean Astronaut, Dr. Soyeon Yi, was launched to the International Space Station. The Korean nation welcomed their astronaut and believed this marked Korea's entry into the space age. However, before long, this aspiration changed to severe criticism. This research analyzes the Korean Astronaut Program (KAP) from its proposal to after its spaceflight in terms of its reception by Korean society.

The Korean Astronaut Program was proposed by the Ministry of Science and Technology (MOST) to overcome the science and engineering crisis in 2004. As such, MOST defined KAP as a science-popularization program and the Korean astronaut as a science popularizer. However, as the first human space program in Korea, the Korea Aerospace Research Institute (KARI), who ran KAP, considered it a research program to achieve human spaceflight technology and the Korean astronaut a space expert. These two different understandings were communicated to the Korean public sphere. However, the Korean public already had its own image of the "heroic" astronaut based on other countries' space programs and popular culture. The public thought that having an astronaut would position the country on par with other countries. Because the visions of MOST, KARI, and the Korean public differed, KAP could not satisfy the expectations of all three actors.

In addition, the process through which Dr. Yi became the first Korean astronaut was opened to the Korean public. Consequently, when the public found an element that did not satisfy their expectations, they doubted Dr. Yi as a space expert, bringing about severe criticism of KAP and the concept of the Korean astronaut.

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## **List of Abbreviations**

ADD: Agency of Defense Development  
CV: Curriculum Vitae  
ESA: European Space Agency  
GCTC: Gagarin Research & Test Cosmonaut Training Center  
G-Force: Gravity Force  
GNI: Gross National Income  
IAC: International Astronautical Congress  
IBMP: Russian Federation State Research Center Institute of Biomedical Problems  
IMF: International Monetary Fund  
INTELSAT: The International Telecommunications Satellite Organization  
ISS: International Space Station  
IT: Information Technology  
ITU: International Telecommunication Union  
JAXA: Japan Aerospace Exploration Agency  
KAERI: Korea Atomic Energy Research Institute  
KAIST: Korea Advanced Institute of Science and Technology  
KAP: Korean Astronaut Program  
KARI: Korea Aerospace Research Institute  
KAO: Korea Astronomy Observatory  
KAU: Korea Aerospace University  
KBS: Korean Broadcasting System  
KETI: Korea Electronics Technology Institute  
KFRI: Korea Food Research Institute  
KIMM: Korea Institute of Machinery & Materials  
KIST: Korea Institute of Science and Technology  
KISTEP: Korea Institute of S&T Evaluation and Planning  
KITsat: Korea Institute of Technology Satellite (Wooribyul Satellite)  
KMS: The Korean Microgravity Society  
KOMPsat: Korean Multipurpose Reconnaissance Satellite (Arirang Satellite)  
KOSEF: Korea Science and Engineering Foundation  
KSR: Korean Sounding Rocket  
KSLV: Korea Space Launch Vehicle  
MAFF: Ministry of Agricultural Forestry and Fisheries  
MBA: Master of Business Administration  
MBC: Munhwa Broadcasting Corporation  
MDRS: Mars Desert Research Station  
ME: Ministry of Environment  
MEST: Ministry of Education, Science, and Technology  
MIC: Ministry of Information and Communication  
MMPI: Minnesota Multiphasic Personality Inventory  
MND: Ministry of National Defense  
MOC: Ministry of Communication  
MOCIE: Ministry of Commerce, Industry and Energy  
MOCT: Ministry of Construction and Transportation

MOFE: Ministry of Finance and Economy  
MOF: Ministry of Oceans and Fisheries  
MOFA: Ministry of Foreign Affairs  
MOFAT: Ministry of Foreign Affairs and Trade  
MOI: Ministry of Interior  
MOLEG: Ministry of Government Legislation  
MOST: Ministry of Science and Technology  
MPB: Ministry of Planning and Budget  
MRI: Magnetic Resonance Imaging  
MSIP: Ministry of Science, ICT, and Future Planning  
NASA: National Aeronautics and Space Administration  
NEO-PI: NEO Personality Inventory  
NIMR: National Institute of Meteorological Research  
NSC: National Space Committee  
PACST: Presidential Advisory Council on Science & Technology  
POSTECH: Pohang University of Science and Technology  
RAS: Russia Academy of Science  
ROS: ISS Russian Orbital Segment  
Roscosmos: Roscosmos State Corporation for Space Activities  
SaTReC: Satellite Technology Research Center  
SBS: Seoul Broadcasting System  
SLAC: Stanford Linear Accelerator Center  
SMMS: Small Mass Measuring System  
STEM: Science, Technology, Engineering, and Mathematics  
STK: System Tool Kit  
STP: Graduate School of Science and Technology Policy  
STS: Science and Technology Studies  
STSAT: Science and Technology Satellite  
TCI: Temperament and Character Inventory  
TEPS: Test of English Proficiency Developed by Seoul National University  
UK: The United Kingdom  
UN COPUOS: United Nations Committee on the Peaceful Uses of Outer Space  
US: The United States of America  
WARC: World Administrative Radio Conference about Space Communication

## Chapter I. Introduction

“That’s one small step for man, one giant leap for mankind.”

On July 20, 1969, 50 years ago, *Apollo 11* landed on the moon. With people worldwide watching, astronaut Neil Armstrong made this bold statement about human progress. The moon landing was an exciting moment many people took as evidence of an American victory in the space race of the Cold War. It was solid proof of the American sociotechnical imaginary as “a technological powerhouse” and “a world superpower to its prowess in science and technology” and “a once and future innovator” of the world.<sup>1</sup> In addition, at that moment, many children the world over started to dream of space.

In Korea, some of these children grew up to become senior researchers in Korean aerospace engineering, developed satellites and rockets, and created the history of the Korean space program.<sup>2</sup> A nation is a group of people who share a vision of their society. They select what they consider the most important events in their history, shape them into myths and legends, and share them. One such event is the achievement of an ambitious national project.<sup>3</sup> For this reason, the Korean Astronaut Program (KAP) had an even bigger impact on Korean society than the moon landing.

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<sup>1</sup> Stephen Hilgartner, "Capturing the Imaginary: Vanguard, Visions and the Synthetic Biology Revolution," in *Science and Democracy: Making Knowledge and Making Power in the Bioscience and Beyond*, ed. Stephen Hilgartner, Clark A. Miller, and Rob Hagendijk (New York: Routledge, 2015). 36.

<sup>2</sup> Seungmi Chung, "Differing Conceptions of Space and Its Consequent Impact in Korean Space Policy" (paper presented at the The 63rd International Astronautical Congress 2012, Naples, Italy, October 3 2012 2012).

<sup>3</sup> Tyrone S. Pitsis et al., "Constructing the Olympic Dream: A Future Perfect Strategy of Project Management," *Organization Science* 14, no. 5 (2003). 574-590.

## Rationales for National Space Programs

It has long been considered that space activities are only possible through the effort of a nation as “markers of national identity,”<sup>4</sup> because of the enormous resources needed for a space program. Many countries have long had their own space programs. Like the *Apollo* project, many national projects have reflected their sociotechnical imaginaries, as evident in their rationales. Justified by rationales, space programs attracted public support, which ensured they continued. These rationales justify not only specific events like *Sputnik* and the moon landing, but also the entire space program.<sup>5</sup>

The rationales of the space programs of the two traditional space powers, the US and Soviet Union (now Russia), were different. The Soviet Union’s rationale was technological utopianism.<sup>6</sup> As such, the space program was a way to expand “the Soviet aspiration to dominate and transform nature for human ends from the earthly endeavors of industrialization and collectivized agriculture into the boundless realm of outer space.”<sup>7</sup> Therefore, they use terms like “conquering” or “mastering” space.<sup>8</sup> For the Soviet Union, space was the object to conquer. The space program including the launch of *Sputnik* and human spaceflight by Yuri Gagarin and Valentina Tereshkova operated under the rationale of expanding Soviet

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<sup>4</sup> Steven J. Dick, *Remembering the Space Age*, ed. Steven J. Dick (Washington D.C.: National Aeronautics and Space Administration Office of External Relations History Division, 2008). 17.

<sup>5</sup> Roger Handberg, "Rationales of the Space Program," in *Space Politics and Policy: An Evolutionary Perspectives*, ed. Eligar Sadeh, Space Regulations Library (Springer, 2004). 34.

<sup>6</sup> Asif Siddiqi, *The Red Rockets' Glare Spaceflight and the Soviet Imagination, 1857-1957* (New York: Cambridge University Press, 2010). 76-78.

<sup>7</sup> Slava Gerovitch, ""Why Are We Telling Lies?": The Creation of Soviet Space History Myths," *Russian Review* 70, no. 3 (2011).461.

<sup>8</sup> Ibid.

aspirations to space. The objectives of the space program were to showcase the excellence of the Soviet Union and socialism, and demonstrate that “flawless cosmonauts flew perfect missions, supported by unfailing technology.”<sup>9</sup> Thus, the Soviet Union dropped its ambition to send people to the moon after the success of *Apollo 11*.<sup>10</sup>

In contrast, the US space program was built on “space exploration.” The vision includes the new world, final frontiers, and freedom.<sup>11</sup> According to the National Aeronautics and Space Act of 1958, NASA was established “to provide for research in problems of flight within and outside Earth’s atmosphere.” The US should provide all humankind with “numerous scientific discoveries and technological advances” as the frontier.<sup>12</sup> President Lyndon Johnson stated, “In the eyes of the world, first in space means first period; second in space is second in everything.”<sup>13</sup> The US holds a concrete idea of human spaceflight. “Loss of human spaceflight . . . , crushes the dream and is a defeat for the human spirit.”<sup>14</sup> Humans should go to unknown space because it is the destiny of humanity, although it requires enormous resources and can lead to tragedy like the *Challenger* disaster.<sup>15</sup> This is consistent with the American national ideology of space as the “endless frontier” and the last place left

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<sup>9</sup> Gerovitch, ““Why Are We Telling Lies?”: The Creation of Soviet Space History Myths.” 463.

<sup>10</sup> Gerovitch, ““Why Are We Telling Lies?”: The Creation of Soviet Space History Myths.” 474.

<sup>11</sup> Howard E. McCurdy, *Space and the American Imagination* (Baltimore: The Johns Hopkins University Press, 2011). 34.

<sup>12</sup> The National Aeronautics and Space Administration, “NATIONAL AERONAUTICS AND SPACE ACT OF 1958, As Amended,” in *Pub. L. No. 85-568, 72 Stat. 426-438 (Jul. 29, 1958)*, ed. The National Aeronautics and Space Administration (Washington D.C.: NASA, 2008). <https://history.nasa.gov/spaceact-legishistory.pdf>.

<sup>13</sup> Walter A. McDougall, “Technocracy and Statecraft in the Space Age: Toward the History of a Saltation,” *American Historical Review* 87, no. 4 (1982).

<sup>14</sup> Handberg, “Rationales of the Space Program.” 38.

<sup>15</sup> Handberg, “Rationales of the Space Program.” 38.

to explore. Although both the Soviet Union and US wanted to be the first in space, the ideas underlying their programs differed.

Similarly, the rationales of European countries, the second tier of the space program, reflected the characteristics of European society. Germany's rationale for its space program is practical, namely to benefit society and the Earth, and improve living conditions. The motto of the German space program is "Into space for the benefit of humankind."<sup>16</sup> Although the US and Germany are working for the benefit of humankind, their rationales are different. In the US, the benefit is being the first to discover scientific knowledge, while in Germany it is finding a solution to problems and challenges on Earth.<sup>17</sup>

The UK's space program considers space a means rather than an end. Although it participates in the European Space Agency's (ESA) space program, it focuses on space science, earth observation, and telecommunications. Since the phase of space activity driven by technological challenge has ended, and the new phase of maturity has started, the UK spends its resources on current needs rather than future, risky goals.<sup>18</sup>

Two rationales dominate Asian space programs, which are newer than those of their counterparts. One rationale, exemplified in Kazakhstan, uses space in the interest of economic or technological development to become an advanced country. Since Kazakhstan

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<sup>16</sup> Federal Ministry of Economics and Technology, *Making Germany's Space Sector Fit for the Future: The Space Strategy of the German Federal Government*, Federal Ministry of Economics and Technology (Berlin: Federal Ministry of Economics and Technology, 2010). 1.

<sup>17</sup> Federal Ministry of Economics and Technology, *Making Germany's Space Sector Fit for the Future: The Space Strategy of the German Federal Government*. 9.

<sup>18</sup> Lord Reay, "UK Space Policy," *Space Policy* 7, no. 4 (1991).; Duncan Lunan, "'Report: British Rocketry and Space Development,'" *Space Policy* 17, no. 3 (2001), [https://doi.org/10.1016/S0265-9646\(01\)00032-7](https://doi.org/10.1016/S0265-9646(01)00032-7) 227-228; Dave Wright, "Taking Space to the Public," *Space Policy* 18, no. 1 (2002).: 67-68.

had its own space center before its independence from the Soviet Union, the space program is now used for rapid national and especially economic development.<sup>19</sup>

The second rationale is that space is a symbol of national advancement. In countries that adopted this rationale, a space program was important evidence of being a “global power”<sup>20</sup> and having global prestige.<sup>21</sup> It marks the historical moment between “before” and “after” in achieving a globally important country.<sup>22</sup> According to this rationale, the ability to maintain a successful space program should be indigenous, and not rely on other countries.<sup>23</sup> Upon launching its first satellite, Indian Prime Minister Indira Gandhi proclaimed it “a great day for India and for Indian science.”<sup>24</sup> China supported space development as a top national priority, which resulted in a strong space program. Its support for space development has been remarkably stable despite political, social, and economic changes. Space development was a symbolic achievement and the way to achieve the Chinese national dream.<sup>25</sup> China called space activity “an integral part of the states’ comprehensive development” including

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<sup>19</sup> Gulnara Omarova and Zhuldis Omarova, "Kazakhstan's Space Policy in a Changing National and Global Context," *Space Policy* 22, no. 3 (2006):200-204, 203.

<sup>20</sup> Dick, *Remembering the Space Age*. 27.

<sup>21</sup> *Ibid.*, 27.

<sup>22</sup> *Ibid.*,21.

<sup>23</sup> *Ibid.*, 22.

<sup>24</sup> *Ibid.*, 21.

<sup>25</sup> Iris Chang, *Thread of the Silkworm* (New York: Basic Books, 1995).; Hyunchul Gong et al., "Space Development Technology Trend of China," *The Trend of Aerospace Industry Technology* 2, no. 1 (2004): 94-105; Yanping Chen, "China's Space Policy- Historical Review," *Space Policy* 7, no. 2 (1991): 116-128; David Chen, "Book Review: Chinese Space Policy: A Study in Domestic and International Politics, Roger Handberg and Zhen Li, Routledge, New York, 2007," *Space Policy* 23, no. 3 (2007): 184-185.



“revitalizing the country with science and education and that of sustainable development, as well as in economic construction, national security, science, and technology development.”<sup>26</sup>

Korea’s space program fits into this second category. It uses the term “development” instead of “program” when referring to the space program, demonstrating the centrality of national development in justifying Korean space exploration.

### **Overview of the Korean Astronaut Program**

Korea’s ambitions for space do not differ much from those of other Asian countries. As chapter 2 shows, the Korean government’s space program and KAP operated under the general sociotechnical imaginary of national development: it was planned and operated for national prestige. However, how KAP set out to achieve national prestige differed from the ways typically employed under the traditional meaning of national development. Table 1 shows a timeline of the Korean Astronaut Program.

The idea of a Korean astronaut was first mentioned in December 2000 in the “Mid to Long-Term Space Development Basic Plan,” the basis of the Korean space program. The Korean astronaut in this plan differed from that imagined in KAP. KAP began in January 2004, when the Ministry of Science and Technology (MOST) proposed the program to President Moo-hyun Roh as one its major projects. KAP was planned and operated as a cooperative project with Russia. The Korea Aerospace Research Institute (KARI) was named the main agency of KAP in November 2005 and the Seoul Broadcasting System (SBS) as the main broadcasting company in April 2006.

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<sup>26</sup> Anonymous, "China's Space Activities," *Beijing Review.com.cn* (Beijing), October 24, 2007, [http://www.bjreview.com.cn/nation/txt/2007-10/24/content\\_82855.htm](http://www.bjreview.com.cn/nation/txt/2007-10/24/content_82855.htm).

**Table 1 Timeline of the Korean Astronaut Program<sup>27</sup>**

Period	Content
December 2000	The plan to train Korean astronauts was first mentioned in the <i>Mid to Long-Term Space Development Basic Plan</i>
January 2004	KAP was proposed in the annual report of MOST
September 2004	Joint Statement of the Ministry of Science and Technology of the Republic of Korea and Federal Space Agency of the Russian Federation (Roscosmos) was signed for KAP
November 2005	KARI became the main agency of KAP
March 2006	The plan for KAP was finalized by the Meeting of Science and Technology Related Ministers
April 1, 2006	The contract between KARI and SBS was signed to signify SBS as the main broadcasting company
April 19, 2006	Preliminary authority to proceed was signed by KARI and Roscosmos
April 21–July 14, 2006	The announcement was released and applications were opened
September–December 2006	The four-step selection process was carried out
December 7, 2006	The main contract between KARI and Roscosmos was signed
December 7, 2006	The 18 scientific experiments were decided
December 25, 2006	Dr. Soyeon Yi and Mr. San Ko were selected as the final candidates for the position of the first Korean astronaut
March 2007–March 2008	The two final candidates were trained in Russia at the Gagarin Space Center, the US, and Korea
March 10, 2008	Dr. Yi replaced Mr. Ko as primary astronaut
April 8–19, 2008	Spaceflight and the return to Earth (Dr. Yi)
August 2012	Dr. Yi took a leave of absence to enter the MBA program at UC Berkeley
August 2013	Dr. Yi married Jason Chung
August 2014	Dr. Yi resigned from KARI

The selection of the first Korean astronaut was run as a public competition from April 2006. In total, 36,206 applicants underwent a 4-stage selection process closely monitored by the Korean public. Through these stages, the number of applicants was reduced to 254, then 30, 10, and finally to 2 final candidates: Mr. San Ko and Dr. Soyeon Yi. Many people wrote about KAP in their blogs and posted in online forums. There were several

<sup>27</sup> KARI, *The White Paper of the Korean Astronaut Program* (Seoul: Saemteoosa, 2009). 29.

thousand discussions on KAP in online forums, and some applicants shared their KAP experience online. The KAP process was a topic of daily conversation in Korean society.<sup>28</sup>

The two finalists, announced on Christmas Day 2006, were Mr. San Ko and Soyeon Yi. They completed a year of astronaut training in Russia, the US, and Korea. Mr. Ko was initially selected as the primary astronaut, but when he was found to have violated regulations, the position passed to Dr. Yi, just several weeks before the scheduled spaceflight.

The *Soyuz* rocket with Dr. Yi and two cosmonauts on board was launched on April 8, 2008 from the Baikonur Cosmodrome. Two days later, the rocket docked at the International Space Station (ISS), where Dr. Yi stayed for ten days. She finished 18 scientific experiments, radio and TV interviews, ham radio communication, and appearances as the first Korean in space. She returned to Earth on April 19 in a ballistic re-entry.

After the return, she worked at KARI as a senior researcher in the Space Science Team, where she stayed for two years beyond her two-year mandatory appointment. There, she delivered many public lectures, popularizing science and technology across Korea by sharing her experience while conducting her own research. She wrote papers based on her experiments at the ISS and participated in other research projects on future space missions. However, she was best known for publicizing and popularizing science. In 2012, she took a leave of absence to complete an MBA at the University of California at Berkeley. She

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<sup>28</sup> Around 2,000 postings were written in the blog and online communities from NAVER and DAUM from April 2006 to April 2008. Many people participated in the discussion by writing responses to the postings; “I Come Back from the First Stage of KAP Selection Program,” <http://egloos.zum.com/Vernadete/v/2467757>, Blogs of Vernadete, (accessed October 2, 2019); “After Finishing 3.5 km Running for KAP in September 2”, [blog.naver.com/PostView.nhn?blogId=hyoonki&logNo=120028490513](http://blog.naver.com/PostView.nhn?blogId=hyoonki&logNo=120028490513), Blog of Hwang Yoonki (accessed October 3, 2019); The Limitation of KAP, <https://alltruth.tistory.com/37>, Speak the Truth, (accessed October 2, 2019).

married Jason Chung, a Korean-American optometrist, in August 2013, and resigned from KARI a year later by mail to stay with her family in Washington State in the US.

The debate over her position and meaning of KAP continued throughout her term as Korea's first astronaut, and intensified after she relocated to the US. Once the controversy spread to the meaning of KAP itself and whether or not Korea had its own astronaut, the program and Dr. Yi became the targets of heavy criticism.

### **Research Questions**

This research began with the questions: “Why was KAP seen as a failure and the first Korean astronaut as a traitor to Korea? Why did the reputation of KAP suffer even though it met its goals?” Answering these questions requires addressing the question of what happened to KAP before, during, and after the program. This research defines the debates around KAP and Dr. Yi as a conflict between two sociotechnical vanguards and one sociotechnical imaginary—MOST, KARI, and the existing images of astronauts in the Korean public sphere—and asks three categories of questions dealing with the sociotechnical imaginary, “expertization” with openness, and women in Science, as elaborated below.

#### 1. Sociotechnical imaginary and the sociotechnical vanguard

- What sociotechnical vanguards and sociotechnical imaginary existed in KAP? How were these vanguards constructed, articulated, and supported in Korean society?
- How have KAP and the Korean astronaut influenced Korean society? How did the struggle among these vanguards and imaginary change the

sociotechnical imaginary of Korea?

2. Expertization with openness

- How are experts constructed in an emerging scientific field? How does the national imaginary influence the making of experts?
- What happens to expert making when the process is open to everyone?
- Why and how did KARI portray the Korean astronaut as a space expert?  
How did that construction fail?

3. Women in Science and Technology

- Did Dr. Yi's gender influence the result of KAP?
- What is the significance of gender in science and technology, especially in an emerging science?

To answer these questions, I track KAP from the first proposal to the public discourse after Dr. Yi's spaceflight. I then analyze the meaning of KAP and changes in Korean society.

### **Analytic Framework and Literature Review**

This research uses two major theoretical frameworks to analyze the Korean Astronaut Program: national sociotechnical imaginaries and the study of expertise. These overarching frameworks are supplemented by a range of other theories including literature on women in science and feminist science and technology studies (STS), the experimenter's regress as discussed by Harry Collins, and Theodore Porter's discussion of the objectivity of numbers.

## National Sociotechnical Imaginaries and the Korean Astronaut Program

Science and technology have always talked about the future, and people have always dreamed of a future with more advanced science and technology, sometimes utopian and sometimes dystopian. When a socially desirable future is imagined and shared, it can be achieved through individual and collective action. People have dreamed of humans diving into deep oceans and going to the Moon, such as in Jules Verne's *Nautilus* and *From the Earth to the Moon*. Both dreams have materialized. The technology that made this possible could not have developed without society, in which the future is co-produced with technology. Sociotechnical imaginaries depict the future of a society with the technological system many people want. Jasanoff and Kim define *sociotechnical imaginaries* as “collectively held, institutionally stabilized, and publicly performed visions of desirable futures.”<sup>29</sup>

Sociotechnical imaginaries is a useful explanation of the ways in which images of the future are tied up with and help to stabilize particular social and technological orders in the present. Changes in technology and society are intertwined and shape the future together. With certain sociotechnical imaginaries, the present social order and direction of development are justified to achieve the desirable future in the imaginaries. It is not limited to a certain field, but covers all types of futures.

Catch-up or development ideology has been used to explain the future orientation of newly developed countries.<sup>30</sup> However, this term is limited to industrial, economic, and

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<sup>29</sup> Sheila Jasanoff and Sang-Hyun Kim, *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (Chicago and London: The University of Chicago Press, 2015). 4.

<sup>30</sup> Tom G. Kessinger Francis X. Sutton, James P. Grant and George Zeidenstein, “Development Ideology: Its Emergence and Decline [with Comments],” *Daedalus* 118, no. 1 (1989); Stephen Holmes Ivan Krastev, “Explaining Eastern Europe: Imitation and Its Discontents,” *Journal of Democracy* 29, no. 3 (2018).

technological futures, and does not capture changes in social conditions, virtues, and thoughts in a society. However, sociotechnical imaginaries incorporates this catch-up ideology, including the future from every perspective. The origin of sociotechnical imaginaries could be located in an individual or a small group of people, but when many people share a vision of the future, it becomes meaningful as a sociotechnical imaginary. In the case of the development of South Africa, Storey showed how a person could make a new, desired future society when society shares his vision.<sup>31</sup> Without the uptake of many people, a vision cannot be seen as a sociotechnical imaginary; rather, it remains what Hilgartner calls a “sociotechnical vanguard.”<sup>32</sup> Because sociotechnical imaginaries propose the shared future of many people, it could carry the ideologies, justice, virtues, and vision of a broader society.<sup>33</sup>

A sociotechnical vanguard is a relatively small collective that formulates and acts intentionally to realize particular sociotechnical visions of the future that have yet to be accepted by wider collectives such as a nation. Each vanguard has its own visions and struggles to achieve the position of a sociotechnical imaginary. The idea of a sociotechnical vanguard makes the concept of sociotechnical imaginaries more useful. Because sociotechnical imaginaries should be shared in society, they are not easy to create. A sociotechnical vanguard shows the previous stage of sociotechnical imaginaries and evolution to becoming a sociotechnical imaginary.

Thus, KAP can be understood as being shaped by a conflict between two sociotechnical vanguards, MOST and KARI, and one sociotechnical imaginary, the dominant

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<sup>31</sup> Jasanoff and Kim, *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. 34-55.

<sup>32</sup> Hilgartner, "Capturing the Imaginary: Vanguards, Visions and the Synthetic Biology Revolution." 34.

<sup>33</sup> Jasanoff and Kim, *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. 6-7.; <https://stsprogram.org/admin/files/imaginaries/NSF-imaginaries-proposal.pdf>

images in the Korean public sphere. MOST imagined the future Korea as a science-loving nation with a strong interest in science and technology. It defined KAP as a science-popularizing program and the first Korean astronaut as a promoter of science to achieve its vision. KARI imagined a future Korea as a world leader in science and technology, defining KAP as a research program to produce the know-how and technology of the human space program, which Korea did not yet have, and the first Korean astronaut as a researcher or a space expert. KARI's vision was similar to the traditional sociotechnical imaginary of Korean society: national development based on science and technology.

MOST and KARI attempted to instill their vision and image in Korean society, which already had its own sociotechnical imaginary of an astronaut. The program was defined to create heroes and a better country. KAP raised the widely shared expectation of a better Korea with a heroic Korean astronaut. The imaginary was constructed through popular culture and the space programs of other countries.<sup>34</sup> By having the same hero as other countries, Koreans believed that this character could catapult Korea into the rank of advanced countries.

The notion of national development informed all three visions; however, each defined national development in its own way. To MOST, national development meant giving Koreans a strong interest and background in science and engineering, which alongside a strong culture, would position Korea as an advanced country. KARI's national development was to catch up with better technologies. Furthermore, many Koreans imagined a developed nation with the national heroes seen in advanced countries.

KAP is not only the story of a new imaginary challenging an existing one. Two sociotechnical vanguards challenged the existing sociotechnical imaginary simultaneously.

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<sup>34</sup> McCurdy, *Space and the American Imagination.*; Parviz Tarikhi, "Iran's Space Programme: Riding High for Peace and Pride," *Space Policy* 25, no. 3 (2009).



This extends beyond the two conflicting imaginaries. This dissertation improves understanding of the characteristics of sociotechnical imaginaries and expands the application of the concept.

### Experts and Expertization

Although KAP is a story of conflict between two sociotechnical vanguards and a sociotechnical imaginary, it is also a story about the failure to create a new type of expert in an emerging field. Against the backdrop of conflicts between sociotechnical vanguards and imaginary, the status of the first Korean astronaut as a space expert was not accepted, thereby undermining the public legitimacy of both Dr. Yi and the program. Thus, this research focuses on how the first Korean astronaut appeared, was defined as a new space expert, and was then rejected by Korean society.

Experts have great authority in modern society based on their specialized knowledge. Their power, which is based on the inequality of knowledge, entitles them to greater participation in decision-making. Experts are essential in a society based on science and technology. However, the disparity in power between the knowledge of experts and non-experts could be harmful to democracy.<sup>35</sup>

The study of experts expands to the discourse on the classification and meaning of experts. Collins and Evans position expertise along a spectrum ranging from ubiquitous to contributory. Based on this classification, we are all experts, but not all scientific experts.<sup>36</sup> However, the authority of and public trust in expertise has eroded as uncertainties have

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<sup>35</sup> Turner, Stephen, "What is the Problem with Experts?" *Social Studies of Science* 31 no.1(February 2001):123-149.

<sup>36</sup> Harry Collins, *Are We Scientific Experts Now?* (Cambridge UK: Polity, 2014).131.

increased in this risk society, raising another level of expert. The mistrust regarding experts led laypeople to think that anyone could be one, including themselves. Consequently, the rise of ideas of the lay expert or experience-based expert is evident.<sup>37</sup> However, Collins and Evans claim that the line between experts and laypersons is an important way to separate specialist from non-specialist experts, even though all are experts.<sup>38</sup>

Various discourses exist on how experts gain their expertise. Relativists argued that expertise is relative and others' lack of ability can elevate a relatively weak ability to the level of expertise. Rosemary McKechnie elaborates, arguing that obtaining expertise is a social process and the concept of expertise itself is a socially achieved idea.<sup>39</sup> According to McKechnie, it changes according to changes in society and culture, because scientific expertise is also socially attributed. Realists, however, argue that expertise is expertise wherever it is, defining it as real knowledge, whether that knowledge is earned from experience or study. Therefore, whether others realize that the person is an expert or not, the person's expertise exists as real knowledge and the person is an expert.<sup>40</sup>

How scientific expertise can be earned is a particularly controversial issue. Usually,

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<sup>37</sup> Alan Irwin and Brian Wynne, eds., *Misunderstanding Science? The Public Reconstruction of Science and Technology* (New York: Cambridge University Press, 1996).; Ulrich Beck, *Risk Society: Toward a New Modernity*, ed. Mike Featherstone, Theory, Culture & Society, (London: SAGE Publications 2009).; Collins, *Are We Scientific Experts Now?*; Steven Epstein, "The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials," *Science, Technology, & Human Values* 20, no. 4 (1995).

<sup>38</sup> H.M. Collins and Robert Evans, "The Third Wave of Science Studies: Studies of Expertise and Experience," *Social Studies of Science* 32, no. 2 (2002). 250-251.

<sup>39</sup> Rosemary McKechnie, "Insiders and Outsiders: Identifying Experts on Home Ground," in *Misunderstanding Science?: The Public Reconstruction of Science and Technology*, ed. Alan Irwin and Brian Wynne (New York: Cambridge University Press, 1996). 23.

<sup>40</sup> Ben Kotzee and JP Smit, "Two Social Dimensions of Expertise," *Journal of Philosophy of Education* 51, no. 3 (2017), <https://doi.org/10.1111/1467-9752.12255>.

scientific experts acquire their expertise through their education and scientific experience in their field. However, this limits the expert to those who are scientists with formal training. Wynne opposed a definition of expertise that excludes non-scientists, describing Cumbrian sheep farmers as experts with their experience and tacit knowledge “located in specialists’ practice rather than in books.”<sup>41</sup> He argued that tacit knowledge has been used as an important criterion of experts, because it could be earned through one’s network and experience. Epstein showed how AIDS treatment activists earned credibility and expertise by learning the language of science and participating in knowledge production. In this research, he claimed that the role of the layperson does not remain passive; rather, they are active participants in the process of knowledge making as lay experts.<sup>42</sup>

Although much research focuses on gaining expertise and the criterion of experts, most studies do not detail the process. The literature tends to concentrate on whether or not certain groups of people are experts. The public has a blurred image of the process through which one becomes an expert. However, the image does not verify the process. In this dissertation, I examine how someone becomes an expert in emerging science and suggest a new term: expertization.

Scientific expertise confers credibility upon those who claim it. Without credibility, scientific experts would not have authority. Credibility is earned with social markers including academic degrees, academic track record, academic career, and affiliation.<sup>43</sup> A social marker is not suddenly bestowed on experts. They spend much time and effort

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<sup>41</sup> Irwin and Wynne, *Misunderstanding Science? The Public Reconstruction of Science and Technology*.

<sup>42</sup> Epstein, "The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials."

<sup>43</sup> *Ibid.*, 411.

obtaining their credentials and become experts over time. However, the process of becoming an expert is black-boxed. People outside the expert community do not know how experts earn social markers. They believe the social markers themselves verify the expertise without directly verifying the process through which one obtains this marker.

This trust in the process of becoming an expert can be destroyed when the box of unclear images is opened to the public. The credibility based on social markers can degenerate if the underlying process challenges public expectations through inauthentic or biased practices, or differs from the public image. Each element of credibility is subject to public judgment and should be verified, whether or not it really provides expertise to the expert. When it is not verified, credibility and authority as an expert are lost. As such, being an expert is not a stable status, but a process of expertization.

In Korea, KARI tried to define the Korean astronaut as a scientific expert in an emerging field—human space flight—in KAP. However, Dr. Soyeon Yi, the first Korean astronaut, did not suddenly emerge as an expert, but became an expert in the public eye. Every step of expertization was made public, and people examined every detail. Unlike that of other experts, the box of the expertization of Dr. Yi was open to the public. When people found an element that could not be justified, her expertise was compromised. Ultimately, Korean society rejected her status as a space expert.

With reference to the open expert-making process of KAP, this research improves our understanding of how society constructs experts and how the openness of expertization influences the making of these experts. This dissertation is a case study of expertization in an emerging science: Korea's human space program.

## Women in Science and the Korean Astronaut

The science and engineering fields have systematically excluded or downplayed the contributions of women. Rossiter calls this the “Matilda Effect.” Many female scientists went and continue to go unrecognized and unrewarded for their achievements despite achieving similar or even better results than male scientists.<sup>44</sup>

Science, especially physics, has been equated with religion. Wertheim claimed that women have to struggle to enter science just as they have to do to enter the priesthood.<sup>45</sup> Men have monopolized standard education in science and technology, and the realm of research was closed to women. From the era of Pythagoras, mathematics has been a male activity and women should be a mathematical male to do mathematics. Women are expected to hide their feminine characteristics and pretend to be male. Whenever there was a revival of mathematics and science, women were banned from participating. To access science and mathematics, women needed male supporters, usually their fathers, brothers, or husbands. However, even after getting science education, women were relegated to the sidelines as spectators and presenters, rather than scientists.

Even women trained in science were expected to be wives and mothers. Their roles as wives and mothers were more important than the role of scientist or mathematician. The achievement of female scientists was considered the achievement of their male co-researchers, even in the case of now famous women scientists such as Dr. Marie Curie. Descriptions of female scientists centered on their gender, not accomplishments. Women scientists were not women “scientists” but “women” scientists. Laura Maria Caterina Bassi is remembered for her 12 children and Maria Sibylla Merian as a good wife. A woman who neglected her family was criticized despite her enormous scientific achievements.

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<sup>44</sup> Margaret W. Rossiter, "The Matthew Matilda Effect in Science," *Social Studies of Science* 23, no. 2 (1993).

<sup>45</sup> Margaret Wertheim, *Pythagoras' Trousers: God, Physics, and the Gender Wars* (New York & London: W.W. Norton & Company, 1997).

The perception that science is a male activity and that women are less accomplished in the field has perpetuated, continuously injected to society through popular culture, and increasingly strengthened.<sup>46</sup>

This trend, most evident in the hard sciences, was not so only in the middle ages, but is also evident in the 20<sup>th</sup> century and now. For example, the women living in Los Alamos because their husbands worked there, were waiters. They complained that they had little time together without their own roles in the town, but Robert Oppenheimer refused to allow family problems to interfere with research.<sup>47</sup> The women in Los Alamos were there merely to support their husbands in their work. The same was evident in Livermore, where the secrecy of work created a solid border between men and women. Tasks in the laboratory were assigned based on gender. Most women in the laboratory worked as secretaries or researchers in the soft sciences, and although female secretaries had the security clearance to type documents, they could not participate in the work of male researchers. The weapons laboratory had no positions for women.<sup>48</sup>

The demarcation between men and women continued outside the laboratory. At home, husbands could not talk about their work, and wives could not enjoy the position women throughout history used to elicit scientific information from their husbands, usually professors or scientists. They knew nothing about what their husbands did all day. A few women researchers in the laboratory were expected to abandon their femaleness. When they acted like their male coworkers, they got positions in the laboratory. It was common that

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<sup>46</sup> Ibid.; Londa Schiebinger, *The Mind Has No Sex?: Women in the Origins of Modern Science* (Cambridge: Harvard University Press, 1996).

<sup>47</sup> Charles Thorpe, *Oppenheimer: The Tragic Intellect*, (University of Chicago Press: Chicago and London, 2006.), 92, 133.

<sup>48</sup> Hugh Gusterson, *Nuclear Rites: A Weapons Laboratory at the End of the Cold War*. (University of California Press: Berkeley, Los Angeles, and London, 1998).94-100.

women would behave like men when performing a public role,<sup>49</sup> as women and their femaleness were considered useless and as weak points in scientific society.

Sharon Traweek made similar observations about high energy physicists. Very few female scientists were physicists in the US, Japan, and Europe, and those that were, all had a privileged background. Even in the Stanford Linear Accelerator Center (SLAC), only a few wives of physicists in the physics communities had careers, but outside of science, most wives did not work outside the home.<sup>50</sup> From the Manhattan Project to weapon science and nuclear accelerators, the fields of hard science have not been open to women.

The space field, especially the role of the astronaut, cannot be free from masculine culture. Astronauts and cosmonauts represented their programs, were admired for their unique skills,<sup>51</sup> and were expected to be perfect. In the US, they were Caucasian males with a military background. Women and racial minorities were not considered. Astronauts' military background strengthened this masculine characteristic.<sup>52</sup> Although women trained for the *Mercury 13* project, this private project was finally rejected.<sup>53</sup> The position of astronaut or cosmonaut was first open to white males, then expanded to include black males, and then to women. The first female astronaut in the US, Sally Ride, was selected in 1978, almost 20 years after the first astronauts in the country. The image of astronauts' wives was similar to that of the wives in the Los Alamos and Manhattan Project: they were expected to support their husbands in flying to space and bolster their public image. Astronauts were considered good

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<sup>49</sup> Ibid.

<sup>50</sup> Sharon Traweek, *Beamtimes and Lifetimes: The World of High Energy Physicists*. (Harvard University Press: Cambridge and London, 1988.), 83-84.

<sup>51</sup> Matthew H. Hersche, *Inventing The American Astronaut*, (Palgrave Macmillan, 2012.) 1-8.

<sup>52</sup> Ibid, 16.

<sup>53</sup> Martha Ackmann, *The Mercury 13: The True Story of Thirteen Women and the Dream of Space Flight* (New York: Random House, 2003).

fathers and husbands, and their wives were expected to be loyal. They were praised for the successful and safe return of their husbands.<sup>54</sup>

Because of Korea's traditional Confucian culture, women have been marginalized in science and industry in Korea. The little opportunity of modern higher education focused on males, and prestigious positions as technicians and engineers were reserved for men.<sup>55</sup>

Korea's patriarchal culture is an important barrier to Korean women who want an education. Korean women who became scientists had families that supported their Science, Technology, Engineering, and Mathematics (STEM) education, as did women scientists in the Middle Ages.<sup>56</sup> Although the number of female students in STEM fields continues to increase, most growth is in fields like bioengineering and environmental engineering, which are considered less masculine. To study and work in the hard sciences, women need to be familiar with masculine culture in the STEM field and be masculine.<sup>57</sup>

In Korea, few women have advanced training in science and technology,<sup>58</sup> and those that do are expected to abandon their femininity and follow male culture to survive.<sup>59</sup> Korean women scientists and engineers are also expected to fulfill the role of wife and mother while

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<sup>54</sup> Jodi Dean, *Aliens in America: Conspiracy Culture from Outerspace to Cyberspace*, (Cornell University press: Ithaca and London, 1998), 80-86.

<sup>55</sup> Kyonghee Han and Gray Lee Downey, *Engineers for Korea*, (Morgan & Claypool, 2014.) 8.

<sup>56</sup> Ara Cho and Jinhee Park, "The Features of 'Becoming a Scientist' of Korean Women Scientists," *The Journal of Asian Women* 49, no. 2 (2010).

<sup>57</sup> Heh-Jeong Moh and Jae Kyung Lee, "Women's Education and the Patriarchal Culture of Engineering," *Journal of Korean Women's Studies* 12, no. 1 (1996).; V. Narry Kim et al., *The Women Who Do Science*, ed. Korea Foundation of Women's Science & Technology Associations (Seoul: Medici media, 2016).164; So Young Sohn et al., *The Women Who Do Engineering*, ed. Korea Foundation of Women's Science & Technology Associations (Seoul: Medici Media, 2017).

<sup>58</sup> *Ibid.*, 12.

<sup>59</sup> *Ibid.*, 123.



simultaneously performing their role as a scientist or engineer. Many leave or change their career after having children if there is no support from their family,<sup>60</sup> which makes it difficult for female students in STEM fields to find female role models.<sup>61</sup>

For Dr. Yi to be a female engineer, she had to be a woman and the first Korean astronaut. As KAP was both a publicity and research program, Dr. Yi had two roles: woman and astronaut. She had to be an ideal lady and professional manlike astronaut. Although she fairly competed with other applicants and was selected as one of two final candidates, she received lower evaluations from the Korean public. Her story is of a female engineer in Korean society and of a woman before men in an emerging science. The examination of Dr. Yi as a woman engineer continues in Chapter 5.

### Previous research on KAP

Park and Hwang focus on the media and public response. Park claims that the media tried to convince the public that the space age is now. Hwang examines how the media covered KAP and how this coverage differed from that of other science issues. As discussed further in the social section in media, Hwang claims that KAP guided different attitudes in terms of its handling of the success and failures of science events.<sup>62</sup>

An and Lee examined KAP as part of the Korean space program. An analyzed the Korean space program based on nationalism, focusing on the history of the development of Korean space objects, namely satellites and rockets. He also argued that KAP was a project to

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<sup>60</sup> Kim et al., *The Women Who Do Science*. 21, 37, 71.

<sup>61</sup> Sohn et al., *The Women Who Do Engineering*. 9.; Kim et al., *The Women Who Do Science*. 78.

<sup>62</sup> Woo Jin Park, *A study on the Korean Astronaut Program as a media event based on the discursive analysis on SBS Program 'Space Korea'*, Master Thesis, Yonsei University, January 2010; Yu Na Hwang, *Comparison of the coverage characteristics of a media event type science news focusing on the coverage of the Korean Astronaut Program and the KSLV-1 Launch*, Maser Thesis, Korea University, June 2010.

catch up to advanced technologies and emphasized the meaning of nationalism in the program. Dr. Yi's statement, "The Korea, as seen from space, is one country," emphasized nationalism in terms of mixing the soil of North and South Korea. Lee provides a different view of KAP, focusing on how the Korean human space program lost the original rationales and Korean dream.<sup>63</sup>

### **Methodology and Sources**

This research was conducted through archival work and oral interviews. Evidence was collected from archives, interviews, government documents, and the media.

The major archives are the National Archive in Korea and National Assembly library. The National Archive in Korea offers access to government documents and media files. Its branches include Daejeon Main archive, Seoul archive, Busan archive, and the President's archive in Sejong. I consulted the President's Archive, Daejeon, and the Seoul branches, which contain historical documents on the Korean space program and human spaceflight. I also collected government documents that provide a clear vision of MOST and Korea's longstanding imaginary. Specifically, the speeches and statements of previous Korean presidents are important evidence of Korean sociotechnical imaginary.

The National Assembly library houses all published materials in Korea and of the National Assembly. I collected the minutes of small committees in the National Assembly and materials for policymaking. The minutes of parliamentary inspection are important

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<sup>63</sup> Hyoung Joon An, "National Aspirations, Imagined Futures, and Space Exploration: the Origin and Development of Korean Space Program 1958-2013" (Doctor of Philosophy Dissertation, Georgia Institute of Technology, 2015).; Seorim Lee, "Space Development without a Dream: Implications of an Industry Focused Space Policy in Establishing a Sustainable National Space Program" (Ph.D. KAIST, 2018).

evidence of various imaginary regarding KAP, which was an issue in the parliament inspection for ten years. In these, KARI answers questions pertaining to the program. I collected all magazines and publications about KAP and Dr. Yi, including articles about Dr. Yi and Ko after they left KARI. These materials are important sources for understanding the public response and what was discussed after the flight.

Furthermore, I used the online archive from the Ministry of Science, ICT and Future Planning (MSIP; formerly MOST) library. It has several versions of the basic plan of space programs, minutes of the National Committee of Science and Technology, and reports of contracted research projects funded by MOST. These are important sources for the imaginary of MOST and public perception of KAP in the Korean space program and society.

I obtained the materials released by KARI through my personal contacts. Since many reports are classified, I was able to gain access to them through my interviewees or from people employed in the space field in Korea. These documents reveal KARI's vision.

I used two online archives to collect media, especially published sources: NAVER News Library (<http://dna.naver.com/search/searchByDate.nhn>) and KINDS media archive (<https://www.bigkinds.or.kr>).

The NAVER News Library is the digital archive for newspapers from 1920 to 1999. It provides old newspapers in their original format. Although it does not include all newspapers in Korea, it has *The Dong-a Ilbo* (established April 1, 1920), *Kyunghyang Shinmun* (established October 6, 1946), *Maeil Business Newspaper*, and *The Hankyoreh* (established May 15, 1988). These newspapers have the second, ninth, fourth, and seventh-largest circulations in Korea.<sup>64</sup> The political characteristics of newspapers are also covered in

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<sup>64</sup> Certificated number of copies of 166 Daily Newspaper for Year of 2018 (Contents for Year of 2017) by Korea Audit Bureau of Certification. (<http://www.kabc.or.kr/about/notices/100000002823>) (accessed by September 19, 2019.)

NAVER News library. *The Dong-a Ilbo* is conservative, *Maeil Business Newspaper* is conservative-leaning, and *Kyunghyang Shinmun* and *The Hankyoreh* are progressive. Therefore, the NAVER News Archive is a good source for public opinion. I used this database to understand the prehistory of KAP and the Korean space program.

The KINDS database is operated by the Korean Press Foundation. It contains about 60 million articles from 54 daily newspapers, broadcasting companies, and regional newspapers since 1990, making it the biggest media database in Korea. On this database, I searched for articles related to KAP and Dr. Soyeon Yi, and tracked the changing public opinion over time. I collected and analyzed articles from the beginning of KAP to 2019. and

I also collected data from TV programs broadcast by SBS, the main broadcasting company of KAP. I watched the 52 episodes of *SBS Space Korea*, news programs, and documentaries about KAP and Dr. Soyeon Yi, and TV programs from the beginning of KAP to 2019. This evidence was collected through the replay from each broadcasting company. I purchased the video files of *SBS Space Korea* from SBS.

Oral interviews were another important source for this research. The interviewees were employed at MOST and KARI, and were participants in the development of scientific experiments at KAP and applicants to KAP including Dr. Soyeon Yi. The persons employed at MOST, including Minister Myung Oh, provided a clear vision of the ministry in terms of KAP, and employees of KARI shared the vision and perspective of the institute for the program. The interviews highlight a stark difference between the two visions. I also interviewed people who worked in the media, including a person from SBS and someone who had interviewed Dr. Yi. In addition, I interviewed the organizer of KAP's tenth anniversary celebration to understand public opinion after the program ended. Table 2 shows the number of interviewees.

**Table 2 Number of Interviewees**

Affiliation	Number of Interviewees
MOST	6
KARI	4
Applicants	3
Media, etc.	5

### **Contributions and Limitations**

This research extends the application of sociotechnical imaginaries and study of expertise using KAP to examine the clash between two sociotechnical vanguards and a sociotechnical imaginary to achieve the status as a new sociotechnical imaginary. In this research, the sociotechnical imaginary is applied to a large government-led science project isolated from public influence. Here, the struggle to be the sociotechnical imaginary has changed as the space program became a household topic.

The change of sociotechnical imaginary is also seen in KAP's influence on Korea's science culture. The program's exhibitions and astronauts are showcased in many science museums and is the dream of the "Soyeon Yi kids" to become astronauts or space engineers. Thus, a better understanding of KAP improves Korea's STEM education and space culture. Dr. Yi has a PhD in engineering, and KARI hired her as a researcher. Furthermore, she is a female astronaut before any male, which enables advancing the discourse on Korean women scientists and engineers.

It also allowed a new imaginary in Korean society, changing Korea's sociotechnical imaginary from a catch-up ideology to a more cultural one. Examining how this happened

helps us understand the construction of a national sociotechnical imaginary in a new field. This could be a good example of the conflict between the struggle between the visions of vanguards in emerging science, especially space programs in other developing countries. Better understanding KAP and conflicts between imaginaries helps in the collaborative planning and operation of other space programs, and could serve as a guideline for other Asian countries designing their own astronaut programs.

This research expands the study of expertise from the discourse of status and having expertise to the issue of process and becoming an expert. Collins and Evans produced a typology of expertise,<sup>65</sup> and Epstein proposed the concept of lay expertise. In both cases, tacit knowledge is an important criterion of expertise.<sup>66</sup> The issue is whether the person has enough tacit knowledge to be considered an expert. However, this research could help explain how experts are socially constructed, especially in emerging science, and how the openness of expertization influences expert-making through KAP's open process thereof.

After the first human space flight, many researchers studied how astronauts struggled to achieve and retain their status as experts. Mindell described the Apollo project as a struggle to justify astronauts' roles and the meaning of human spaceflight with machines.<sup>67</sup> Some scholars focused on how women entered the astronaut society,<sup>68</sup> and other

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<sup>65</sup> Harry Collins and Robert Evans. *Rethinking Expertise*. (University of Chicago Press: Chicago, 2007).

<sup>66</sup> Alan Irwin, and Brian Wynne eds., *Misunderstanding Science? The Public Reconstruction of Science and Technology* (London: Cambridge University Press, 2004); Steven Epstein, "The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials." *Science, Technology, & Human Values*, 20(4, Autumn 1995):408-437.

<sup>67</sup> David A Mindell, *Digital Apollo: Human and Machine in Spaceflight* (Cambridge: The MIT Press, 2008).

<sup>68</sup> Martha Ackmann, *The Mercury 13: The True Story of Thirteen Women and The Dream of Space Flight* (New York: Random House Inc., 2004); Bettyann Holtzmann Kevles, *Almost Heaven: The*

analyzed the events and meaning of space flights and the people and processes behind them.<sup>69</sup> However, most research on the human space program is limited to advanced countries with little relevance to Asia. This research could complement the literature on Asian studies. Furthermore, KAP was the story of a woman astronaut, the first in Korea, her attempt to position herself in society, and of the people who wanted to define her. Thus, this study builds on previous research on astronauts and provides new insights into the construction of the meaning and identity of these astronauts in a non-western context.

This study provides a better understanding of these discourses in Korean society, and can shape space programs in Korea and other countries as well as the scientific culture of societies that do not yet have a strong science culture. Furthermore, it enhances understanding of women in science and engineering.

Finally, this research stimulates discussions of the negative results thereof. Most academic research describes positive results. Although failures are important in research and help other scientists modify their research plans, academic publications do not like to report them.<sup>70</sup> This preference for successful projects extends to the research project. In KAP, all actors achieved or exceeded the expected goals. However, based on the assumption that KAP was a failure, Koreans stopped wanting to talk about it, and the program became a taboo in

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*Story of Women in Space* (Cambridge: The MIT Press, 2006); Amy E. Foster, *Integrating Women into the Astronaut Corps: Politics and Logistics at NASA, 1972-2004* (Baltimore: The Johns Hopkins University Press, 2011).

<sup>69</sup> Margaret Lazarus Dean, *Leaving Orbit: Notes from the Last Days of American Spaceflight* (Minneapolis: Graywolf Press, 2015); Chris Jones, *Out of Orbit: The True Story of How Three Astronauts Found Themselves Hundreds of Miles Above The Earth With No Way Home* (Toronto: House of Anansi Press Inc., 2008); Jay Barbree, *Neil Armstrong: A Life of Flight* (New York: Thomas Dunne Books & St. Martin's Press, 2014); Wayne Hyde, *The Men Behind the Astronauts* (New York: Dodd, Mead & Company, 1965); Joseph D. Atkinson, Jr. and Jay M. Shafritz, *The Real Stuff: A History of NASA's Astronaut Recruitment Program* (New York: Praeger Publishers, 1985).

<sup>70</sup> Phyllis G. Weintraub, "The Importance of Publishing Negative Results," *Journal of Insect Science* 16, no. 1 (2016), <https://doi.org/10.1093/jisesa/iew092>. 109.

Korean society. Based on a comprehensive examination of KAP and Korea's first astronaut, this dissertation considers the meaning of success and failure in scientific programs.

## **Chapter Organization**

This dissertation consists of an introduction, conclusion, and four chapters. Chapter 2 covers the years before KAP. I analyze the history of the national imaginary of the Korean space program, and review previous trials of the Korean human space program through government works such as policies, laws, and international activities. The analysis describes the history of the Korean space program and human space flight before KAP.

Chapter 3 focuses on the period from the first proposal for KAP in January 2004 to the beginning of the selection process in April 2006. I trace how one person's dream transformed into the sociotechnical vanguard and the conflict between sociotechnical vanguards in institutional politics.

Chapter 4 covers the selection to Dr. Yi's spaceflight, and her portrayal by KAP as a space expert. In the selection process, KARI expressed its imaginary, which defined KAP as a research program and the Korean astronaut as a researcher or space expert in the structure of the selection process, described the training, and focused on scientific experiments. This chapter examines how the general person transformed into an expert in the open space.

Chapter 5 covers the aftermath of the spaceflight. It traces the clash between national sociotechnical vanguards after Dr. Yi's spaceflight and the result of KAP and expert making. I examine how the meaning of the first Korean astronaut was constructed through her own and other's actions, and why the Korean public turned against her. I conclude that the outcome of KAP was pre-determined regardless of Dr. Yi's performance as a Korean astronaut.



The conclusion summarizes the most important findings and arguments. It shows the change in Korean society's public perception of space after KAP in the public sphere and growth of the public discourse.

## Chapter 2. Imagining Korea in Space

The Korean space program was developed as part of the larger socio-technical imaginary of National Development. However, this high-level analysis does not provide an understanding of the specific program choice or clear direction on how to orient space programs that require a struggle over the sociotechnical imaginary of space itself. Although Korea had an interest in space programs and the Korean nation imagined space, the interest did not lead to the construction of the national sociotechnical imaginary of the Korean space program. An tries to dissect the transition of the imaginary of the Korean space program from modernity to self-defense, economic security, and national prestige (Table 3).<sup>71</sup> However, these were a different expression of national development, not the imaginary of the Korean space program.

**Table 3 Rationales of the Korean Space Program<sup>72</sup>**

	1958–1969	1970–1984	1985–1997	1998–2013
Imaginary	Modernity	Self-Defense	Economic Security	National Prestige
National Space Project		Paekkom missile	Satellite (KoreaSat, KITsat, KOMPsat series), Sounding Rockets (KSR-I, II)	Satellites (KOMPsat, STsat, Comsat series), Sounding Rockets (KSR-III), KSLV-1, KAP

<sup>71</sup> An, "National Aspirations, Imagined Futures, and Space Exploration: the Origin and Development of Korean Space Program 1958-2013."

<sup>72</sup> An, "National Aspirations, Imagined Futures, and Space Exploration: the Origin and Development of Korean Space Program 1958-2013."

Modernity is not the same as modernization in English. It refers to a comfortable standard of living, and expresses the strong desire of a poor country after the war to satisfy physiological needs such as having enough to eat, wearing good clothes, and educating children.

From there, it transitioned to the need for self-defense, which was made important by the confrontation between South Korea and North Korea. The Paekkom missile was developed for this purpose. After achieving self-defense, it became important to establish economic security to sustain a stable economy in Korea. The civil space program began, and various satellites including the first Korean one, KITSAT-1 (Korea Institute of Technology Satellite -1), communication satellites, and broadcasting satellites were developed.

In the last stage, national prestige is desired to ensure the country is equal to other nations. Like other Asian countries, Korea used its space program to become a global power and elevate its national prestige to the global level.<sup>73</sup>

According to the change of imaginary of the Korean space program, the Korean government showed an interest in space. The media and other forms of public communication showed how Koreans imagined space. In the 1950s and 1960s, Korea was a poor, but rapidly developing country.<sup>74</sup> However, the Korean government tried to demonstrate its interest in space to other countries and its nation. It joined international agreements on space, communicated with other countries about space, and promoted civil space programs through other countries' cases.

As Korea experienced rapid national development, the imaginary of a space program reached the public sphere. This imaginary was closely connected with the longstanding

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<sup>73</sup> Dick, *Remembering the Space Age*. 27.

<sup>74</sup> Jong Won Lee, "The Impact of the Korean War on the Korean Economy " *International Journal of Korean Studies* 5, no. 1 (Spring/Summer 2001). 109.

sociotechnical imaginary of Korean society, namely national development. However, it could not offer specific guidance to the Korean space program, which has consequently been floundering without clear direction despite that many space programs have been proposed, planned, and operated.

There was no shared discourse on the space program, space policies and laws, and space institutions when the issue of human space flight emerged in Korea. In this chapter, I explore the Korean government's efforts regarding space issues before the beginning of the Korean space program by examining laws, policies, international activities, and public promotion strategies. I also examine the background of KAP and national imaginary of the Korean space program by analyzing the first attempts to establish a human space program.

### **Imaginations of the Korean Space Program**

Research on the imaginaries of space programs has usually been performed in terms of rationales, which are used to justify the vision of each imaginary. However, the rationale for space development has changed. In the early stage of space programs, the rationales focused on scientific knowledge and national security. The space race between the US and Soviet Union could be considered the manifestation of technology and latent military power; however, this later changed to commercial application and economic benefit.<sup>75</sup> Van Dyke considered the motives of the US space program as including military security, both immediate and conjectural; peace and cooperation; science and technology; economics and social progress; national prestige; various “special interests and ulterior motives”; and national pride.<sup>76</sup>

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<sup>75</sup> Roger Handberg, 2004. “Rationales of the Space Program.” *Space Politics and Policy* 2(1):27-42.

<sup>76</sup> Vernon Van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana: University of

The Korean space program has operated with various rationales under the imaginary of national development. Kim views Korean space development as commercialism, and Korea has had to find its own goal and reason suited to Korean conditions and purposes.<sup>77</sup> Cho argues that Korean science and technology policy is “techno nationalism,” contending that industrial competitiveness is only a more detailed type of techno nationalism. In Korea, the industrial promotion policy is considered the most important part of science and technology policy.<sup>78</sup> This was the same in the space program. These scholars show that the rationale of the Korean space program was commercialism and the promotion of industrial competitiveness.

The Korean civil space program can be divided into four periods (1989–1993, 1994–1999, 2000–2005, after 2006) based on the priority of rationales. The priority has changed from the acquisition of technology and knowledge to economic benefit. Based on an analysis of turning points, critical events, space-related acts and policy, and national space projects, An delineated the national imagination of the Korean space program into four periods: modernization in the 1950s–1960s, self-defense from 1970 to 1984, economic security from 1985 to 1997, and national prestige from 1998 to 2013.<sup>79</sup> An’s periodization covers the entire Korean space program and is based on national imaginaries.

One similarity between studies on the rationales of the Korean space program stands out, namely nation building based on economic development as the prevailing rationale.

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Illinois Press, 1964).

<sup>77</sup> (In Korean) Jong Bum Kim, “Rationales of Korean Space Development,” *Technology Trend of Aerospace Industry* vol.4, no.2 (2006): 3-9.

<sup>78</sup> (In Korean) Cho, Hyun-Suk. 2002. “A Study of Science and Technology Policy in Korea: Searching for New policy Ideas.” *Science and Technology Studies*. 2(1):85-105.

<sup>79</sup> An, "National Aspirations, Imagined Futures, and Space Exploration: the Origin and Development of Korean Space Program 1958-2013."

Commercialism is central to Kim's study, and Cho claimed that industrial competitiveness and techno nationalism form the basis of Korean science and technology policy. The periodization of the Korean space program also included economic benefits through technology acquisition as an essential factor in the Korean space program. Furthermore, An argued that the Korean space program is closely related to nation building, and that economic security was the major imaginary of the third period.

It has a solid basis. Science and technology appeared in the sixth version of the Korean constitution, which was revised in December 1962 and released in December 1963. It states that science and technology are “for the economic development of Korean society.”<sup>80</sup> The eighth version of the Korean constitution says that science and technology should be developed and promoted “for national economic development.”<sup>81</sup> As such, the perspective about science and technology in the Korean constitution has centered on economic development, and science and technology have been tools of economic growth into the tenth and current version of the Korean constitution.<sup>82</sup> This indicates that science and technology in Korea have been understood and used as a tool of national—mainly economic—development. The Korean space program cannot be excluded. However, science and technology for economic growth could not provide clear guidance for the Korean space program.

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<sup>80</sup> The Sixth Version of the Korean Constitution, National Law Information Center, [www.law.go.kr/lsInfoP.do?lsiSeq=53191&ancYd=19621226&ancNo=00006&efYd=19631217&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202#0000](http://www.law.go.kr/lsInfoP.do?lsiSeq=53191&ancYd=19621226&ancNo=00006&efYd=19631217&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202#0000) (Accessed August 25, 2019).

<sup>81</sup> The eighth Version of the Korean Constitution, National Law Information Center, [www.law.go.kr/lsInfoP.do?lsiSeq=53087&ancYd=19721227&ancNo=00008&efYd=19721227&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202#0000](http://www.law.go.kr/lsInfoP.do?lsiSeq=53087&ancYd=19721227&ancNo=00008&efYd=19721227&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202#0000) (Accessed August 25, 2019).

<sup>82</sup> The tenth Version of the Korean Constitution, National Law Information Center, [www.law.go.kr/lsInfoP.do?lsiSeq=53087&ancYd=19721227&ancNo=00008&efYd=19721227&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202#0000](http://www.law.go.kr/lsInfoP.do?lsiSeq=53087&ancYd=19721227&ancNo=00008&efYd=19721227&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202#0000) (Accessed August 25, 2019).

## National Interest in Space

The Korean government tried to show national interest in space issues with the firm intention of science and technology for national economic development. It developed international relations in the space field by joining international agreements, communicating with countries with advanced space programs about space-related events, and promoted space exploration in the Korean public sphere.

### Building International Relations

From its inception in August 1948, the Korean government showed an interest in space. The first action was the application in November 1949 to the International Telecommunication Union (ITU), “the United Nations specialized agency for information and communication technologies.”<sup>83</sup> The first application was rejected in March 1950. The government reapplied two months later, and was admitted to the ITU in January 1951.<sup>84</sup> Although the ITU is not a space agency, it does allocate global radio spectrum and satellite orbits, which is directly related to space.<sup>85</sup> Thus, this shows that the Korean government was interested in space technologies for the purpose of national development before it launched any space programs.

In the 1950s, economic and industrial development was the most crucial task of the Korean government. The military regime led by Chung-hee Park, who seized power through a coup d'état in 1961, wanted to develop Korea through science and technology. The Korea

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<sup>83</sup> “Overview,” ITU, accessed February 7, 2018, <https://www.itu.int/en/about/Pages/overview.aspx>

<sup>84</sup> “History of Information and Communication,” National IT Industry Promotion Agency, accessed February 7, 2018, [https://www.nipa.kr/cyber/historySub.it?value=history\\_1945\\_4](https://www.nipa.kr/cyber/historySub.it?value=history_1945_4) ; ITU approved the join of Korea in October 1950. But, Korea became the member of ITU in January 31, 1952 because the Korean War broke out in June 1950.

<sup>85</sup> ITU “Overview.”

Institute of Science and Technology (KIST) was established, the first national research institute of science and technology in Korea in 1966, and MOST was established in 1967. President Park's intention was clear in the second five-year economic development plan, namely to promote science and technology as tools of economic growth. The Korean government controlled science and technology.<sup>86</sup> For instance, the government asked the Export-Import Bank of the United States for a loan to establish a domestic base station of satellites.<sup>87</sup> After signing the loan agreement in 1967, the base camp of satellites was established at Geumsan in June 1970. This indicates that the Korean government was interested in the use of satellites.

Thereafter, the Korean government more actively demonstrated its interest in space, and the country signed several international agreements in this regard. In 1967, it joined a space agreement by the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) and Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies in 1967. It later signed the Agreement of the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space (1968); Convention on International Liability for Damage Caused by Space Objects (1972)<sup>88</sup>; and the Outer Space Treaty and Convention on Registration of Objects Launched into Outer Space (1981).<sup>89</sup> Among these agreements, the

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<sup>86</sup> The Compilation Committee of the Forty-Year History of Science and Technology, *The Forty—Year History of Science and Technology* (MOST, 2008).

<sup>87</sup> “(US EXIM) Files of Loans for the Construction of Earth Station of Satellite Communication, 1968-1968” (1968), (Document number BA0146645); “Files of Loans for the Construction of Satellite communication for Existing satellite, 1968-1968”, (1968), (Document number BA0146657); “Files of Loans for the Construction of Satellite communication for Existing satellite, 1968-1968”, (1968), (Document number BA0146691), Korean National Archive, Seongnam, South Korea.

<sup>88</sup> It was finally approved by the Korean Cabinet Council on September 21, 1979.

<sup>89</sup> MOST, *2006 Space Development Whitepaper*, (MOST, 2006), 81-83; “Korea Joined the



Outer Space Treaty and Convention on Registration of Objects Launched into Outer Space deals with the regulation of space use and registration of launched objects by each country. Therefore, joining these agreements implies that the country is planning to soon operate space programs.<sup>90</sup> The Korean government then planned to launch a space program from the late 1960s. In 1969, Korea attended the World Administrative Radio Conference about space communications (WARC) in Geneva, Switzerland, and in 1971, the International Telecommunications Satellite Organization (INTELSAT).<sup>91</sup>

In the 1980s, the Korean government intensified and diversified its activities. The Korean government continued to attend international conferences and to join regulations of space applications including the use and management of radio frequencies and development of communication technologies for constructing the Asian telecommunication network.<sup>92</sup>

#### Showing National Interest in Space

The Korean government expressed its interest in space to other countries whenever possible. President Chung-hee Park sent a congratulatory message to NASA on the success of the *Gemini* project in 1965, receiving a reply from Dr. Kurt H. Debus, the director of John F.

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Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 1969.4.4,” (1969), (Document number CA0006396), Korean National Archive, Seongnam, South Korea.

<sup>90</sup> Sanghyup Kim, “<’North Korea noticed to launch rocket in the next month’> North Korea, Join the ‘Space Agreement’ in a hurry in this month.,” *Moonhwa Ilbo*, 2009.3.13.; The north Korea joined these treaties just before the Gwangmyungsung-2 launching in 2009.

<sup>91</sup> “World Administrative Radio Conference about Space Communication, 1967-1971,” (1971), (Document number BA0109460) Korean National Archive, Seongnam, South Korea.

<sup>92</sup> “Document for Technology Cooperation Relationship 1982-1982” Ministry of Information and Communication Bureau of Information and Communication Policy, Industrial Technology Team. (Document Number DA106067).

Kennedy Space Center, NASA.<sup>93</sup> When astronaut Walter M. Schirra and Frank Borman, and their families visited Korea in 1966, the government extended a warm welcome. The police, administrative departments, and local government prepared the welcome ceremony, which was attended by 50,000 citizens.<sup>94</sup> The event cost 1,018,800 KRW (US\$ 3,750 in 1966), enough to support a family of 5 for more than 7 years.<sup>95</sup> The astronauts sent a mail to President Chung-hee Park thanking him for the lavish welcome.<sup>96</sup>

The American astronauts visited more than once. In November 1969, the astronauts of *Apollo 11* visited Korea. In addition to preparing a big welcome ceremony, the Korean government made a movie in Korean and English covering the full story of the visit. It emphasized the close relationship between the American astronauts and Korea, mentioning that Neil Armstrong and Buzz Aldrin had fought in the Korean war. The movie, which was disseminated to other institutes and countries, strengthened the friendship between the US and Korea by documenting the ceremony to welcome the Apollo astronauts. The astronauts were hailed as space heroes, and several words such as astronauts, spacemen, and moon men were used in the movie with reference to the American astronauts manning *Apollo 11*.<sup>97</sup>

The Korean government joined the pilot program of NASA's technology transfer project to developing countries in 1970 based on these efforts to show its interest in space, strengthening the relationship between Korea and the US. As a result, NASA's technologies were transferred and applied to Korean society. President Chung-hee Park's administration

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<sup>93</sup> Grateful Reply(Debus, Director of Kennedy Space center, Kurg H. Debus)(open), (1965).

<sup>94</sup> Seoul, 1966 Birthday Event of President\_Welcome Ceremony of American astronauts, (1966).

<sup>95</sup> According to the national statistics, the average monthly income of a normal Korean family was 11,750 KRW (US\$ 43.36) (US\$ 1 = 271 KRW in 1966).

<sup>96</sup> Anonymous, Grateful Reply(Astronaut Walter M. Schirra, Jr.) (Open), (1966).

<sup>97</sup> The chief of National Movie Production, Kwon, Kyungkook, "The Instruction of Movies Production: Apollo Astronauts Visited Korea," 1969.

acquired technologies through this project and tried to publicize the acquisition as a technological and social achievement.<sup>98</sup>

The Korean government was also interested in the space industry, notably in the space facilities of other countries. In March 1982, the science secretary of the Embassy of the Republic of Korea in France and two journalists from Munhwa Broadcasting Corporation (MBC) visited France's space facility, the Aérospatiale Division Systèmes Balistiques Spatiaux Les Mureaux. They toured the facilities and met with the Director, the commercial division, and engineers. The purpose of the visit was to collect technical materials from Aérospatiale and make a TV show about the technologies used in the space industry. The science secretary highlighted the development of future-oriented technologies including aerospace and nuclear engineering as the reason for France's rapid scientific development. He also reported the plan of the European space program and detailed specifications of European satellites and rockets.<sup>99</sup>

These expressions of interest are evidence not only of interest in the space program itself, but also of the desire to develop in the same way as other advanced countries.

### Building Public Interest

The Korean government also tried to promote space programs and increase the Korean public's awareness of space. From 1957, the government disseminated news on domestic/international space-related programs to Koreans through its *Daehan News* video bulletin, which was broadcast from 1953 to 1994 in theaters before the movie started. This

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<sup>98</sup> Woonsoo Chung, *The Project of NASA Technology Transfer (Open)*, (Seoul 1970).

<sup>99</sup> "Document for Technology Cooperation Relationship 1982-1982" Ministry of Information and Communication Bureau of Information and Communication Policy, Industrial Technology Team. (Document Number DA106067).

was one way in which the Korean government kept citizens informed. Through these videos, the government introduced the *Explorer*, the first American satellite; the development, launches, and failures of several other satellites; and the use of satellites. *Daehan News* exposed the public to domestic and international news on space, including the establishment of the Geumsan base station of satellites. The effort showed that the government wanted to inform the nation about space programs.<sup>100</sup> These activities became the base of the Korean space program and public perception of it, although it is difficult to say that the actions had direct goals for space development.

The official daily gazette also encouraged public interest in space. The gazette contained agreements, executive orders, instructions, notifications, announcements, and bulletins. It released information about international agreements and amendments to laws and

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<sup>100</sup> “Oversea News(Failure of the launch of American Satellite, Aquarium of Oranda, Jet Helicopter, Competition of Skiing, Dog Shows)”, (1957), (Document Number CEN0000064); “The Launch of American Satellite” (1957), (Document Number CEN0002371), “1958, Oversea News (The Launch of Satellite, Attendance of the Queen of England to Parliament, De Gaulle’s seizes the power, The Crisis of Middle East, 1958 Taiwan Strait Crisis),” (1958) (Document Number CEN0002113); “Oversea News (American Nuclear submarine, Accident of Turkey Strait, Experiments of American Satellite, New York Toy Show, Italian Fashion Show, Car Racing, Chicago Boxing Competition),” (1958), (Document Number CEN0000074); “Oversea News (Space trip of Mouse)” (1960), (Document number CEN0000205); “Oversea News (New Satellite, The painting of Matthew, Sports), (1960), (Document Number CEN0005164); “Oversea News (Weather Satellite, New Boat),” (1960), (Document Number CEN0000178); “Oversea News (Launch of Satellite, Discover 14),” (1960), (Document Number CEN0000197); “Oversea News (Heavy Snow in the U.S., New Satellite, Sport-Boats),” (1960), (Document Number CEN0000212); “Oversea News (Marina 2, Venus Satellite),” (1962), (Document Number CEN0000300); “American Spacecraft (Successful Launch of two satellites in a year from Kennedy Center),” (1965), (Document Number CEN0000430); “Astronauts visit Korea (The astronaut who succeeded Space Rendezvous of American Satellite Gemini 6.7 visited Korea),” (1966), (Document Number CEN0000476); “Opening Ceremony of the Earth Station of Satellite Communication” (1970), (Document Number CEA0000453), National Archive, National Archive Online archive <http://www.archives.go.kr/next/viewMain.do> .

other significant events; on space-related international agreements; and included the special stamp to join the space-related international agreement.<sup>101</sup>

The public responded whenever astronauts or cosmonauts visited Korea, and TV programs reported on them and released information on space-related programs. The *Apollo 11* astronauts appeared on KBS 1 and gave interviews, and the *Apollo 11* documentary was released nationwide.<sup>102</sup> Through this, the Korean government demonstrated its strong interest in space and tried to elicit public support for it through these media. The space program was considered a means to transform Korea into a developed country. The Korean government tried to position the Korean space program to this end in various ways, but these attempts lacked a clear direction.

## **The Expressed Intent of Korean Space Policy**

Government policies and documents report the notions of government. In this section, I analyze the laws and plans of the Korean government and examine the relationship between them and KAP.

### Space Plan and the Human Space Program

Korea established the basic plan for the Korean space program in 1996 and updated it regularly. The plan, entitled “Mid to Long-Term Space Development Basic Plan,” formed the

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<sup>101</sup> The 5,222<sup>nd</sup> Official Daily Gazette, 1969.4.15, The Korean Government, National online archive.; The 9,291<sup>st</sup> Official Daily Gazette 1982.11.15, The Korean Government, National online archive; The 8,467<sup>th</sup> Official Daily Gazette, 1980.2.11, The Korean Government, National online archive.; The 10,802<sup>nd</sup> Official Daily Gazette, 1987.12.4, National online archive.

<sup>102</sup> The chief of National Movie Production, Kwon, Kyungkook, “The Instruction of Movies Production: Apollo Astronauts Visited Korea”, 1969.

basis of the Korean space program. Table 4 shows its stated goals and visions. According to KARI, KAP was based on this plan.<sup>103</sup> However, there are some differences between KAP and the human spaceflight. In this section, I analyze the versions of this plan and examine the relation between it and KAP.

**Table 4 Goals and Visions of the Korean Space Plan (KARI 1990, 1995, 1998, 2000, Korea Aerospace University 2005, MOST 2006, Korea Science and Engineering Foundation 2007)**

Year	Goal	Vision
1990	<ul style="list-style-type: none"> <li>· Survive in the future science and technology race</li> <li>· Independence in the military field</li> <li>· Show national vision as an advanced country of science</li> </ul>	<ul style="list-style-type: none"> <li>· Development of science and technology</li> <li>· Commercial viability</li> <li>· Independence of information and technology</li> <li>· Social stability</li> <li>· National pride</li> </ul>
1995	<ul style="list-style-type: none"> <li>· Survive in the future</li> <li>· Expand territory</li> </ul>	<ul style="list-style-type: none"> <li>· Overall national power</li> <li>· Encourage other technology</li> </ul>
1998	<ul style="list-style-type: none"> <li>· Survive in the future</li> <li>· Expand territory</li> </ul>	<ul style="list-style-type: none"> <li>· Overall national power</li> <li>· Encourage other technology</li> </ul>
2000	<ul style="list-style-type: none"> <li>· Survive in a knowledge-based society</li> </ul>	<ul style="list-style-type: none"> <li>· Overall national power</li> <li>· Satisfaction of domestic needs</li> <li>· Reduce opportunity cost</li> <li>· Independence of information</li> </ul>
2005	<ul style="list-style-type: none"> <li>· Improve quality of life</li> <li>· Improve national prestige</li> <li>· Contribute to economic development and society</li> </ul>	<ul style="list-style-type: none"> <li>· Independence of information</li> <li>· National needs and pride</li> <li>· Space resource</li> <li>· Improve other technology</li> </ul>
2006	<ul style="list-style-type: none"> <li>· Enter the world market of the space industry</li> <li>· Improve quality of life</li> <li>· National pride</li> </ul>	<ul style="list-style-type: none"> <li>· Independence of information</li> <li>· Improve national welfare</li> <li>· Improve other technology</li> </ul>
2007	<ul style="list-style-type: none"> <li>· Contribute to an improved national economy and national security through the encouragement of peaceful use and scientific exploration.</li> </ul>	<ul style="list-style-type: none"> <li>· Realization of a powerful space nation</li> <li>· Development of the national economy</li> <li>· Improvement of national welfare</li> <li>· National pride</li> </ul>

<sup>103</sup> Woo Jin Park, "A Study on the Korean Astronaut Program as a Media Event Based on Discursive Analysis on SBS Program 'Space Korea'" (Master Yonsei University, 2010).

The plan was announced in 1996, and it was revised every five years. The purpose of the plan was to systemize the technological development of the space field. By 2015, Korea was to be one of the top 10 countries through the development and launch of 19 satellites and launch vehicles.<sup>104</sup> This plan the work of MOST and an agreement between nine government departments.<sup>105</sup> This indicated that the Korean government understood that the interdisciplinary nature of the space program would influence many aspects of Korean society.

The first version delineated the Korean space program plan into sections on satellites, launch vehicles, and the application of space and space science. The plan for satellites was to develop and launch 19 satellites (5 communication, 7 multi-purpose, 7 science). The goal was for Korea to acquire the ability to develop satellites on its own and participate in international cooperative programs in the space field.

The plan for launch vehicles was similar. Korea wanted to develop its own launch vehicle to launch satellites without other countries' help by 2010 through the step-by-step development of rockets. The last part of the plan, the application of space and space science, is connected with the application of satellite information, and the human space program, only mentioned humans space program. The plan did not provide a specific year or plan, but merely noted the probability of a human space program.<sup>106</sup> Economic issues pertaining to the space program were considered important, but public participation in it was not mentioned in

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<sup>104</sup> Minister of Science and Technology, The Mid- and Long-term Basic Plan of Space Development (Draft), (Seoul 1996).

<sup>105</sup> The ministries that agreed with this plan include the Ministry of Finance and Economy, Ministry of Foreign Affairs, Ministry of National Defense, Ministry of Agriculture Forestry and Fisheries, Ministry of Information and Communication, Ministry of Environment, and Ministry of Construction Transportation.

<sup>106</sup> Technology, Short The Mid- and Long-term Basic Plan of Space Development (Draft).

the first version of the “Mid to Long-Term Space Development Basic Plan.”<sup>107</sup> This shows that the major national imaginary of science and technology in Korea—national development, especially plans to catch up to developed countries—was at work in the space program plan.

The first revision of the plan was in November 1998. MOST noted that the reason for the revision was to accelerate the acquisition of technology to launch Korean satellites with a Korean rocket and to become an early leader in space technology. However, this change was necessitated by the *Daepodong-1* rocket launched by North Korea on August 31, 1998. North Korea claimed it was the launch of its first satellite, *Kwangmyungseong-1*. This drove the rapid development of a Korean rocket that could launch a Korean satellite,<sup>108</sup> triggering the first revision. All major revisions were related to the project to launch a satellite with a Korean launch vehicle, the timetable of which was fast-tracked from 2010 to 2005. The construction of the launch pad was also expedited from 2010 to 2005.<sup>109</sup>

KARI submitted the draft of the comprehensive plan of space development to the Presidential Advisory Council on Science & Technology in December 1999 for the next revision. The basic goals were similar to those of the first revision. However, it provided eight major fields of development in three categories: satellites (multi-purpose satellite, communication satellite, and science satellite), launch vehicles (science rocket, low earth orbit satellite launch vehicle), and satellite application (satellite images processing, imaging

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<sup>107</sup> The Ministry of Science and Technology, *Mid and Long-term Space Development Plan in Korea*. 1996. The Ministry of Science and Technology.

<sup>108</sup> Lee, "Space Development without a Dream: Implications of an Industry Focused Space Policy in Establishing a Sustainable National Space Program."; An, "National Aspirations, Imagined Futures, and Space Exploration: the Origin and Development of Korean Space Program 1958-2013."

<sup>109</sup> Ministry of Science and technology, *The Revision of Mid- and Long-term Basic Plan of Space Development (Draft)*, (Seoul 1998). 1.



information processing and data transmitting, and satellite communication). It did not mention a human space program.<sup>110</sup>

The next revision was in December 2000, just two years after the first. This was undertaken to reflect the changes in domestic and international conditions, conduct preliminary research for core technology and international cooperation based on already-acquired technologies, and make specific plans about the long-term vision of space projects.<sup>111</sup> The revision added a multi-purpose satellite and space launch vehicles (for 1 ton and 1.5-ton satellites). It also provided plans and a timeline for each space program. This revision started to consider international cooperation, although it focused on the development of satellites, rockets, and a launchpad. The goal of international cooperation projects is the continuous development of space science and technology and procurement of core technology.

Although the plan mentioned the human space program four years before KAP was proposed, it differed from KAP. The plan was to train Korean astronauts from 2003 to 2015 for the ISS and planetary exploration. The Korean astronaut program was the part of the research program to procure core technology for the human space program. However, details of the human space program were not provided.<sup>112</sup>

The May 2005 revision provided a five-year and long-term plan. The biggest changes were that the timeline for the development of satellites and a launch vehicle was modified, and the commercial satellite program was removed from the plan. Astronaut training was

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<sup>110</sup> KARI, Comprehensive Plan of Space Development (Draft), (Daejeon 1999).

<sup>111</sup> Ministor of National Defense, Ministor of Science and Technology, and Ministor of Information and Communication, The Revision of Mid- and Long term Basic Plan of Space Development (Draft), (2000).7.

<sup>112</sup> Defense, Technology, and Communication, Short The Revision of Mid- and Long term Basic Plan of Space Development (Draft). 32-33.

changed from 2003 to 2015 to 2005 to 2010. Although this revision was published after KAP was proposed, the plan for the human space program followed the previous revision. The tasks of the astronauts were ISS activities and planetary exploration. This revision provided three levels of international cooperation. Astronaut training had a role in international cooperative research on planetary exploration and participation in the ISS project from 2006 to 2010.<sup>113</sup> This was the final revision of the “Mid to Long-Term Space Development Basic Plan” without a legal basis.

Since 2005, the characteristics of the national plan of space development in Korea have changed. The Korean government enacted the *Space Development Promotion Act* to give a legal basis to the Korean space program and to trigger national obligation in national agreements. The National Space Committee (NSC) was established to consider space-related issues. “The Space Development Promotion Plan,” developed under the deliberation of the NSC, was to be revised every five years,<sup>114</sup> and 2005 was designated as Year Zero of Space Korea.<sup>115</sup>

The first “Space Development Promotion Plan,” announced after KAP started, was established in June 2007. Its purpose was to reflect social consensus and provide future vision and policy direction based on past achievements.<sup>116</sup> KAP, which also set out to inspire the

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<sup>113</sup> Minister of National Defense Gwangwoong Yoon Minister of Science Technology Myung Oh, Minister of Industry and Resource Heebuhm Lee, The Revision of Mid- and Long term Basic Plan of Space Development (Draft)

(Seoul 2005).

<sup>114</sup> Space Development Promotion Act, Ministry of Government Legislation (MOLEG), 2005.

<sup>115</sup> Joo-Jin Lee, ““2005”; the year “zero” of Space Korea,” (paper presented at the 2nd International Conference on Recent Advances in Space Technologies, Istanbul, Turkey, 2005).

<sup>116</sup> Ministry of Science and Technology et al., Space Vision 2016 The First Basic Space Development Plan, (Seoul 2007). 1-2.

Korean youth, was mentioned several times in the plan, in which the aims of the program were “to acquire human space technology” and “operate Korean human space flight ” in the workforce of the space field. The section on the establishment of infrastructure highlighted the “acquisition of human space technologies, the inspiration of national pride, and space and science culture diffusion” “by producing the first Korean astronaut.”<sup>117</sup> KAP was the only human space program included in the ten-year plan. The space exploration program did not include the human space program in this version.

It is difficult to find a correlation between KAP and the human space program in the “Mid to Long-Term Space Development Basic Plan” and “Space Development Promotion Plan,” although MOST and KARI claimed that KAP was part of the previous Korean space program plan. The human space program was a research program based on international cooperation. Public promotion, an important goal of KAP, was not mentioned, indicating that the Korean space program was based on a vague imaginary—national development—without clear direction or guidelines.

### **Several Human Space Program Attempts in Korea**

The human space program appeared in the government plan of the Korean space program in 2000 as a part of international research cooperation. However, human space flight attempts in Korea started in the early 1980s on the initiative of foreign actors.

The first attempt was in January 1984. NASA suggested that MOST and the Ministry of Communication (MOC) send a Korean scientist to space on a space shuttle. According to MOST, the US asked Korea to select one scientist to participate in NASA’s astronaut training program as part of the US’ international cooperation with its allies. As such, Korea would

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<sup>117</sup> Technology et al., Short Space Vision 2016 The First Basic Space Development Plan. 5, 7.

have its first astronaut before 1990.<sup>118</sup> However, the plan to send a civilian to space was suspended after the *Challenger* disaster in 1986 and not resumed until 2007.<sup>119</sup>

The suggestion to MOC was related to the 1988 Seoul Olympics. The Korean government considered having its own satellites broadcast the Olympics globally, as Seoul would be hosting the Summer Olympics in 1988. Ariespace, a European multinational company, offered to provide a communication satellite and launch it for Korea. NASA offered to provide a loan to Korea to develop its own communication satellite, and suggested placing a Korean scientist on the shuttle Korea would use to launch the satellite. While Ariespace cost 20–25% less than NASA, Korea considered the offer to create the first Korean astronaut attractive.

The minister of MOC announced a plan to develop Korea's own communication satellite and launched it in early 1988. The project was privately led by five electronics companies; two broadcasting companies; and Korea Telecommunication, a Korean public cooperation. The minister of MOC was Dr. Myung Oh, who led KAP.<sup>120</sup>

However, the plan was unfeasible.<sup>121</sup> Instead, the Korean government leased nine Intelsat satellites for the 1988 Seoul Olympics because of the huge investment in satellite development. Despite this, it was important that a Korean astronaut appear at this point in the history of the Korean space program. However, note that this opportunity was provided to

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<sup>118</sup> This was part of the Cold War. The Soviet Union also sent the cosmonaut of their allies to strengthen the allies during the period of communism.

<sup>119</sup> Anonymous. "To Board Space Shuttle will be decided in Korea-the U.S. cabinet meeting in July," *Kyunghyang Shinmun* January 16, 1984.

<sup>120</sup> "Catch the Korean Market," *Maeil Business Newspaper* (August 30, 1983). (in Korean); Anonymous, "Communications Satellite, Led by the Private Sector," *The Dong-a Ilbo* (Seoul), January 20, 1984 1984.; An, "National Aspirations, Imagined Futures, and Space Exploration: the Origin and Development of Korean Space Program 1958-2013." 106.

<sup>121</sup> KIST, *A Feasibility Study on the Korean Space Program*, KIST (MOST, July 1985 1985). 14-17.

Korea as an additional gift for the communication satellite contract without any discourse or imaginary of the human space program in Korean society.

The next attempt was in 1993. The Korean space program started in the early 1990s. In 1989, the Satellite Technology Research Center (SaTReC) in KAIST, the first space-related research institute, and KARI were established. SaTReC developed and launched Korea's first and second satellites in 1992 and 1993,<sup>122</sup> marking the first achievement of the Korean space program. Korea was in an exciting position in the fields of space and science, and planned to host the '93 Daejeon Expo, the theme of which was "The Challenge of a New Road of Development." Dr. Myung Oh, the chair of the organizing committee, hoped to showcase the country's advanced science and technology and create a place for public communication and science education. He envisioned using the Expo site as a science park like Disney World's EPCOT Center and Parc de la Villette in Paris.<sup>123</sup> For that, the '93 Daejeon Expo needed strong public attention and interest. He therefore planned many space-related events. The US Space Shuttle *Columbia* was exhibited and he contacted Russia to exhibit the Russian Space Station *Mir* in the Expo, despite the bad relationship between Russia and Korea.<sup>124</sup>

Myung Oh's plan to cooperate with Russia was not limited to exhibiting *Mir*. He suggested making the first Korean astronaut an Expo event with Russian cooperation. In the plan, the first astronaut would be selected in a public competition, which he thought would rally the Korean nation such as during the Olympics or World Cup. This was consistent with the spirit of the Young-sam Kim administration, the first elected through popular vote. Russia agreed to send a Korean to space if Korea provided funding, which it eventually secured from

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<sup>122</sup> SaTReC, (1993) "We launched star," (Gimyungsa).

<sup>123</sup> Myung Oh, *Daejeon Expo, the Touching and Rejoicing* (Seoul: Woongjin Jisik House, 2003). 17-28.

<sup>124</sup> *Ibid.*, 78-80.

private companies. The Expo committee then sought the cooperation of the Korean government, but backed away from this suggestion because of the government's lack of interest in the project.<sup>125</sup>

The project aimed to stimulate public interest in science and technology, especially in space. Dr. Oh believed that science and technology in Korea could develop with greater national support if events aroused interest in these fields. At the time, the Korean people paid attention to Korea's achievements in economic as well as science and technology development. Specifically, he hoped to fuel the interest of Korean teenagers to explore the frontiers of space.<sup>126</sup> The attempt to make a Korean astronaut was for this purpose. Dr. Oh transformed from a mindless receiver of an external offer to an active actor with clear imaginary.

In 1995, the issue of the Korean astronaut emerged twice. The first was in connection with the Russian company NPO Energia and Korean Astronomy Observatory (KAO). In 1990, *Glazer II*, the ultraviolet telescope at the Russian Space Station *Mir*, malfunctioned. Energia suggested that KAO pay and send an engineer to fix it, because Russia's economic situation had deteriorated after the dissolution of the Soviet Union. However, no agreement existed between Energia and KAO.<sup>127</sup> A Korean engineer was assigned to undertake the repairs. As NASA suggested in 1984, the position of Korean astronaut was earmarked for scientific experts such as scientists and engineers.

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<sup>125</sup> Ibid, 83-85.

<sup>126</sup> Sinyoung Kim, "MOST performs the Project for 2007 / The Countdown for Making The First Korean Astronaut" *Hankook Ilbo*, July 09, 2004; Oh (2003), 189.

<sup>127</sup> Anonymous, "The Possibility of Making the First Korean Astronaut" *Kyunghyang Shinmun* February 11, 1995.

The second issue involved the Korean Broadcasting System (KBS), the major state-run broadcasting company, whose president wanted to produce a space broadcasting program. KBS and the chief of Yuri Gagarin Cosmonaut Training Center (GCTC) agreed to send a journalist to create a TV program in space for a month. Unlike previous attempts, this project was further developed. KBS selected two candidates, one of whom would be trained at GCTC for 18 months and go to space in December 1996 or spring 1997. However, the Asian financial crisis put an end to this plan.<sup>128</sup>

The last opportunity before KAP was NASA's suggestion to join the ISS project. NASA proposed that Korea develop a support system for the High Energy Particle Detector at ISS. If Korea joined this project, a Korean astronaut could be born. For Dr. Gi Hyuk Choi, this was the most feasible and low-cost way to ensure the making of a Korean astronaut. However, the dream of a Korean astronaut was ultimately realized through cooperation with Russia in KAP, not through NASA.<sup>129</sup>

These attempts to create the first Korean astronaut were underscored by different philosophies of space flight. Each attempt was spearheaded by different national institutes and agencies. KBS is a state-run company, KAO is a national research institute, and the '93 Expo was a government-led program. The Korean government supported the project over the ten years. However, the project goals were sometimes related to research, and sometimes to entertainment or sending Korean people to space. The main aim of the government was to send the first Korean astronaut to space, not what Korea should do once there. This was not

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<sup>128</sup> Anonymous, "Korean first astronaut will appear in 1997" *The Dong-a Ilbo* June 3, 1995; Anonymous, "KBS Decided Two Final Candidates of the Korean Astronaut," *The Hankyoreh* November 10, 1995; Anonymous, "Korean first astronaut project has a big problem because of cost," *The Dong-a Ilbo* February 11.

<sup>129</sup> Anonymous, "[Together with hope in 2003] Green light for participate in the International Space Station," *Kukmin Ilbo*, December 31, 2002; Anonymous, "Korean Astronaut can be born in 2008," *Yonhap News*, November 5, 2003.

only the problem in previous cases, but also in KAP, which sent Dr. Soyeon Yi to space. Each administration had different ideas about the space program, especially the human space program, and as mentioned, their underlying philosophies differed. Based on the characteristics of each administration, any attempts made in the human space program failed. The characteristics of administration helps understanding these attempts. Table 5 lists the Korean presidents.

**Table 5 List of Korean Presidents**

Presidency	President	Term	Characteristics
1948.7.24– 1960.04.26	Syngman Rhee	1–3	Selected by Congress
1960.8.13– 1962. 3.23	Bosun Yun	4	Selected by Congress
1963.12.17– 1979.10.26	Chung-hee Park	5–9	Military Coup
1979.12.6– 1980.8.16	Kyu-hah Choi	10	
1980.9.1–1988.2.24	Doo-hwan Chun	11–12	Military Coup
1988.2.25– 1993.2.24	Tae-woo Roh	13	
1993.2.25– 1998.2.24	Young-sam Kim	14	Civilian Administration
1998.2.25– 2003.2.24	Dae-jung Kim	15	National Administration
2004.2.25– 2008.2.24	Moo-hyun Roh	16	Participatory Administration
2008.2.25– 2013.2.24	Myung-bak Lee	17	Practical Administration
2013.2.25– 2016.12.9	Geun-hye Park	18	Daughter of President Junghee Park, impeached in December 2016
2017.5.10–	Jae-in Moon	19	



### **Chapter 3. Whose Images and Whose Ideas: From the First Proposal by MOST to the Beginning of Selection (January 2004–April 2006)**

This chapter focuses on the preparation of KAP and traces the influences of sociotechnical vanguards including Minister Myung Oh and MOST, and KARI. It covers the period from the first proposal of the program in January 2004 to the beginning of the selection process for the first Korean astronaut in April 2006. It shows how one person's vision transformed the sociotechnical vanguard, how various visions appeared and developed during the process, and how one national program could be settled through intertwining multiple visions.

This chapter describes how the vision and images of KAP emerged. KAP was first suggested by MOST and implemented by KARI under the influence of the Korean government. The MOST annual report announced the program as a public promotion of science and technology. The Minister of Science and Technology, Dr. Oh, gave many speeches and interviews, and explained its goals and benefits as a program to popularize science in the Korean nation. However, these goals and aims changed. When KARI took over, it defined KAP as a research program, viewing promotion as only a small part thereof. For KARI, the most important goal of the program was the acquisition of technology and creation of an astronaut as the result of technology transfer from Russia. The image and meaning of the Korean astronaut had changed from one of an ordinary Korean citizen to that of a space expert.

In this chapter, I clarify the vision and image of the Korean astronaut and KAP of each sociotechnical vanguard through an analysis of the speeches, interviews, and documents of MOST, KARI, and other institutes. I track how the vision and meaning of KAP changed, and examine how KAP was constructed in the institutional politics of conflicting visions between

MOST and the broadcasting companies as well as between MOST and KARI. Through it, I show how the Korean astronaut was defined, constructed, and changed, clarifying how the image of the astronaut as a scientific expert was built and then weakened.

## **Two Crises in Korean Society**

Korea's economy, industry, politics, and society changed rapidly after the war. Its Gross National Income (GNI) per capita soared from US\$ 120 in 1962 to US\$ 28,480 in 2017.<sup>130</sup> Korea successfully hosted the Seoul Olympics in 1988 and Daejeon Expo in 1993, and boasted impressive achievements in science and technology. While only dreaming of joining the space program in the 1960s, Korea now operated multiple satellites, developed sounding rockets, and ran many space programs. One of the four dragons of Asia, Korea had become a role model for developing countries.<sup>131</sup> However, the economic crisis in the late 1990s changed everything.

As Korea developed, it became more dependent on foreign trade, and its industries operated with much debt. The Asian Economic Crisis in 1997 weakened the Korean economy, and ultimately, the Korean government requested a bailout from the International Monetary Fund (IMF) on November 12, 1997. The IMF approved a bailout of US\$ 21 billion on December 3, 1997, and required reductions in the number of workers and their wages. More than 20,000 companies were destroyed, and those that survived cut staff and salaries. On August 23, 2000, Korea ended the period under the bailout earlier than expected.

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<sup>130</sup> GNI per capita, Atlas method (current US\$), [https://data.worldbank.org/indicator/NY.GNP.PCAP.CD?locations=KR&year\\_high\\_desc=true](https://data.worldbank.org/indicator/NY.GNP.PCAP.CD?locations=KR&year_high_desc=true) , World Bank, (accessed August 27)

<sup>131</sup> M. Schuman, *The Miracle: The Epic Story of Asia's Quest for Wealth* (HarperCollins e-books, 2009). <https://books.google.com/books?id=UuHo1sEo8EUC>.

However, many workers in companies lost their jobs, and their families experienced severe difficulties.<sup>132</sup> Consequently, Koreans had to consider job security as a significant factor in their choice of career.

Scientists and engineers in Korea were directly affected, as Korean companies laid off their researchers in research centers. The unemployment rate of scientists and engineers with post-graduate degrees was about 30%, twice the national rate. Koreans questioned the job security of scientists and engineers, and prospective university students were reluctant to enter the science and engineering fields. The number of applicants in science and engineering dropped by 43%. High-rank students preferred to enter medical or law school, which provided high job security and is considered a professional job in Korea.<sup>133</sup> This trend continued after the country ended the period under the IMF's bailout, as prospective students still avoided entering the science and engineering fields. If students wanted to enroll for science and engineering rather than medicine if they qualified for medical school, they were pushed to enter medical school or considered strange.

Consequently, the Korea Federation of Science and Technology Societies declared a science and engineering crisis in April 2002. Something had to be done to fuel interest in science and engineering. This was the vision of MOST, to make a science-loving Korea with strong national interest in science and engineering.

### **Roh's Administration and Science and Technology**

Moo-hyun Roh was inaugurated as the 16<sup>th</sup> President of Korea in February 2003, soon after Korea finished the period under the bailout and when the new power of

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<sup>132</sup> Kyonghee Han and Gary Lee Downey, *Engineering for Korea*, ed. Gary Downey, Synthesis Lectures on Global Engineering #5, (Morgan & Claypool, 2014). 120.

<sup>133</sup> Han and Downey, *Engineering for Korea*. 132-133.

development was needed. President Roh considered science and technology the way in which to accomplish this goal. He had a deep interest in and strong will to use science and technology to improve Korea. He declared “the establishment of the second science and technology-centered nation” when he was inaugurated, which was selected as one of his major national projects to achieve.<sup>134</sup> He hoped for a Korean renaissance comparable to President Chung-hee Park’s “establishment of the science and technology-centered nation.”

This attempt by President Roh to emphasize science and technology drove competition between MOST, the Ministry of Commerce Industry and Energy (MOCIE), and Ministry of Information and Communication (MIC) to obtain power in the administration. Ultimately, Roh’s administration empowered MOST based on the discussion of the government committee, Presidential Committee on Government Innovation Decentralization, because the administration’s image of science and technology was closer to a science-based model than an industry-based one. President Moo-hyun Roh appointed the Minister of MOST as Deputy Prime Minister which afforded MOST with budget authority and a higher position than that of other ministries.

The promotion from Minister of Science and Technology to Deputy Prime Minister had been scheduled earlier—President Roh offered Dr. Oh the post in 2003—but this became official in October 2004. President Roh tried to persuade Dr. Oh to join the administration based on the importance of science and technology, as supported by the administration’s several attempts to recruit him.<sup>135</sup> Through the support of the president, MOST would be able

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<sup>134</sup> Sejong Chon and Yeonseob Ha, "A New Institutional Analysis of Science and Technology Policy Governance Changes: The Cases of Roh Moo-hyun and Lee Myung-bak Administrations," *Korean Policy Studies Review* 22, no. 4 (2013).

<sup>135</sup> Myung Oh, *Dream Korea in the Future After 30 Years - The Self-Management Method of Myung Oh, the Representative Korean Technocrat Who Made Korea as the IT Super Power* (Seoul: Woongjin Jisik House, 2009 ).

to achieve its objectives.<sup>136</sup> This was a substantial milestone in MOST's pursuit of its vision to create a science-loving Korea.

### **From the Dream of One Person to a National Project**

Sometimes an imaginary starts with one person. This transforms into a sociotechnical vanguard and then to a national imaginary when the vision is shared, which is what happened in KAP. Before 2004, no clear guidelines for Korea's human space program existed, even though it was mentioned in the "Mid to Long-Term Space Development Plan." The human space program and KAP differed.

Dr. Myung Oh has a PhD in electrical engineering and is one of the representative technocrats in Korea. He believed that space events would inspire the Korean nation in the way *Sputnik* and *Apollo 11* inspired him. Furthermore, he thought that the astronaut program could attract Koreans to science and engineering based on his experience of science popularization when he was Minister of Communication. As Minister of Communication, he also laid the groundwork for the Korean information technology (IT) industry and information welfare society, and envisioned a society "where no one is left out in their access to the benefit of informatization." He established nationwide telecommunication infrastructure and encouraged an IT culture. His dream materialized.<sup>137</sup>

His success in the IT field strengthened his dream of KAP despite the failure of the '93 Daejeon Expo. As Minister of Science and Technology, he could realize this dream. Transforming from a passive receiver of an external offer to an active actor with a clear

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<sup>136</sup> Bangjoo Park, "<The Annual Report of MOST> The Korean First Astronaut Will Be made in 2007," *Science and Technology*, March 2004, 2004.

<sup>137</sup> Jung-Soo Kim, "Leader of the Telecommunications Revolution of the 1980s: A Study of Oh, Myung," in *Public Entrepreneurs in a Time of Turbulence: Models for Leadership in Korea* (Seoul: Nanam Publishing House, 1994). 243-281.

vision from 1984 to 1993, he changed from a powerless dreamer to the powerful leader of the program. During this time, Dr. Oh developed a strong network that supported KAP. He constructed his network of human and non-human actors in the astronaut program by negotiating with Russia and in cooperation with private companies. Furthermore, an achievement as Minister of Communication was constructing and strengthening a network of government officers and government systems. This strong network, which as mentioned comprised human and non-human actors, formed the foundation of his transformation.<sup>138</sup>

#### Start of the Public Promotion Project

In December 2003, President Moo-hyun Roh appointed Myung Oh as the new Minister of MOST. This was the administration's second attempt to recruit him.<sup>139</sup> One month later, MOST announced the plan for KAP. The 2004 MOST annual report was special because of the ministry's elevated status, and the meeting to report its annual plan with the President was longer than expected. After the meeting, Minister Oh emphasized that MOST would change for the better. The annual report included a review of the previous year's achievements and plan for the next year. The 2004 plan comprised five chapters: Establishment of a National Science and Technology Innovation System, National Movement of Science Korea, Achievement of the main goals of the administration, and work innovation of MOST.

KAP was in the National Movement of Science Korea. According to MOST, Korea needed to increase public interest in science and technology, encourage the "science spirit (creativity, rationality, efficiency)" of Koreans, and promote interest in science and a spirit of

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<sup>138</sup> Bruno Latour, *Science in Action* (Cambridge, Massachusetts: Harvard University Press, 1987).

<sup>139</sup> Two years prior, the administration asked him to be the Minister of Education, but Oh refused.

exploration among adolescents.<sup>140</sup> To this end, MOST proposed “Science Korea.” The rationale was the establishment of the second science and technology-centered nation, one of the major national projects in Roh’s administration. As science and technology would become the basis of the economy, society, culture, and politics, all Koreans were expected to become familiar with this field.

To achieve this goal, it focused on the popularization of science rather than on traditional catch-up or development ideologies. The plan had four parts: 1) dream of space with Koreans, 2) dream of a Nobel Prize with Koreans, 3) increase interactive scientific exhibitions, and 4) develop interesting scientific contents and media. KAP was part of the “dream of space with Koreans.” “Launch a Korean satellite with a Korean rocket in Korean territory” is also in this part. It is the project to develop the Korean Space Launch Vehicle -1 (KSLV-1). However, although both KAP and KSLV-1 project were in the same category, their goals were different.

As specific outcomes of the “launch” program, the report suggested developing a Science and Technology Satellite-2 (STSAT-2A), establishing a Korean space launchpad, reaching a space technology agreement between Korea and Russia, and establishing international cooperation for core rocket technology. However, the focus of the plan for KAP was on public events, namely interactive experiments and media coverage. The overall plan for KAP was just to select the first Korean astronaut through several stages of local and national competitions.

The media and Korean society did not focus on KAP much when its plan was announced. Many newspapers and TV news shows emphasized employment issues in the STEM field.<sup>141</sup> Only one newspaper reported that KAP was a revival of Minister Myung

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<sup>140</sup> MOST, *2004 Report of Work Plan*, MOST, 2004.1.30, 33.

<sup>141</sup> Sungjae Yoo, "Make 10,000 Employment Position for Master and Ph.D. Degree Holders," *8'o*

Oh's dream of a Korean astronaut. It reviewed the plan of KAP and described the government's hesitation.<sup>142</sup> Another newspaper article focused on President Roh's assertion that the project was nothing more than window dressing.<sup>143</sup>

While not enthusiastic about KAP, President Roh also did not oppose it, and advised MOST to run the program carefully. Minister Oh asked the President to trust him to organize KAP as planned by himself and MOST. The President emphasized his trust in him.<sup>144</sup> KAP was a one-time event to build national interest in the plan, but did attract public interest in science and technology and encourage teenagers to pursue a career in this field.<sup>145</sup> Because KAP was planned as a project to promote science and technology, MOST considered public awareness crucial. Dr. Oh believed that the familiar image of a woman could be a good way to attract national interest. Thus, he discussed the possibility that the first Korean astronaut could be a woman several times, especially when addressing female audiences.<sup>146</sup> KAP was proposed and prepared in line with MOST's vision.

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*Clock News* (2004).; Wook Jang, "Work Report of Ministry of Science and Technology in This Year - Public Company Should Employ STEM Persons," *Maeil Business Newspaper* (Seoul), January 30, 2004 2004.; Donghyun Lee, "Ministry of Science and Technology Has the Right of Compilation of the R&D Budget... Perform the Role of Combination of Planning- Coordination-Evaluation," *The Munhwa Il-bo* (Seoul), January 30, 2004 2004.

<sup>142</sup> Hyunjee Kim, "Science and Technology Minister Myung Oh, "Continuing the Dream of Astronaut", " *Money Today Co., Ltd.* (Seoul), January 30, 2004 2004.

<sup>143</sup> Chulwoo Oh, "Is It Too Much?/Ministor Myung Oh "Start to Select Korean Astronaut"/ President Roh Stops It as "Worry about Showing Event", " *The Hankyoreh* (Seoul), January 31 2004 2004.

<sup>144</sup> Anonymous, interview by Seungmi Chung, Seoul, Korea, July 16, 2018.

<sup>145</sup> Anonymous, interview by Seungmi Chung, Sanbon, Kyungi-do, August 1, 2017.

<sup>146</sup> Junghun Kim, "'Korea select the first astronaut'" ... who will board on Russian Soyuz," *The Dong-a Ilbo* (Seoul), September 7, 2004; Eunjeong Lee, "The first Korean astronaut will be born in 2007, Korea made a cooperation agreement ... planned to board on Soyuz," *Kyunghyang Shinmun* (Seoul), September 22, 2004.



## Between Cost and Benefit

After the annual report was finished, MOST began organizing KAP, although it did not have information about the human space program. Everything about the program had to be decided: from the justification of the program to procedures and contents. The starting point on March 12, 2004 was the experts' meeting on KAP, which served as the foundation of the program's justification. The meeting contended that it was not too early to start KAP based on the national level of Korea and size of the Korean space program.<sup>147</sup> In 2004, there were 421 astronauts in 34 countries, and countries less developed than Korea, such as Mongolia and Vietnam, had already sent astronauts into space, despite that their space technologies lagged behind Korean technology. Mongolia only launched its first satellite in June 2017.<sup>148</sup> As Korea had the capability to have an astronaut, this became the argument for accelerating KAP. KAP was a milestone for Korea in becoming an advanced country. The meeting also decided that KAP should be run based on a mid or long-term plan. An important reason for the astronaut program was to ensure that astronauts could conduct experiments in space.<sup>149</sup>

KAP's preparations started in June 2004. Domestically, KARI and MOST organized the unofficial "Astronaut Secretariat (Woojuin Samooguck)" in KARI to run KAP's two-year planning project. It determined selection guidelines for Korean astronauts, gathered case studies of foreign astronaut programs, and arranged for exploratory talks with the Federal Space Agency in Russia about boarding the Korean astronaut on *Soyuz*.<sup>150</sup> Negotiations between Korea and Russia were held at the end of June 2004. In the two days of negotiation

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<sup>147</sup> The Result of the "Nurturing Korean Astronaut" Related Expert Meeting. 04.3.12.

<sup>148</sup> MONTSAME, "First Mongolian Satellite Launched into Space," (MONTSAME, September 13, 2018 2017), Article. <http://www.montsame.mn/en/read/10343>.

<sup>149</sup> The Result of the "Nurturing Korean Astronaut" Related Expert Meeting. 04.3.12.

<sup>150</sup> KARI, *The White Paper of the Korean Astronaut Program*. 23.

from June 29–30, 2004, Roscosmos (The Roscosmos State Corporation for Space Activities), the state corporation responsible for the space flight and cosmonautics program for the Russian Federation, and MOST agreed on the training period (18 months) and guidelines for the Korean astronaut (Koreans aged 22 years and older with a sufficient level of intelligence). This was the first agreement on the space flight of a Korean astronaut and staying in the ISS. However, it served to confirm mutual understanding regarding interest in KAP, and not as a binding legal agreement.<sup>151</sup>

On September 21, 2004, the Joint Statement of the Ministry of Science and Technology of the Republic of Korea and Federal Space Agency of the Russian Federation was signed by Minister Oh of Korea and the Head of the Federal Space Agency of Russian Federation, A. Perminov. This was part of a larger international cooperation of space technologies including the KSLV-1 project, namely the *Agreement between the Government of the Republic of Korea and Government of the Russian Federation on Technology Safeguards Associated with Cooperation in the Field of the Exploration and Use of Outer Space for Peaceful Purposes*.<sup>152</sup> As a cutting-edge technology, space technology is directly related to a country's science and technology, and to national security. The need to develop a Korean rocket increased as North Korea tried to launch its own satellites using its own rocket. However, the development of a launch rocket was limited by the Missile Guideline between the US and Korea.<sup>153</sup> Thus, Korea needed another way to advance its rocket technologies.

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<sup>151</sup> “Agreement between Roscosmos and MOST about the Korean Astronaut Program 04. 6. 29 - 6. 30.

<sup>152</sup> AGREEMENT BETWEEN THE GOVERNMENT OF THE REPUBLIC OF KOREA AND THE GOVERNMENT OF THE RUSSIAN FEDERATION ON TECHNOLOGY SAFEGUARDS ASSOCIATED WITH COOPERATION IN THE FIELD OF THE EXPLORATION AND USE OF OUTER SPACE FOR PEACEFUL PURPOSES, (2007).

<sup>153</sup> In 1979, Korea agreed to ballistic missile guidelines, which limit Korea's ballistic missile development and possession to a range of 180 km. In 2001, the range was extended to 300 km, and again to 800 km in 2012. However, this was after KAP.

Therefore, the international cooperation between Russia and Korea was a good way for Korea to learn about new space technology. At the intersection of international cooperation with Russia and science popularization, President Roh's administration's national project—KAP—was a good way to achieve both goals simultaneously.<sup>154</sup> The joint statement about KAP clearly expressed its role as part of a larger cooperation.

Aiming at the development of inter-governmental cooperation on science and technology between the Republic of Korea and Russian Federation in the exploration of the outer space and practical application of space assets and technology, and confirming their commitment to the promotion of the peaceful use of the outer space in the interests of international cooperation.<sup>155</sup>

The joint statement expressed the possibility of having a Korean astronaut board the ISS through the *Soyuz-TMA* rocket. The flight was to be scheduled for 2007, and other ISS partners would sign the agreement between Roscosmos and KARI. While further discussion on KAP was needed,<sup>156</sup> it was no longer merely a proposal, but an international project.

Next, MOST began the process of selecting the main agency to run KAP. Originally, because it considered KAP a science promotion program, MOST conceptualized the program as a project driven by the private sector with governmental support. More private than public funds were needed for the program. Therefore, Korean broadcasting companies were considered the main agency for KAP, and a consortium of private companies would be

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<sup>154</sup> Myung Oh, interview by Seungmi Chung, July 16, 2018, 2018.

<sup>155</sup> Joint Statement of the Ministry of Science and Technology of the Republic of Korea and the Federal Space Agency of the Russian Federation, September 21, 2004.

<sup>156</sup> Ibid.

established to raise the needed funds.<sup>157</sup> MOST expected the broadcasting companies to publicize KAP.<sup>158</sup> Ultimately, it was envisioned that more than 70% of the budget for KAP could come from the private sector: MOST planned to provide 6 billion KRW, and the broadcasting companies were to provide 20 billion KRW.<sup>159</sup> The first meeting between MOST and Korea's three biggest broadcasting companies—KBS, MBC, and SBS—was held on September 8, 2004 to introduce KAP. Follow-up meetings continued in November and December.

The public call to select the main agency of KAP was announced on October 15, 2004. All three broadcasting companies applied, but there was no winner in the first public subscription. MOST held a presentation for the broadcasting companies on November 9, 2004,<sup>160</sup> where they agreed to form a consortium to run KAP. They held another meeting with MOST on November 29, 2004. MOST explained the goals and benefits of KAP, and basic guidelines for the program were decided at the meeting, including clarifying its purpose as the public promotion of science and technology, through which the aim to establish a science culture and popular support for science and technology, especially for the human space program, would be achieved. It was also expected that KAP would reinvigorate the Korean economy and industry through the development of scientific experiments as a byproduct. The broadcasting companies could benefit from their broadcasting expertise by

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<sup>157</sup> Hanwool Woo, "The First Korean Astronaut Will Be Selected Since October/ the Astronaut Will Be on Board in the Soyuz Rocket in 2007 according to the Contract with Russia," *Segye Ilbo* (Seoul), September 22, 2004 2004, Comprehensive; Hanwool Woo, "Science/ Is "the First Spaceflight of Korea" a Tour? - the Government Will Select a Public Candidate and Put the Person Be on the Board of Russian Spacecraft in 2007," *Segye Ilbo* (Seoul), September 8 2004 2004, Information Communication/ Science.

<sup>158</sup> Oh, interview.

<sup>159</sup> Anonymous, Interview by Seungmi Chung, Sanbon, South Korea, August 1, 2018; Sungjoon Park and Hanwool Woo, "The Plan of Astronaut Falls Out of Orbit," *Segye Ilbo* (Seoul), April 13, 2005 2005, Comprehensive.

<sup>160</sup> Anonymous, Interview by Seungmi Chung, Sanbon, South Korea, August 1, 2018.

directing TV programs on space and owning the technologies.<sup>161</sup> The slogan was “If you try, you will be the astronaut.” Essentially, the focus was on popularizing science.

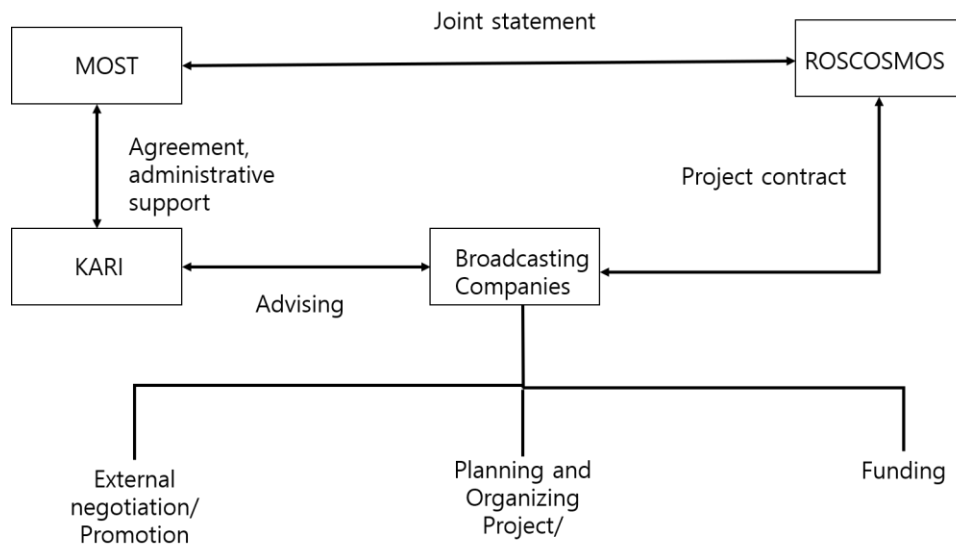
Specific plans were discussed at the meeting. There was a five-person planning team for organizing KAP, one from each broadcasting company and two from KARI. MOST tried to position KAP as an integral part of national science and technology projects, and thus tried to connect it to the human space program in the “Mid to Long-Term Space Development Basic Plan,” even though the plans for the two differed. It was expected that KAP would last 24 to 30 months from selection to the space flight. Six months were needed for the astronaut selection process, 6 for basic training, and 12–18 months for advanced training, after which the flight would be scheduled.<sup>162</sup>

The consortium of broadcasting companies submitted the project plan to MOST in December 2004. In the plan, KARI would operate KAP’s executive office and the planning team would arrange the funding. Work started in December 2004. Figure 1 shows the role of each actor when the consortium of broadcasting companies became the main agency of KAP.

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<sup>161</sup> Project Proposal for the Korean Astronaut Program, 2004.11.29

<sup>162</sup> Ibid.



**Figure 1 Role of Each Actor with Broadcasting Companies as the Main Agency<sup>163</sup>**

MOST would issue joint statements with Roscosmos as a national counterpart, because KAP was an international cooperation project with no direct relation to the broadcasting companies. KARI would advise the broadcasting companies, and provide administrative support and communication with MOST based on the agreement between the broadcasting companies and MOST. The broadcasting companies would also negotiate the contract for the project with Roscosmos in their role as the main agency under the contract and as advised by KARI. Their role included promotion; external negotiation, planning, and organizing of all processes in KAP; and securing funds for the project. Two-thirds of the members of the planning team were from the broadcasting companies, with KARI serving as advisor.<sup>164</sup>

However, the budget strained the agreement between the three broadcasting companies. Although their representatives agreed to be the co-main agency of KAP, other persons in their companies did not support the consortium. As a public service broadcasting

<sup>163</sup> “The Join Project Proposal of Three Broadcasting Companies,” 2004. 12.

<sup>164</sup> “The Join Project Proposal of Three Broadcasting Companies,” 2004. 12.

company, KBS did not operate for benefit/profit, leading to a severe budget deficit. KBS claimed a deficit of 6 billion KRW (about US\$ 5.7 million) in 2004, meaning that the broadcaster could not allocate a budget for KAP. When KAP was launched, KBS emphasized its willing support for public promotion to create a festive mood in Korean society as the public service broadcasting company. The board of directors of MBC did not approve of the agenda to be the main agency of KAP. Furthermore, SBS also had funding problems.<sup>165</sup> The agreement between the three broadcasting companies finally collapsed on February 18, 2005.<sup>166</sup> Each company claimed to have an appropriate reason for the abrogation of the agreement; however, this confirms that none of the companies thought they benefited from the agreement. KAP also did not necessarily benefit from the broadcasting companies, although they could reduce the burden of funding. Despite this, one company did ultimately benefit.

This was clearly shown through MOST's actions after the abrogation of the agreement between the three broadcasting companies. On April 8, 2005, just two months after the abrogation, MOST met with the representatives of the three broadcasting companies and Deputy Prime Minister Myung Oh.<sup>167</sup> After the meeting, MBC and SBS stated that they did not have a team or workforce to organize KAP, and KBS reported that nothing had been processed and that it would be difficult to join the program because of the slump in the

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<sup>165</sup> Anonymous, Interview by Seungmi Chung, Seoul, South Korea, July 7, 2017; Anonymous, Interview by Seungmi Chung, Sanbon, South Korea, August 1, 2018; "The Result of Meeting of Three Broadcasting Companies about the Korean Astronaut Program, Hosted by the Vice Minister Office" 2005. 1. 29; 6 billion won was based on the average exchange rate between KRW and USD of December 2004, \$1 = 1050.91 KRW.

<sup>166</sup> "About the Discussion about the Korean Astronaut Program", 2005. 2.18

<sup>167</sup> "The Meeting with the Deputy Prime Minister, Deputy Minister, and Presidents of Broadcasting Companies," 2005 4. 8.

advertising market.<sup>168</sup> However, according to a MOST internal document, while SBS had stated it could not join KAP because of a funding issue, MBC had said it would lead the program.<sup>169</sup>

Through the MBC's active response, MOST began specifying the role of the main agency and plan for KAP. The main agency had the authority to negotiate with Russia, select and train the Korean astronaut, and decide which experiments would be conducted in space. Although it raised funds for KAP, it held the exclusive right for TV programs on the program and owned all video materials. The roles of KARI and MOST were limited to technical and administrative support. Furthermore, while the preference was for an astronaut with a science and engineering background, any Korean person could apply. The main agency (MBC) was to prepare the specific plan for KAP, which was to be agreed on by other ISS members.<sup>170</sup>

However, MBC changed these terms after it became the only option for participation by a private company. According to the budget for KAP, MOST provided 6 billion KRW and the main agency 20 billion KRW. These amounts had been decided before MBC accepted the role, and the company was aware of the stipulation at that time. However, in July 2005, MBC demanded that MOST contribute 10 billion KRW and as the main agency, asked for exclusive rights for the TV programs and video materials of other space programs like the KSLV-1 project. MBC consistently argued that the risk as the main agency for KAP was too big, and while they demanded that MOST contribute more funds, the ministry refused.<sup>171</sup>

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<sup>168</sup> Park and Woo, "The Plan of Astronaut Falls Out of Orbit."

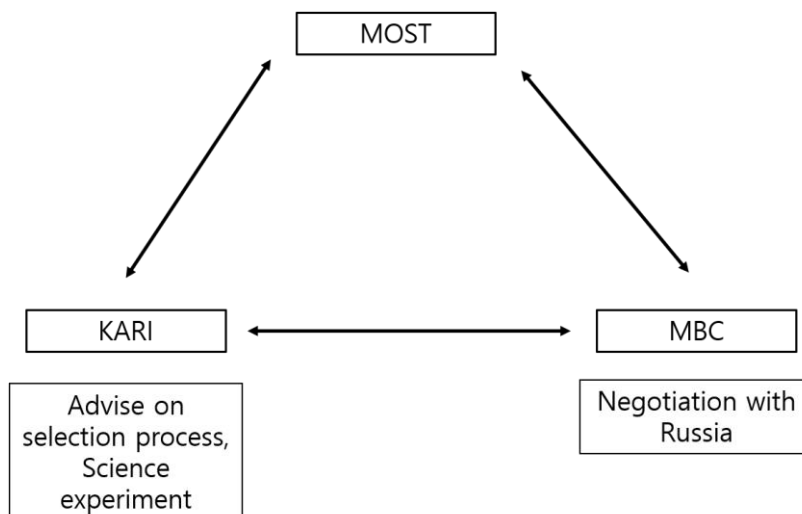
<sup>169</sup> "The Meeting with the Deputy Prime Minister, Deputy Minister, and Presidents of Broadcasting Companies," 2005. 4. 8.

<sup>170</sup> "Meeting for Prior Consultation about the Korean Astronaut Program," 2005.5.13; "The Report of the Result of Consultation about the Korean Astronaut Program, 2005.5. Bureau of Basic Research.

<sup>171</sup> "The Result of Meeting with Private Companies and Deputy Prime Minister," 2005. 7.18; "The Meeting of the Korean Astronaut Program, hosted by Vice Minister", 2005. 8. Bureau of Basic Research.



MOST asked MBC to make its final decision regarding whether to retain its position as the main agency for KAP or not by the end of August 2005.<sup>172</sup> However, MBC continued to process the schedule without announcing a decision. Consequently, MOST issued another public call to select the main agency for KAP, and MBC again applied. As MBC was the only applicant, the provisional contracts were drawn up between MOST, KARI, and MBC, although the final decision would only be made in early November. The provisional contracts consisted of three parts. KARI and MBC had a contract as the cooperating research institute and main operating institute. MOST and MBC signed a provisional contract in mid-October. In addition, MBC, as the main agency for KAP, tried to negotiate a contract with Russia for training, boarding, and science experiments.<sup>173</sup> Figure 2 depicts this relationship.



**Figure 2 Contractual Relationship between the Actors of KAP (September–October 2005)<sup>174</sup>**

MBC’s demands increased, despite that it had already signed the provisional contracts. Finally, MBC asked MOST for 20 billion KRW more on November 2, 2005, one

<sup>172</sup> “The Meeting of the Korean Astronaut Program, hosted by Vice Minister, 2005. 8. Bureau of Basic Research.

<sup>173</sup> “The Future Plan of the Korean Astronaut Program,” 2005. 9. Bureau of Basic Research; “The Meeting of the Korean Astronaut Program, hosted by Vice Minister,” 2005. 9.23.

<sup>174</sup> Oh, interview.

day before the final decision. MOST held an emergency meeting on November 3. The meeting concluded that MBC was not reliable and judged that the company did not have the will to operate KAP as its main agency. Thus, as MBC, the only applicant for the subscription, was not available, KARI was selected as the main agency for KAP.<sup>175</sup>

This was a conflict between the public project and private benefit, not between imaginaries. MOST considered KAP a public project to encourage public interest in science and technology, and was ignorant regarding the benefit for private companies. The broadcasting companies considered KAP an inexpensive way to achieve their benefits. Because both sides had their own priorities, KAP wasted a year without a main agency.

### **From Private Company to KARI**

KAP was initiated when KARI became its main agency. While KARI's expected role was as advisor and supporter, it ultimately had much more authority and responsibilities regarding the program than envisioned. It was responsible for planning, negotiating with Russia, promotion, and preparing scientific experiments. Only promotion would be a shared responsibility between KARI and a private broadcasting company, which had not yet been selected.<sup>176</sup> Although KARI became the main agency, this decision was sudden based on the absence of other options, and not what KARI wanted.<sup>177</sup> However, KARI could not refuse the role of the main agency for KAP because of the hierarchy between MOST and KARI.

KARI is a government-funded research institute. These institutes were first established in 1966 when the Korean government made science and technology a means of

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<sup>175</sup> Oh, interview.; Anonymous, Interview by Seungmi Chung, Sanbon, South Korea, August 1, 2018.

<sup>176</sup> "The Way of the Korean Astronaut Program, 2005.11.3. 19:30 at Baekwon, "The Meeting Agenda for Vice Minister."

<sup>177</sup> Anonymous, Interview by author, July 28, 2016, Daejeon, South Korea; Anonymous, Interview by Author, July 14, 2017, Daejeon, South Korea

national development. As time passed, more government-funded research institutes were established.<sup>178</sup> KARI was established in late 1989 as part of the Korea Institute of Machinery & Materials (KIMM), and became a separate government-funded research institute in 1996.<sup>179</sup> In 1999, the Korean government enacted the *Act on the Establishment, Operation, and Fostering of Government-Funded Research Institutions* and created five “research societies”: the Economics and Social Studies Research Society, Liberal Arts and Social Studies Research Society, Basic Technology Research Society, Industrial Technology Research Society, and Public Technology Research Society. The purposes of the societies were to assist, foster, and manage government-funded research institutions. Based on this law, government-funded research institutions fell under these research societies.<sup>180</sup> The societies were included in the Prime Minister’s office, although the Basic Technology Research Society, Industrial Technology Research Society, and Public Technology Research Society were shifted under MOST in 2004. KARI was also transferred to MOST.

MOST was the higher institute of KARI not only administratively, but also economically. The budget of the government-funded research institutes is roughly divided into two parts: government-provided funds to operate the institute and income generated from an institute’s projects. Specifically, government-provided funds are decided hierarchically. Each government-funded research institute drafts its own ideal budget. The research society in which the research institute is included then revises the details. MOST reviews the revised draft and the budget is decided through negotiations between the Ministry of Economy and

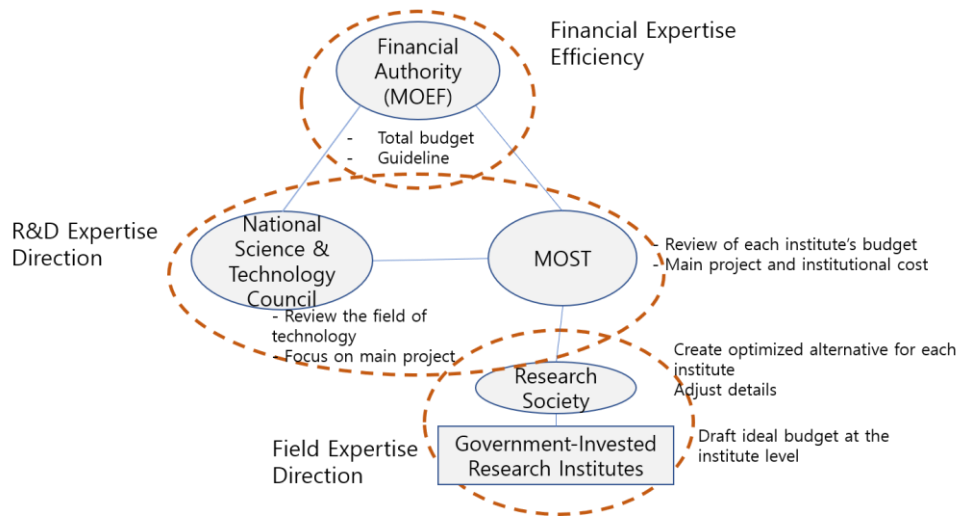
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<sup>178</sup> Sohee Park, *Change and Influence on the R&D Funding System of Government Funded Research Institutes*, KISTEP (KISTEP, 2017).

<sup>179</sup> KARI, [www.kari.re.kr](http://www.kari.re.kr) (accessed by April 2017)

<sup>180</sup> "ACT ON THE ESTABLISHMENT, OPERATION AND FOSTERING OF GOVERNMENT-FUNDED RESEARCH INSTITUTIONS," in 5733, ed. Office for Government Policy Coordination (January 29, 1999 1999).; “Introduction of Research society” [http://www.nst.re.kr/nst/about/02\\_01.jsp](http://www.nst.re.kr/nst/about/02_01.jsp) (accessed October 6 2018).

Finance (MOEF), National Science & Technology Council, and MOST. KARI's budget must also be approved by MOST. Figure 3 illustrates this budget system.<sup>181</sup>



**Figure 3 Role of Each Actor in the Compilation of the Budget of a Government-Invested Research Institute<sup>182</sup>**

KARI is administratively and financially subordinate to MOST. This hierarchical relationship is clear in the selection of KAP's main agency. Although KARI did not expect and did not want to be selected, it had to accept the appointment.

KAP becoming KARI's project marked the start of the conflicts between sociotechnical vanguards as KARI's vision entered the project.

### **Launch of the Program: Start of a Conflicting Imaginary (November 2005)**

To prepare for KAP in December 2004, MOST set up a planning committee to deliberate and decide on crucial issues pertaining to the program. The committee members were officers from MOST and KARI; academics; and representatives of private companies,

<sup>181</sup> Park, *Change and Influence on the R&D Funding System of Government Funded Research Institutes*.

<sup>182</sup> Park, *Change and Influence on the R&D Funding System of Government Funded Research Institutes*. 146.

public schools, and the military. The committee was chaired by the Vice-Minister of MOST and Professor Doohwan Kim from Ajou University.<sup>183</sup> It met twice to select the main agency for KAP before November 7, 2005, and decided to reject the MBC proposal. Furthermore, it was decided in the second meeting to propose KARI to MOST, after which KARI was appointed as the main agency for KAP on November 8, 2005. The meeting on November 11, 2005 finalized the basic plan and set the project period as 20 months (November 2005 to June 2007). The estimated cost of the project was 26 billion won, including 6 billion won from the Korean government.<sup>184</sup> MOST signed a contract with KARI on November 16, 2005, after which preparations for the program began.<sup>185</sup>

However, KARI could not do everything expected in KAP, which as mentioned, was the first attempt to make a Korean astronaut. For this, KARI needed to collaborate with other institutes because it did not have any experience in terms of astronaut programs. Under MOST's supervision, KARI's role in KAP included organizing the program; negotiating with Russia; selecting, managing, and providing training support for the Korean astronaut; and developing the scientific mission in space. MOST had the taskforce needed to support KAP and organize its committee.

A taskforce under MOST was established in December 2005 to support the selection process for the first Korean astronaut and create the public mood for KAP. The working period was from December 1, 2005 to the selection of the two final candidates. Three members of the taskforce were from MOST and two from KARI. Although a temporary taskforce under the bureau of basic research at MOST, it was directly positioned under the

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<sup>183</sup> KARI, *The White Paper of the Korean Astronaut Program*. 30.

<sup>184</sup> "The Current Status of the Korean Astronaut Program (Report)", The Bureau of Basic Science ( '0.11/Confidential).

<sup>185</sup> Ibid.

Vice-Minister. However, Deputy Prime Minister was regularly updated on the program's progress.<sup>186</sup>

KARI had established committees for astronaut selection and mission development. The astronaut selection committee drafted the selection guidelines and developed the selection process. It had two subcommittees, one for general selection and one for medical selection. The former, chaired by Dr. Hyochoong Bang of the Aerospace Engineering Department at KAIST, evaluated the applications in terms of science, common sense, English ability, a physical test, and conducted interviews. Two other members were from the Korean Air Force, one was a professor from the English department, three were from the Psychology department, one was a high school teacher, and one was a human behaviorist. Seven others from various backgrounds served as consultants to ensure that the developed guidelines were fair.

The medical selection subcommittee developed guidelines that candidates had to meet to adapt to space. Fourteen doctors from various medical fields sat on the subcommittee, which was chaired by Dr. Ki-Young Chung from the Air Force Aerospace Medical Center. Dr. Ki-Young Chung worked on the selection of candidates for the role of the first Korean astronaut. He was also the flight surgeon of the first Korean astronaut.

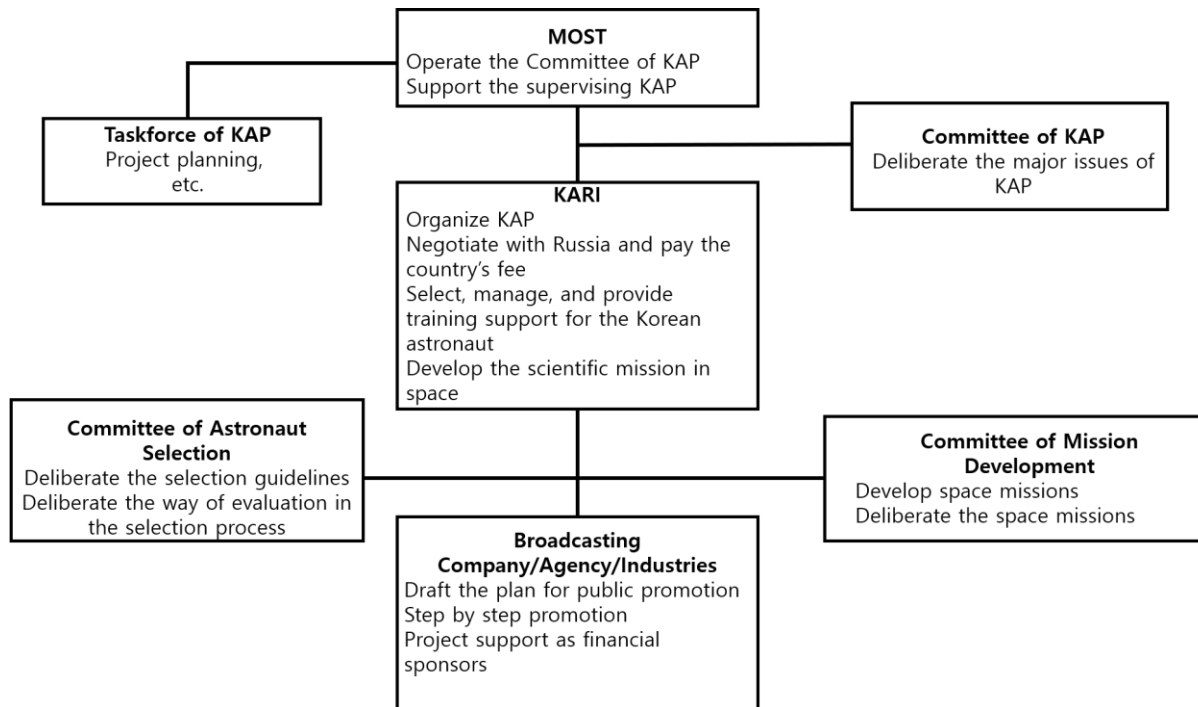
The mission development committee evaluated the experiments proposed by the research team to ensure they were feasible and meaningful. The scientific experiments had many limitations including time as well as the weight and size of the experimental equipment. Dr. Sug-Whan Kim from the astronaut department chaired the committee, most members of which were from a range of academic departments. While very few members

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<sup>186</sup> "Making the Management Plan of the Korean Astronaut Program Team," MOST.

were from industry, they came from diverse fields of study such as aerospace engineering, botany, and education.<sup>187</sup>

The broadcasting companies helped promote KAP and provided funding. Industry funding was also welcome. Figure 4 shows KAP’s network.



**Figure 4 The KAP Network<sup>188</sup>**

By 2006, KAP’s plan was nearly complete. Discussion on the Technology Safeguard Agreement between Korea and Russia had continued from September 2005, and the final agreement was planned for February 2006. By January 2006, KAP’s timeline had almost been finalized. The announcement and opening ceremony would be held in March 2006, and the astronaut would be selected between March and December 2006.

<sup>187</sup> KARI, *The White Paper of the Korean Astronaut Program*. 29-33.

<sup>188</sup> KARI, *The White Paper of the Korean Astronaut Program*. 29.

The candidates for the first Korean astronaut would be gradually reduced from 300 to 30, to 10, and then to the final 2 through a 4-step selection process. Finally, the first Korean astronaut would go to ISS, perform the space mission, and return to Earth in April 2008.<sup>189</sup> As the supervising institute, MOST already had a clear timeline for KAP, although the announcement and starting ceremony were postponed for one month. The meeting with the Minister of Science and Technology was held in March 2006. The plan for KAP had not changed much, and MOST's plan was close to approval. MOST still viewed KAP as a public promotion project to diffuse a culture of science in Korean society and stimulate national self-esteem.<sup>190</sup>

At this point, a significant change in MOST emerged. Dr. Myung Oh, the Deputy Prime minister of MOST, resigned on February 10, 2006. There are two perspectives regarding his resignation. Some said that Dr. Oh had long wanted to leave the position, and resigned on his own volition. However, it was also rumored that he had to resign after taking responsibility for the controversy surrounding Dr. Woo-suk Hwang.<sup>191</sup> Dr. Woo Sik Kim replaced Dr. Oh in early January 2006, but Dr. Oh performed his role until the last day of his

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<sup>189</sup> "15. The Korean First Astronaut Program," Revised by January 27, 2006. Eunchul Choi, Director of Space Technology Development and Youngsik Kim, Director General of Basic Research.

<sup>190</sup> Ibid.

<sup>191</sup> The controversy around Dr. Hwang was the most controversial scientific issue in Korea. It was suspected that MOST would not investigate the research fund, and it was said that Dr. Oh did not respond to the issue appropriately. Because Dr. Hwang was a scientific hero in Korean society at that time, his downfall accelerated distrust in science and technology and the scientific community. Thus, a new event to encourage national interest in science and technology and a new scientific hero were needed in Korean society; Kwonyong Kim, "The Sad Resignment of the Deputy Prime Minister Myung Oh... He Become an Emeritus Professor of State University of New York at Stony Brook that He Graduated," *The Hankyoreh* (Seoul), February 10, 2006 2006, Society. ; Jeongsun Moon, "The Deputy Prime Minister Myung Oh Who Resign the Position Become the Emeritus Professor of State University of New York at Stony Brook that He Graduated," *HelloDD* (Daejeon), February 12, 2006 2006.



period, February 10, 2006. When the Deputy Prime of MOST changed, there was some discussion on whether to sustain KAP. Ultimately, MOST decided to retain the program.<sup>192</sup> KAP's goals, intention, and timeline were preserved, showing that the vision of one individual, Dr. Myung Oh, was adopted as the vision of the institution, MOST. Thus, it was not affected despite that the person who first dreamed it was no longer around. This confirms that when one's vision transforms into the vision of a sociotechnical vanguard, it does not easily disappear.

A broadcasting company was still needed for the purposes of KAP, and in December 2005, SBS entered into negotiations with MOST in this regard. SBS appointed an organizing team in March 2006, and signed a contract with MOST on April 14, 2006. The broadcasting company promoted KAP and provided partial financial support. The financial contribution decreased from 20 billion to 5 billion KRW, and the planning burden was reduced to include only the promotion part. SBS thought that it could cover the cost through industry sponsorship and a grant for a video content competition from the Korea Foundation for Science Culture.

SBS hoped that the next president would appear on its TV show, because the spaceflight of the Korean astronaut would take place in the next presidential period. The airing monopoly held by KAP gave SBS an advantage in the competition between broadcasting companies.<sup>193</sup> The conflict between MOST, which considered KAP a public project, and broadcasting companies, who viewed KAP as an event for their own benefit, was resolved and each side achieved what it wanted.

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<sup>192</sup> Anonymous, Interview by Author, July 7, 2017, Seoul, Korea.; The person is from MOST.

<sup>193</sup> Total Broadcasting Team, "The reasons that KBC and MBC do not accept but SBS accept the Korean Astronaut Program " *Media Today* (Seoul), January 9, 2007 2007.; Anonymous, Interview by author, July 16, 2018, Seoul, Korea.

The contract with Roscosmos was agreed on through several steps. The first step of the contract was the “Agreement between the Government of the Republic of Korea and Government of the Russian Federation on Technology Safeguards Associated with Cooperation in the Field of the Exploration and Use of Outer Space for Peaceful Purposes” between MOST and Roscosmos. On April 19, 2006, they received preliminary authority to proceed. In the first step, they checked that both had an interest in continuing negotiations regarding KAP. In the second step, they made decisions regarding major issues pertaining to KAP. They scheduled the launch for April 2008, set the cost of program at US\$ 20 million, and decided that Russia would train the two final candidates for one year, send a 45 kg payload to ISS, and have support from a Russian cosmonaut for ten hours. Specific aspects including the role of the Korean astronaut and those that would be decided in December 2006 were not clarified at this stage.<sup>194</sup>

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<sup>194</sup> KARI, *The Korean Astronaut Program*, KARI (MEST, 2008). 13.

## **Chapter 4. Black-boxed and Openly Created Experts: From Selection Process to Space Flight**

The media first reported on KAP in 2006, releasing details on the selection process in January. The program plan was decided in March at the meeting of Ministers related to science and technology. MOST and KARI announced the start of KAP on Science Day: April 21, 2006. Visions of the vanguards around the first Korean astronaut and KAP were expressed, and expert making started.

This chapter covers the selection process through training of the two final candidates and the spaceflight of the first Korean astronaut. The selection process ran from April to December 2006. The two final candidates, Dr. Soyeon Yi and Mr. San Ko, were selected from 36,206 applicants and trained for the mission. They entered the GCTC in March 2007 and underwent a year of training. Most training was conducted in Russia, but some also took place in the US and Korea. Dr. Yi's spaceflight was in April 2008. She launched on *Soyuz*, stayed at the ISS for ten days, and conducted scientific experiments and made other performances appearances for public communication.

In this chapter, I investigate how the Korean astronaut was transformed from an ordinary citizen into a space expert, and how the openness of these processes influenced her expertization in Korean society. I examine each element: selection, training, and tasks in the ISS of the first Korean astronaut. I also explore the guidelines for the selection process; process to decide the work to be undertaken by the Korean astronaut, including the list of experiments and other activities; and her performance and activities as the first Korean astronaut on the ISS. This chapter shows the construction of the image and meaning of the astronaut, and how her activities affected the public perception of astronauts and space experts.

## Meaning of the First Astronaut

The “first” was important. The US and Soviet Union competed to be first in space. Russia had the title of first space object and first human spaceflight, and the US boasted the first moon landing. The meaning of being first was not limited to the space program, but was also valuable in the field of space including “the first popular monograph on space travel; the first public agency to promote interplanetary travel; the first media images of rockets reaching into space by reaction power and parabolic line; the first world exhibition on spaceflight; the first international language dedicated to space flight; the first encyclopedia of spaceflight”; and so on.<sup>195</sup>

The meaning of first is still significant to latecomer countries, although this differs from that for the space race. Latecomer countries claimed that their achievement is the first in their countries, arguing that it provides evidence they have caught up when they achieved the development in space field. KAP held a similar position in the Korean space program. Like other Korean space programs, being the first was a very important adjective in KAP.

Korean society did not have a clear definition of astronaut, which became a severe problem when companies planned space events and offered space tours as a prize. The first Korean to leave Earth would be someone found through the events of a private company if these events were performed as planned, although they were proposed just after KAP was first proposed. It fueled debates on who the first Korean astronaut would be and on what is the meaning of astronaut.

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<sup>195</sup> Michael G. Smith, *Rockets and Revolution: A Cultural History of Early Spaceflight* (Lincoln: Univeristy of Nebraska Press, 2014). 6.

The online shopping KT mall launched a “Space Tour Festival” when it opened its online shop. The suborbital space flight was the first prize. All members of the shopping mall could enter at the event, and two persons, one woman and one man aged in their 30s, were selected as the winners of the space tour. However, the prize was conditional. They would go to space only once space tourism stabilized, thought to be December 2006. If this did not materialize, the winners would get 100 million KRW (around US\$ 101,000).<sup>196</sup> KT mall planned this event to promote space science and technology.<sup>197</sup>

Furthermore, the Korean branch of Oracle launched the “Oracle Space Trip for Programmers” in June 2005. People could participate in the event by answering questions about Oracle software. The winners would participate in Space Adventure’s suborbital spaceflight program. One winner would come from America, one from Europe, and one from Asia.

In January 2006, Mr. Jaemin Heo, a university student in Korea, was announced as the winner from Asia including Korea, India, Australia, and Singapore.<sup>198</sup> Space Adventure’s Suborbital Spaceflight Experience program, a commercial spaceflight program, included a tour of the spaceport and mission control center, training, a medical check, suborbital spaceflight, and post-flight celebration. In the spaceflight, the participants would experience a zero-gravity environment at an altitude of 100 km.<sup>199</sup> Mr. Heo would undergo four days of

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<sup>196</sup> This is based on the currency exchange rate of 2006 between Korean Won (KRW) and US Dollar (US\$).

<sup>197</sup> Wonseok Kim, "[Focus] KT Mall," *Electric Times* (Seoul), June 18, 2004 2004.

<sup>198</sup> Ohyong Kwon, "'Let's Go to Space after Solving Quiz' SW Company 'Oracle' Event, 100km Suborbital Spaceflight," *Kyunghyang Shinmun* (Seoul), June 10 2005 2005.

<sup>199</sup> Space Adventure <http://www.spaceadventures.com/experiences/suborbital-spaceflight/> (Accessed October 16, 2017).

training, which included wearing a spacesuit, adjustment training in a zero-gravity environment, spacecraft communication, safety training, and experiencing zero-gravity at an altitude of 100 km, from where he would be able to see the Earth. The prize was a five-minute flight.<sup>200</sup> The Korean media paid great attention to this issue. In January 2006, more than 20 articles on Mr. Heo appeared in the Korean media, in which he was referred to by different labels including Korea's first private astronaut and space tourist. Some newspapers stated he would be the first person in space, while others contended he would be the first Korean astronaut.<sup>201</sup>

As these events and KAP took place in a similar era, many people wondered who would be the first Korean in space or first astronaut, fueling debates on what a Korean astronaut was. The winners of the KT mall contest were announced in August 2004, and Mr. Heo became the winner of the Oracle suborbital spaceflight program in January 2006. Although KAP was proposed before then, its selection process took place after these competitions. Thus, when Mr. Heo won the Oracle contest, some media considered Mr. Heo and the KT mall winners as the first Koreans in space.<sup>202</sup>

The delay in technical development led to the replacement KT mall prize and postponement of Mr. Heo's flight. Thus, through KAP, the astronaut would become the first Korean astronaut in space. However, the debate on the first Korean astronaut gave rise to the

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<sup>200</sup> Junghoon Cho, "Unrealized Dream of "First Korean Astornaut", " *Chosun.com* (Seoul), March 14, 2008 2008.

<sup>201</sup> Byungheon Kim, "Win the Space Trip," *MBC* (Seoul), January 9, 2006 2006.; Juyoung Moon, "Win the Space Trip, The Man Who Catch the Star Experience the Attitude of 100 km, Mr.Heo, One of Three Lucky Guys in the World " *Kyunghyang Shinmun*, January 10 2006 2006.; Anonymous, ""It Seems Like Dream that I Am the First Private Astronaut in Korea", " *The Seoul Economic Daily* (Seoul), January 9, 2006 2006.

<sup>202</sup> Chulhwan Jeong, "Mr. Jaemin Heo, a University Student Won the Space Trip Prize as the Representative of Asia-Pacific Region," *Hankook Ilbo* (Seoul), January 9, 2006 2006.

question of what should differ between KAP and other events, and the meaning of the first Korean astronaut. For example, Mr. Heo's space tour would reach an altitude of 100 km for around 5 minutes. This altitude is the boundary of the Earth's atmosphere and of Earth and space. Thus, while Mr. Heo would be outside the boundary of the Earth, would being there for five minutes in parabolic motion be considered a "space tour"? The Korean people questioned whether being outside the Earth's atmosphere would be sufficient or whether other conditions were required to be considered an astronaut.

KAP had to be justified in Korean society as the program to make the first Korean astronaut. Likewise, KARI had to differ from other programs. The debate on the meaning of astronaut re-emerged later in discussions on whether Dr. Yi was an astronaut or a space tourist. This triggered actions to characterize the processes in KAP as a research project to distinguish it from other programs. KAP emphasized the national value of the Korean astronaut and science experiments, and highlighted the issue of whether Dr. Yi could be considered a space expert or merely a lucky girl.

### **You are the first Korean Astronaut!**

The Minister of MOST announced that KAP would be launched in science month: April 2006. Newspapers published articles stating that KAP's selection process would begin on April 21.<sup>203</sup>

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<sup>203</sup> Byungseok Yoo, "The First Korean Astronaut... a Man or Woman Over 19 Years Old with Ji, Deok, Che," *Kukmin Ilbo* (Seoul), April 4 2006 2006, International; Anonymous, "The Accepting Application for Being 'Korean Astronaut' from April 21," *The Seoul Economic Daily* (Seoul), April 4 2006 2006, Society; Heewon Kim, "Challenge the First Korean Astronaut," *Hankook Ilbo* (Seoul), April 4 2006 2006, International.

Selection began on April 21, Science Day, as scheduled. The date was intentionally chosen to call attention to the national importance of science and technology. April is the month of science in Korea, and April 21 is Science day. Many scientific events including competitions for scientific drawings and science book reviews are held.<sup>204</sup> The opening ceremony for Science day included many other public events in line with the promotional goal of KAP. Even before the opening ceremony, many science events were held to educate people about space. There was several hands-on activities, an astronaut suit exhibition, space food, pictures, a photo zone, a booth to apply to KAP, sun observation, a science lecture, and space drawing contest. The opening ceremony started at 6 pm at Seoul Plaza in front of the Seoul City Hall.

The opening ceremony was also an event. SBS broadcast the entire ceremony, which included the opening proclamation, designating the goodwill ambassador of KAP, a video screening, and many performances. The famous singer Chae Yeon and Korean sports star Dae-sung Moon were named goodwill ambassadors, and many famous singers performed to celebrate the opening of KAP.<sup>205</sup> Celebrities' participation drew attention to the program. Deputy Prime Minister Woo Sik Kim and the President of KARI, Hongryul Baek, announced the launch of KAP. The statement can be divided into three parts. First, the goals of KAP were stated as being to increase public understanding and interest in space development and science and technology and to acquire human spaceflight technology. The role of the first Korean astronaut was to be aboard the Russian spaceship and conduct experiments on the ISS. Finally, they encouraged anyone aged more than 19 years who "has a dream and

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<sup>204</sup> KARI, *The Korean Astronaut Program*. 28; KARI, *The White Paper of the Korean Astronaut Program*. 47.

<sup>205</sup> KARI, *The White Paper of the Korean Astronaut Program*. 72; KARI, *The Korean Astronaut Program*. 29.



passion” to apply. The specific guidelines for the selection process were attached after the statement. Interesting was the very simple explanation about who could apply. The only criterion was being a “Korean national aged more than 19 years.” The application instructions, which provided more detailed information, provided only guidelines to meet the minimum physical conditions required to board the Russian *Soyuz* spaceship. Figure 6 shows the physical guidelines applicants to KAP were expected to meet. The astronaut’s tasks were limited to going to the ISS on the Russian *Soyuz* rocket and conducting scientific experiments. The role of the Korean astronaut before, during, or after the flight was not elaborated. Interestingly, it explained that applicants would visit the space centers of other countries and receive special gifts rather than information on the role or applicant guidelines,<sup>206</sup> indicating MOST and KARI’s efforts to attract Koreans to apply to KAP.

**Table 6 Physical Guidelines for KAP Applicants**

Height	Height	150 – 195 cm
	Sitting Height	80 – 99 cm
Vision	Uncorrected vision	Over 0.1
	Corrected Vision	Over 1.0
	Refraction index	Within +/- 6D
Blood Pressure	Systolic	140-90
	Diastolic	90-60
Foot Size		Under 295 mm
Weight		50-95 kg

These guidelines differed from the requirements for NASA’s astronauts. When NASA announced a public competition to select astronauts, there were three qualifying criteria:

<sup>206</sup> KARI, *The Korean Astronaut Program*. 30-35.

1. Bachelor's degree in engineering, biological science, physical science, computer science, or mathematics.
2. At least three years of related professional experience obtained after completing the degree OR at least 1,000 hours of pilot-in-command time on a jet aircraft.
3. The ability to pass the NASA long-duration astronaut physical. Distant and near visual acuity must be correctable to 20/20 for each eye. The use of eyeglasses is acceptable.<sup>207</sup>

Candidates had to also possess good communication, teamwork, and leadership skills, and have obtained higher education in an STEM field and experience in the field. More than two years of training was required after the final selection, much longer than the training period for KAP. However, more than 18,300 people applied to be an astronaut in 2016, even though the standards were much higher than those set out for KAP.

In contrast, KAP did not have any educational or professional requirements. The training period was only one year. As such, those who applied to KAP were less qualified than NASA candidates. In addition, skills development was also inferior to that for NASA astronauts, who already had existing professional experience. This indicates that KAP did not intend to create professional astronauts or experts who are same with other astronaut in its beginning stages.

KAP was promoted through newspaper advertisements, TV commercials, Internet websites, and in various other ways. The KAP banner was hung in many places and media frequently reported on the program. Life-size pictures of astronauts were placed in convenience stores.<sup>208</sup> Naver, the major Internet portal site in Korea, posted banners to

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<sup>207</sup>“Astronaut Requirement”

[https://www.nasa.gov/audience/forstudents/postsecondary/features/F\\_Astronaut\\_Requirements.html](https://www.nasa.gov/audience/forstudents/postsecondary/features/F_Astronaut_Requirements.html) , NASA, (accessed March 25 2019).

<sup>208</sup> Jisun Lim and Hyunjoo Lim, “The Eight-Month Experience of Astronaut Selection Process “There Is Nothing Possible without Dream,”” *Kyunghyang Shinmun*, Society, December 22, 2006.; Anonymous, Interview by Seungmi Chung, January 4, 2017, Sejong, South Korea.

advertise KAP, and many people applied to the program through ads on portal sites.<sup>209</sup> Dr. Yi applied after seeing a newspaper advertisement.<sup>210</sup> A voluntary Internet posting also encouraged people to apply. Some companies posted the board on their website, and personal blogs were another channel by which KAP was promoted. Some people posted about KAP on their blogs or websites after submitting their application, encouraging their friends' interest in the program.<sup>211</sup>

All promotional material used similar slogans: "You are the first Korean astronaut." "Looking for the first Korean astronaut. Before you go to space, it is merely part of the imagination, but this is not so for you any longer." All slogans emphasized that KAP was not a program to select a special person, but to select the first Korean astronaut from the general population. The official announcement, promotional materials, and slogans used in the campaign all reflected the vision of MOST.

### **The Challenge of the General Person**

KAP emphasized that the first Korean astronaut is not a special person, but one from the general population. The oldest applicant, Mr. Jae-eun Chung (aged 67 years), the honorary president of Shinsegae Group, said that the Korean astronaut program would be the last challenge of his life and that he wanted to show his grandchildren that he could go to the ISS. Some people came from abroad to participate in the selection process. Many who

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<sup>209</sup> "My schedule is messed up," <https://blog.naver.com/dhlrns/120028850758>, Under Sky, Above the Land, Small world where I live (Accessed May 28, 2018).

<sup>210</sup> "Background Music of the CF for the Korean Astronaut Program," <https://blog.naver.com/hsh357/140024135727> A Flash of Nakyeopdo, (accessed June 14, 2019); Soyeon Yi, Interview by author, September 21, 2018 Puyallup, Washington, U.S.A.

<sup>211</sup> "I passed Physical Test for the Korean Astronaut Program," <https://planeman.blog.me/130008422662>, Planeman, (accessed June 14, 2018).

dreamed of being an astronaut when they were young applied to KAP and completed the challenges, despite many difficulties including pregnancy and unexpected injury.<sup>212</sup> KAP was the first real opportunity to achieve their childhood dream and set an example for their children, who had their own dreams of being an astronaut. The Koreans who did not apply followed the news on KAP and attended public events. In total, 36,206 applications were submitted. The selection process was organized as an open competition. The slogan to promote applying to the program stimulated the hidden dreams of the Korean nation, which responded to the call.

Thus, KAP’s selection process set out on the challenge to find someone from the general population and enable them to achieve their desire. This challenged their childhood dreams and desire to be a proud family member. The four-step selection process entailed specific tests in each phase. Each test was based on general suitability, behavioral suitability, medical suitability, and language skill, which according to KARI, were the same aspects addressed in the international guidelines.<sup>213</sup> However, as most countries do not publicize their guidelines for the selection of astronauts, MOST and KARI based the selection process on research from 2004.<sup>214</sup> Table 6 describes the basic information for each step of the selection process.

**Table 7 Selection Process**

Application (On/Off-line)	Provide your basic information, occupation, career, language skills, physical information, health information, history of disease, and Statement of Purpose
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<sup>212</sup> Hyoung Joon An, *I am a Korean Astronaut* (Seoul: Donga Science, 2008). 29-49.

<sup>213</sup> KARI, *The White Paper of the Korean Astronaut Program.*; Anonymous, Interviewed by author, KARI in Daejeon, South Korea. (June 14, 2017).

<sup>214</sup> Anonymous, Interviewed by Author, June 14, 2017, Daejeon, Korea.

1 <sup>st</sup> Selection (36,206 → 245)	General Suitability	CV
	Behavioral Suitability	SOP and comprehensive evaluation
	Medical Suitability	Basic physical strength test (run 3.5 km), physical check-up
	Language Skill	Comprehensive test (TEPS)
2 <sup>nd</sup> Selection (245 → 30)	General Suitability	
	Behavioral Suitability	In-depth physical strength test Mission capability (In-depth examination of knowledge/language)
	Medical Suitability	Mental/psychological evaluation
	Language Skill	English test (reading/writing)
3 <sup>rd</sup> Selection (30 → 10)	General Suitability	
	Behavioral Suitability	Space Aptitude Test 1 (Low-pressure chamber, acceleration of gravity, spatial disorientation, sudden decompression flight, night vision, and emergency escape training, etc.)
	Medical Suitability	In-depth physical check-up, in-depth mental evaluation
	Language Skill	
4 <sup>th</sup> Selection (10 → 2)	General Suitability	
	Behavioral Suitability	Space Aptitude Test II (e.g., isolation room, test flight, etc.), field evaluation in Russia, social aptitude interview
	Medical Suitability	
	Language Skill	

However, the selection process reflected KARI's imaginary, as it served the role of KAP's main agency. The challenge of a general person changed to the process to find a special one. Although MOST was a supervising institute, KARI was responsible for running KAP. As mentioned in earlier chapters, KARI is a research institute based on a traditional sociotechnical vision, namely national development through advanced science and technology. The selection process focused on identifying a person with the potential to become a space expert. As such, the test guidelines became increasingly professional as more steps were concluded. This was related with the controversy regarding being a space tourist.

In the debate on the first Korean astronaut versus space tourist, KARI emphasized that the Korean astronaut was not a space tourist, but an astronaut, because the selection and training process differed from that of space tourists and the mission or tasks could only be completed by a space scientist. Therefore, the Korean astronaut had to be in good physical condition and have a high scientific ability.<sup>215</sup> The Korean astronaut was to be the most brilliant and strongest in Korea, and this rhetoric was used to justify KAP as a national project.<sup>216</sup> As such, the Korean astronaut was to be carefully selected, well trained, and an expert.

As mentioned, 36,206 people applied to KAP in less than 3 months, indicating that the program attracted the attention of many Koreans regardless of age, education level, region, and gender. Six percent of applicants were aged 19 years. The oldest applicant was a male aged 67 years, although most applicants (68%) were aged between 20 and 29 years.<sup>217</sup> A large number of applicants were eliminated in the first step of the selection process, and the 3.5 km run eliminated all but 3,237 applicants, including the oldest one. The written test included English and comprehensive knowledge. Most questions were to check applicants' intelligence, and the remaining 20% assessed their scientific knowledge.<sup>218</sup> The test results were combined with the evaluation of their application (30% for the English Test, 30% for comprehensive knowledge, and 40% for the assessment). This left 500 applicants for the in-depth medical examination. While scientific knowledge was not a significant factor in

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<sup>215</sup> Hyoung-Joon An, "Is Yi Soyeon an Astronaut or a Space Tourist?: The First Korean Astronaut Debate on the View of ANT," *Journal of Science & Technology Studies* 9, no. 1 (2009).101.

<sup>216</sup> Park, "A Study on the Korean Astronaut Program as a Media Event Based on Discursive Analysis on SBS Program 'Space Korea'." Vi.

<sup>217</sup> KARI, *The Korean Astronaut Program*. 39-41.

<sup>218</sup> Heebuhm Park, *Close Coverage during 700 Days of the First Korean Astronaut by a Journalist - The Endless Challenge of Astronaut Soyeon Yi* (Seoul: Electronic Times, 2008). 32.

selecting the applicants, some questions were included, such as: “What does not change in the human body in zero-gravity?” The 500 applicants included some whose level of education was equal to or less than high school. Although the oldest applicant was not included based on a physical restriction, a 56-year-old professor did make it through. The last part of the first selection was the medical test, which reduced the applicant pool to 245 people.<sup>219</sup> This was the decision of the Committee of Astronaut Selection.

The second stage of the selection process screened for more specialized abilities. It ran from October 21–22, 2006, and all applicants stayed together for the test. There was an in-depth physical fitness check (push-ups, sit-ups, and shuttle run), a psychological examination, and an interview in Korean and English. All applicants had to pass at least two of the three parts of the physical fitness check. They were also evaluated for mental illness, personality traits, and personality dimensions using the Minnesota Multiphasic Personality Inventory -2 (MMPI-2), NEO Personality Inventory (NEO-PI), and Temperament and Character Inventory (TCI). Furthermore, interviews assessed their ability to operate missions. The interview in Korean evaluated communication skills, interpersonal relationships, collaboration, decision-making and problem-solving abilities, and public sociability through group interviews. The English interview focused on engineering skills. The applicants had to be able to read articles on aerospace in English, summarize them in Korean, and answer questions about the content in English. They were also required to understand specialized knowledge quickly and explain it. Applicants who had majored in science and engineering were at an advantage. After this round of test, 30 applications remained, 14 of whom had majored in science or engineering.<sup>220</sup>

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<sup>219</sup> These 245 applicants formed the club Woojuro 245. While they were not selected as the Korean astronaut, they promised to be strong supporters of KAP.

<sup>220</sup> KARI, *The Korean Astronaut Program*. 48-52.; An, *I am a Korean Astronaut*. 83; The ratio for

In the third stage, 20 applicants were eliminated, leaving 3 women and 7 men. The third stage evaluated applicants' capacity to cope with the situation, space aptitude, and required a more rigorous physical. The assessment of space aptitude included adaptability to zero-gravity, a high G-force, and low pressure. However, the evaluation of the capacity to cope with the situation included tests that required scientific knowledge and experience. As such, applicants with scientific knowledge and experience were advantaged, although these things were not required. The applicants had to deliver a presentation on a science topic, with only 20 minutes to prepare. Applicants had two hours to read a manual (30 minutes), perform experiments (50 minutes), and write a report (30 minutes). The last 10 minutes of the 120 was for the evaluators, not the applicants.<sup>221</sup> This task was easy for those familiar with scientific experiments, but tough for someone who did not study science and engineering. The evaluators included a professor of aerospace engineering, a high school science teacher, and two researchers from KARI. KARI defined the Korean astronaut as a researcher with the expertise to conduct scientific experiments. Thus, in KAP, the Korean astronaut is a researcher and space expert simultaneously.

The last stage of the selection process was the most controversial. It comprised three steps. The first was "Space Camp," where two more applicants were eliminated. Six applicants remained after the Russia test. The final step was an evaluation on a live TV show. San Ko and Dr. Soyeon Yi were the final candidates. The Space Camp started with the televised announcement of the person selected in the third stage. The ten remaining applicants started the fourth stage at 11:30 pm that day.

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applicants' academic background at the beginning was not available.

<sup>221</sup> An, "Is Yi Soyeon an Astronaut or a Space Tourist?: The First Korean Astronaut Debate on the View of ANT."; KARI, *The Korean Astronaut Program*. 53-56.



The Space Camp test demonstrated KAP's emphasis on science and engineering to select a Korean astronaut who was also a researcher. Applicants had to build a Goldberg machine that would perform the simplest task in the most complicated way, assemble a robot arm, operate software to track the orbit of satellites, undergo an MRI, take an English test, and answer questions in a rotating chair. The first three tasks were science and engineering-based. Applicants were evaluated on their scientific thought and ability to operate the machines and software used in aerospace engineering. Those who majored in a science or engineering field were more familiar with these tasks than the others. The task to answer questions in a rotating chair was a test of scientific knowledge. The space camp evaluated science and engineering knowledge, indicating that KAP's selection process favored applicants with an STEM background and highlighting the first Korean as a researcher, as KARI intended. Two male applicants dropped out.

The next step was held in Russia. After four days of training for skin scuba and adapting to high-altitude conditions, the eight applicants went to Russia on December 3, 2006. They completed three tests including a mission in a zero-gravity airplane, an underwater mission, and delivered a presentation on their suitability for the role of first Korean astronaut in Russia. The mission in a zero-gravity airplane was evaluated by a Russian instructor. These tests decreased the number of applicants from eight to six. Two women and four men remained, and completed a test on their ability to adapt to Russia.

The controversy was the live TV show on December 25, 2006. In this final evaluation, all evaluations completed during the selection process were re-evaluated, and a one-minute presentation on the live TV show and national preference survey were added, as shown in Table 7.

**Table 8 Evaluation in the Final Stage**

Scientific ability (35%): theory (5%) + experiment (30%)

- Theory: comprehensive knowledge (1<sup>st</sup> stage), inferential skill (3<sup>rd</sup> stage)
- Experiment: optical experiments (3<sup>rd</sup> stage), System Tool Kit (STK) (4<sup>th</sup> stage), Goldberg machine (4<sup>th</sup> stage), robot arm (4<sup>th</sup> stage)

Social appropriateness (20%)

- General interview (2<sup>nd</sup> stage), in-depth interview (3<sup>rd</sup> stage), presentation skill (3<sup>rd</sup> stage), Lego block (3<sup>rd</sup> stage), road mission (4<sup>th</sup> stage), presentation in Russia (4<sup>th</sup> stage), one-minute presentation on live television, national preference survey

Space appropriateness (10%)

- Zero-gravity airplane (4<sup>th</sup> stage), underwater mission (4<sup>th</sup> stage), answering questions in a rotating chair (4<sup>th</sup> stage)

Language skill (25%)

- TEPS (1<sup>st</sup> stage), English interview (2<sup>nd</sup> stage), English interview (3<sup>rd</sup> stage), English interview (4<sup>th</sup> stage)

Personality evaluation (10%)

- Career, sincerity, positive attitude, view of the state and sense of duty, future contribution

The controversial point was the national preference survey, which represented a different way for KARI to select a Korean astronaut with science and engineering ability.

This was aligned to the vision of MOST to attract public interest in KAP and in science and engineering. In addition, the objectivity of the selection process was questioned, as the final evaluation took place on a live TV show and included the national preference survey.

Experts—including professors of aerospace engineering or astronautics, medical doctors, and

staff from KARI and MOST—evaluated each process except the national preference survey. The public accepted the result of the selection process because they considered experts’ judgment objective, implying fairness and impartiality.<sup>222</sup> However, this objectivity was then questioned, and the public started doubting whether the two final candidates were really the best. Some media claimed that the fourth stage of the selection process was the public sociability evaluation and the national preference survey influenced the result of the selection process.<sup>223</sup>

In contrast, other media claimed that the national preference survey did not influence the result of the selection process because the most popular two candidates in the poll were not the final candidates. KARI said that the result of the survey did not significantly impact the final outcome. The live TV show and national preference survey were conducted only to boost nationwide interest. Ultimately, it did attract the nation’s attention in terms of space and science technology as MOST intended, but also damaged the image of the Korean astronaut as a space expert and researcher.<sup>224</sup>

### **General Person? Or Special One?**

Here, training refers to the process of expertization of two candidates as space experts. The Korean public expected the astronaut to represent their country. As such, the candidates were considered special people with a heavy burden. The expected image of an astronaut changed to that of someone special. Before becoming candidates for the title of first Korean astronaut, Dr. Yi was a graduate student in her 20s and Mr. Ko a researcher at

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<sup>222</sup> Therodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (New Jersey Princeton University Press, 1995). 4.

<sup>223</sup> “The Republic of Korea, The Dream of Space Era★” *The Munhwa Il-bo*, 2008.4.8.

<sup>224</sup> An, *I am a Korean Astronaut*.

Samsung Advanced Institute of Technology and prospective student at a graduate school in the US. Like other applicants, they were general people. However, being prospective astronauts set them apart. The Korean nation, even people who applied to KAP, expected them to be proud representatives of Korea. The Korean astronaut would also be a “space hero” and pioneer in the history of Korean space development, emulating the national or space heroes of other countries.<sup>225</sup>

This was based on the image of the American astronaut to which the Korean public had been continuously exposed. MOST also asked its two final candidates to be special. The expectation was not about being well trained or based on the success of Korea’s first space flight. Rather, all they were expected to do was represent Korea. While it would be an honor to be the first Korean in space, it was also daunting.

Even the clothes Dr. Yi and Mr. Ko wore were criticized. MOST asked them not to wear the criticized clothes, and gifted them with a traditional watch when Dr. Yi wore ripped jeans and colorful watches made by Lego.<sup>226</sup> Mr. Ko and Dr. Yi worried about being misunderstood and tried very hard to meet public expectations. Although this was a burden, they did not deny their responsibility, and tried to meet the expectations of the Korean nation. This expectation was not unusual. Most countries that had sent their first astronaut to space considered every little detail of their astronaut, which sometimes exacerbated misunderstanding regarding their intentions. The first astronauts were always considered

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<sup>225</sup> Anonymous, “The Korean First Astronaut my become a “Space Hero”” 『Chosun Ilbo』 2006.12.25, Anonymous, “The first Korean Primary Astronaut who would board on Soyuz is Mr. San Ko,” *Naeil*, 2007.9.5.

<sup>226</sup> Jongwoo Won and Soyeon Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*, *Sitting with Science*, (Seoul: East Asia, October 1, 2018, 2018).65-69.

special people, and the societies in these countries had a deep interest in their astronauts.<sup>227</sup>

However, whether the special one was considered so from the selection process differed. The first Korean astronaut was selected from the general population, and was unintentionally transformed into someone special, driving conflicting expectations about the Korean astronaut and her responsibility.

### **Expertization: Transformation from a General Person to Someone Special**

The transformation from a general person to someone special was part of expertization during the training and spaceflight. The year of training for the two final candidates began in March 2007. Dr. Gi Hyuk Choi, the chief of KAP, said that the training would transform laypeople into astronauts and space experts.<sup>228</sup> If the selection process was the process of admission of educational institutes in the traditional expertization process, the training of the two final candidates was the education provided in the institutes. However, the period of training was much shorter than the education usually provided in the making of an expert, such as earning a PhD, and it was opened to the public.

Mr. Ko and Dr. Yi would finish their training on *Soyuz* and the ISS in Russia, on the American module at the ISS in the US, and on their mission at the ISS in Korea. The training covered professional technology including engineering and scientific knowledge for the flights; staying on *Soyuz* and on the ISS and the related technology; and the practice of stress management, physical control, and languages including Russian and English. Table 8 provides the training schedule.

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<sup>227</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*.65-69.

<sup>228</sup> Gi Hyuk Choi, Interviewed by Author, KARI in Daejeon, South Korea. (July 28, 2016).



However, Mr. Ko and Dr. Yi had to be trained in Russian without an interpreter during the flight simulation training, because the *Soyuz* model is too small to include an interpreter. Thus, they had to quickly learn Russian to communicate with the training instructor and other cosmonauts.

Specifically, the training, which started in November 2007, was performed in a group training format with other Russian cosmonauts. The primary astronaut trained with the cosmonauts who would go to the ISS, and the backup astronaut with the backup cosmonauts. The training was identical to that completed by astronauts for a real spaceflight. The training team had to be able to solve any problems that could arise in a real spaceflight.<sup>231</sup> As such, a general person could become an astronaut and expert in spaceflight through this training.

### **The Primary Astronaut and Backup**

Mr. Ko and Dr. Yi were in the same position when they went to Russia for their training. However, only one would be the first Korean astronaut. Furthermore, the person who would go to space had to be decided before starting the second half of training, which took place in a group. The decision regarding who would be the primary astronaut was based on four parts: evaluation of the selection process, evaluation of the first half of training in Russia, evaluation of scientific mission training, and a comprehensive evaluation. The first half of the training in Russia was most important (50%), followed by the selection process (30%). The assessment of scientific mission training and comprehensive evaluation accounted for 10% each. Everything was scored.

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<sup>231</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*. 82-85.

The decision regarding the primary and backup astronaut was made by the consultative group. Table 9 lists the members of the group, which included the president of KARI, project chief of KAP, one representative from MOST, one representative from SBS, one professor of aerospace engineering, one professor of astronomy, and one person from the Air Force Aerospace Medical Center. They participated in the group as space experts. The Russian instructors influenced the evaluation of the training in Russia. However, the group was responsible for all other parts of the evaluation, including the final scores. However, all these members were male and aged more than 50 years. The consultative group to select the Korean astronaut claimed that everything was evaluated according to score to minimize bias.

On September 5, 2007, Mr. San Ko was selected as the primary astronaut, and Dr. Yi became the backup. The media focused on Mr. Ko, describing him as the perfect Korean man with knowledge, virtue, and a good physical condition. The media positioned him as an idol for young Koreans.

**Table 10 Members of Consultative Group to Select the Korean Astronaut**

List of consultative group members to select the Korean astronaut			
Name	Occupation	Name	Occupation
Hong-Yul Paik (1953)	President, KARI	Ki-Young, Chung (1960)	The Air Force Aerospace Medical Center
Heekywon Chung (1971)	Team chief of space technology cooperation team at MOST	Chulho Bae (1955)	SBS Space Korea Bureau
Hyochoong Bang (1964)	Professor, Department of Aerospace engineering, KAIST	Gi Hyuk Choi (1960)	Project chief of KAP, KARI.
Sug-Whan Kim (1959)	Professor, Department of Astronomy, Yonsei University		



His life had elements that Korean society and the media liked. He was raised in a low-income family by a widowed mother after his father, the captain of a ship, passed away. His life was a testament of his outstanding ability and effort to achieve great things. He studied in a foreign language high school and Seoul National University, and worked at Samsung Advanced Institute of Technology. He always achieved his goals and did not consider failure. Dr. Gi Hyuk Choi described Mr. Ko as having a strong tenacity to achieve everything he strove for.<sup>232</sup> Being the primary astronaut of KAP was another achievement. He worked hard to achieve his goals during the training period, and considered Dr. Yi as a looser because she would not go to space as the Korean first astronaut.<sup>233</sup>

Korean society preferred a self-developed man who had put in much effort under challenging conditions. Furthermore, learning is considered a favorable thing in Korea. Mr. Ko also suggested the future of Korean aerospace technology related to his major as a space expert.<sup>234</sup> Ultimately, he presented the image KARI intended, and his story would be popular with the public.

The media portrayed him as a standard man with leadership ability, brawn, a good personality, and the desire to learn. The media interviewed his friends, coworkers, and previous teachers. His strong desire to learn was a good characteristic for a Korean astronaut, and the media wanted to report on all aspects of his life, including on his girlfriend, her life, and their love story. He became a celebrity, and his private life became public.<sup>235</sup>

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<sup>232</sup> Eunpyo Kim and Yongha Yoo, "Astronaut San Ko Who Emerged as an Icon for Young People," *Maeil Business Newspaper* (Seoul), September 8, 2007 2007, Society, <https://www.mk.co.kr/news/society/view/2007/09/480492/>.

<sup>233</sup> Soyeon Yi, Interview by author. September 21, 2018. Puyallup, Washington.

<sup>234</sup> "Interview with Mr. San Ko" *The Munhwa Il-bo*, 2007.9.6

<sup>235</sup> Kim and Yoo, "Astronaut San Ko Who Emerged as an Icon for Young People."

## **The Woman before Any Man: Cherry Picker or Prepared Person?**

The most surprising event during KAP was the sudden change of primary astronaut. A journalist found a photograph showing Dr. Yi training with the cosmonauts who were set to go to the ISS on March 8, 2008. The Ministry of Education, Science and Technology (MEST)<sup>236</sup> and KARI announced on March 10, 2008 that Dr. Soyeon Yi had been selected as the new primary astronaut. Dr. Yi had not yet been informed, although she had already started training with the on-board crew. The change was because Mr. San Ko, the primary candidate for the first Korean astronaut, had broken the rules twice. He had sent a mission training manual that was not supposed to leave the Yuri Gagarin Space Center to Korea, and had read a manual he was not authorized to read.<sup>237</sup> Following regulations and instructions from the ground station is a significant practice for astronauts to stay with other people in a restricted space on the ISS and achieve their mission in space as planned.<sup>238</sup> While the materials read were not that important and available online,<sup>239</sup> Russia claimed that Ko was not qualified to be an astronaut and that Korea should make the change. Russia wanted to banish him from the training center. However, it was ended with just change of the primary astronaut.<sup>240</sup> This signaled the first change regarding the primary and backup astronaut based

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<sup>236</sup> As the administration changed, MOST was integrated with the Ministry of Education. The name was changed to the Ministry of Education, Science and Technology (MEST).

<sup>237</sup> Gun-hyung Park, "Mr. San Ko, Truth or Dare," *Seoul Shinmun* (Seoul), March 13, 2008 2008, International - Russia.

<sup>238</sup> Anonymous, Interviewed with Author, June 14 2017, Daejeon, Korea.

<sup>239</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*. 64.

<sup>240</sup> Soyeon Yi, Interviewed with Author, September 21, 2018, Puyallup Washington, ;Park, "Mr. San Ko, Truth or Dare."

on the violation of regulations in the history of human spaceflight. Note that changes based on medical issues had occurred several times.<sup>241</sup>

The consultative group to select the Korean astronaut maintained that their evaluations were based on scores and were objective; however, having to select a new primary astronaut indicated that their evaluation was insufficient.

The Koreans were shocked at the controversy. Some people claimed that he acted under orders from the government to obtain information on advanced human space program technology, highlighting that he had no personal motivation to do so. Others said he was a foolish person who forewent the honorable opportunity to go to space for the desire to know more about spaceflight. This was not assigning blame, but rather an expression of regret. Interestingly, no blame was assigned to Mr. Ko, who was considered a hero who tried to obtain more knowledge to improve the level of national technology in the space field and as having the desirable characteristic of seeking to learn. The media called his violation a trivial mistake and highlighted the tragedy of having to miss the opportunity based on a very minor mistake to be the first Korean astronaut, which would provide great honor and wealth.<sup>242</sup>

Public opinion turned against Dr. Yi, not against Mr. Ko. Some said she had gotten the position by default, despite having been selected from more than 36,000 people and undergoing the same training. Others called her a cherry picker because they thought she was selected without effort on her part.

As such, society's expectations changed and criticism of Dr. Yi intensified. For example, the controversy about the additional income of the Korean astronaut was applied differently

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<sup>241</sup> Jongchan Choi, "Russia, "Mr. San Ko is not a spy. He just wanted to study more.," *Seoul Shinmun* (Seoul), March 12, 2008 2008, International- Russia.

<sup>242</sup> Jiyong Lim, "Meet Astronaut San Ko after Three Years," *Sisain*, 2011, <https://www.sisain.co.kr/?mod=news&act=articleView&idxno=11472>.

to Dr. Yi. When Mr. Ko became the primary astronaut, the media talked about his future after the spaceflight, mentioning his higher income as the first Korean astronaut and additional earnings from appearing in advertisements, writing books, and giving public lectures on his experience. His income would be large, and according to regulations although part of it would be spent on the Korean space program or promoting the space programs.<sup>243</sup> No one questioned his earnings when he was the primary candidate. However, the Korean people had double standards for Dr. Yi.

An interview she gave as one of the top 30 candidates resurfaced when she became the first Korean astronaut. She said in the interview, conducted before she thought she would be selected, that she wanted to buy an apartment for her parents if she became the astronaut and earn a lot of money through various activities including appearing in advertisements.<sup>244</sup> Some claimed that she was not patriotic enough to be the first astronaut, saying she considered KAP as merely a career.<sup>245</sup> Dr. Yi was criticized as not having a strong sense of nationalism, despite that most applicants applied for personal reasons rather than national benefit.<sup>246</sup> In addition, some claimed that she was chosen to fill the gender quota—which KAP did not have in the selection process—and did not have sufficient capability. She was considered a lucky cherry picker who made no effort and had no ability.<sup>247</sup>

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<sup>243</sup> Kim and Yoo, "Astronaut San Ko Who Emerged as an Icon for Young People."

<sup>244</sup> SeoulGlow #4.1 – Dinner with Soyeon (Part 1 of 3), <https://www.youtube.com/watch?v=MmzIKDK6zVs> YouTube, (accessed July 13 2019)

<sup>245</sup> Anonymous, "Yongseok Kang, "The Mucktui Controversy of Soyeon Yi. The Korean Astronaut should be researcher or soldier," JTBC News, Entertainment, July 4, 2014. [http://news.jtbc.joins.com/article/article.aspx?news\\_id=NB10519669](http://news.jtbc.joins.com/article/article.aspx?news_id=NB10519669)

<sup>246</sup> Ibid.

<sup>247</sup> Anonymous, "One Spot of the Korean Astronaut Candidates is for Woman," *The Chosun Ilbo*, October 9, 2006; Anonymous, interviewed by Author. June 14, 2017, Daejeon, Korea.

Interestingly, the media did not handle Dr. Yi's story as carefully as they did for Mr. Ko. Unlike for Mr. Ko, the media focused on her academic career and the evaluation during the selection process and training. Many articles asked: "Who is Dr. Yi, the first Korean astronaut?" Only two pieces were based on interviews with her high school teachers and students, and most did not know her personally. They did say they were proud of her as an alumna. One teacher who knew her said that he remembered her asking questions in chemistry class.<sup>248</sup> No one described her as a person. Instead, the media tried to justify her appointment as the primary astronaut. Mentioning that she had obtained a PhD at KAIST, one of the best engineering universities in Korea, the articles emphasized her intelligence and excellent training evaluations to confirm that she was qualified to be an astronaut. KAP should have validated her expertise as a space expert.<sup>249</sup>

Also interesting is that some media handled the stories of both Mr. Ko and Dr. Yi together. The media mentioned Mr. Ko's background and forgave his rule-breaking behavior, and then reported on Dr. Yi taking his place. This implied that Dr. Yi was lucky to be given the position as the first Korean astronaut for no effort.<sup>250</sup>

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<sup>248</sup> Youngmin Yoon, "'I Am Proud of My Daughter, My Senior'," *Kwangjoo Maeil Shinmoon* (Gwangju), March 11, 2008 2008, Culture; Jaejoon Oh, "'Good for My Daughter, Soyeon Yi'," *Jeonnam Ilbo* (Gwangju), March 11, 2008 2008.

<sup>249</sup> Digital News Team, "Who Is Ms. Soyeon Yi, the Primary Astronut of Korean First Spaceflight on April 8?," *The Korea Economic Daily* (Seoul), March 10, 2008 2008, IT\_Science - Science, International - Russia.; Jaebuhm Kim, "Who Is the Fnal Primary Astronaut, Soyeon Yi?," *Hankook Ilbo* (Seoul), March 10, 2008 2008, International- Russia.

<sup>250</sup> Hyunjoo Lim, "Mr. San Ko Does Reserach of AI in the Samsung Advanced Institute of Technology, and Ms. Soyeon Yi Studies Biosystem Engineeirng from KAIST.," *Kyunghyang Shinmun* (Seoul), March 11, 2008 2008, International - Russia.; Hyunjoo Lee, "Who is Soyeon Yi? She studies Biosystem engineering in KAIST," *Kyunghyang Shinmun* (Seoul), March 10, 2008 2008, International - Russia.

The selection of a new primary astronaut also raised questions about KAP and Russian authority. Roscosmos suggested that Dr. Yi take over as the primary astronaut after Mr. Ko broke the rules. The committee of the Korean astronaut management finally agreed to the change. However, the training team changed on March 7, although the committee did not meet until March 10. Dr. Gi Hyuk Choi, the chief of KAP, explained that the training with the new team started before the final decision was made, because Roscosmos suggested changing the primary astronaut and to begin training Dr. Yi as soon as possible to ensure a successful mission. It caused doubt about whether Korea had authority over KAP.

Some people thought the importance of the documents that Mr. Ko read was more important than the violation itself, although the reason Russia asked that a new primary astronaut be appointed was because of the violation of the regulation. Thus, some claimed that Russia overreacted by replacing Mr. Ko.<sup>251</sup> Only a warning was issued without a specific penalty, the personnel committee was not held to decide his punishment. This trivialized Mr. Ko's violation, cementing in the minds of some that Russia had overreacted.<sup>252</sup> While the issue was misunderstood, the reaction highlights the sympathy in Korea for Mr. Ko.

Another issue regarding the change was why Mr. Ko violated the rules, which he had been aware of before entering GCTC.<sup>253</sup> Mr. Ko said he wanted to learn as much as possible as the first Korean astronaut, and he overstepped the line set by Roscosmos. He claimed that he thought that being an astronaut was about more than being a space tourist. Thus, he tried

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<sup>251</sup> Sungsoo Ko, "Korean Space Program "Depends on Russia's Decision", " *Naeil* (Seoul), March 11, 2008 2008, International-Russia, IT\_Science - Science.

<sup>252</sup> Seocki Yoon, "Russia Changed "Korean Astronaut" Before Korea Made the Final Decision," *Yonhap News Agency* 2008.

<sup>253</sup> Hyungjoo Lim, "Q & A with the Ministry of Education and Science and Technology, "Because He Repeated Timid Mistakes... the Korean Government Made Final Decision," *Kyunghyang Shinmun* (Seoul), March 11, 2008 2008, International- Russia, Science.

to learn more about being an astronaut, although this opportunity was denied to him. The Roscosmos administrator announced that Ko was not a spy, but a person who wanted to study more. Ko's statement was to justify his behavior, but to also tacitly accuse Dr. Yi of not wanting to learn as much as he did about being a Korean astronaut.

While the manuals Mr. Ko studied were available online, he claimed they were confidential and that he lost his position as the primary astronaut because he would not name the person who helped him obtain them. He said that while inconvenient, he did not regret his actions, justifying what he did.<sup>254</sup>

It has been argued that the Korean government did not manage the candidates well. KARI sent a person to GCTC during the training to manage and support Mr. Ko and Dr. Yi. However, MOST and KARI did not know that Mr. Ko had violated regulations until Roscosmos notified KARI in September 2007. Even, thereafter, KARI changed their management of the two candidates from staying at GCTC to visiting in November 2007. As such, there was no manager at GCTC and Ko was not being monitored by MOST and KARI when he breached protocol again in February 2008. KARI was blamed for not ensuring that Mr. Ko knew that the role of the Korean astronaut was as a mission specialist, because the manual he read was not related to his role.<sup>255</sup>

Mr. Ko's replacement also came as a shock to other countries. A NASA marketing person asked Dr. Yi whether the change was intended to attract international attention to KAP.<sup>256</sup> The change attracted the attention of countries interested in gender equality and

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<sup>254</sup> Lim, "Meet Astronaut San Ko after Three Years."

<sup>255</sup> Gunhyung Park, "[Exclusive] "Management of the First Korean Astronaut was loose," *Seoul Shinmun* (Seoul), March 12, 2008 2008, International - Russia.; Yoon, "Russia Changed "Korean Astronaut" Before Korea Made the Final Decision."

<sup>256</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space.*

women's rights. Before KAP, only the UK had a female astronaut before a male one. As such, KAP received international attention.<sup>257</sup> Dr. Yi felt a sense of burden and concern regarding people not considering her the right person to go to space based on the controversy surrounding her replacing the initially selected primary astronaut.<sup>258</sup>

## **In Space**

The *Soyuz* rocket with Dr. Yi on board launched on April 8, 2008. The spaceflight was an essential part of KAP. Some people argued that the spaceflight made Dr. Yi the Korean astronaut and provided her with tacit knowledge about the real flight no one else had. Her schedule was planned in minutes after docking at the ISS. She spent most of her time on scientific experiments and the remainder on science education and public promotion.

### Scientific Experiments at the ISS

Scientific experiments at the ISS were the most important part of Dr. Yi's activities in space. KARI defined KAP's goals as establishing guidelines for the selection of the Korean astronaut and conducting scientific experiments in space.<sup>259</sup> These experiments defined the program, justifying that its main purpose was not merely sending a Korean to space.

The scientific experiments were proposed through open contests and decided on by the mission developing committee. These included science and educational experiments: 13 for the scientific mission for research purposes from universities and research institutions,

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<sup>257</sup> Ibid., 86-94

<sup>258</sup> Ibid.

<sup>259</sup> Kihyuck Choi, Interviewed by Author, KARI in Daetajeon, South Korea. (July 28, 2016)



and 5 for the educational mission. Preparation started in January 2006, and was announced to the public on May 19, 2006. Industry, government-funded institutes, and universities could apply for the space science experiments, as could those who applied to KAP. KAP encouraged renowned researchers to propose experiments,<sup>260</sup> and of the 21 proposals submitted, 13 were selected.

The public competition for the educational experiments was announced in May 2006. The purposes were to expand interest in space, and science and engineering; support science education nationwide through experiments at the ISS; and identify future science talent. Teams comprising one student and one teacher could submit a proposal. Four experiments proposed by one elementary school student, two middle school students, and one high school student were selected. These experiments were prepared by the Korea National University of Education, and the Korea Atomic Energy Research Institute (KAERI) later added one educational experiment. Table 10 provides a list of all experiments.

**Table 11 List of Scientific Space Experiments Conducted by the Korean Astronaut**

	Experiments	Experiment Developer
Scientific mission	Experiments on growth and variation of spaceship loaded plant seeds	Korea Atomic Energy Research Institute (KAERI)
	Identification of gravity-responsive and aging-related genes of drosophila in space environments	Konkuk University
	Development of a bioreactor for cell culturing in space	Biotron Inc.
	Medical monitoring experiments (Intraocular pressure and the Holter monitoring system)	Aerospace Medical Center
	Research on Korean astronaut's facial edema on ISS by Moiré	Hannam University
	Korean space food	Korea Food Research Institute (KFRI)& KAERI
	Synthesis of zeolite microcrystals in microgravity	Sogang University

<sup>260</sup> Anonymous Interview by Author. June 9, 2019.

	Synthesis of metal-organic porous materials in microgravity	POSTECH
	MEMS telescope for extreme lightning (KAMTEL)	Ewha Woman's University
	Earth observation	National Institute of Meteorological Research (NIMR)
	Noise measurement	Korea Advanced Institute of Science and Technology (KAIST)
	Verification of new non-volatile memory technology	Korea Electronics Technology Institute (KETI)
	Small mass measuring system (SMMS) experiment under microgravity	KARI
Education mission	Space pen Newton's law Momentum and acceleration/gravity Surface tension	Korea National University of Education
	Growth of plant seeds	KAERI
International Collaboration Experiments	Crew PADLES HDTV	JAXA
	Sleep pattern experiments	NASA

However, no funding was provided for developing the experiments. KARI would fund the training of the Korean astronaut to perform them; verify the experimental equipment in Russia in collaboration with Roscosmos, Energia, and Russian Federation State Research Center Institute of Biomedical Problems RAS (IBMP); and send the equipment. The institution that proposed the scientific experiment would pay all other costs, and share the results with KARI.<sup>261</sup> However, some renowned laboratories could use the research funds after the experiments were selected.<sup>262</sup>

The selection of experiments coincided with the selection of the Korean astronaut, meaning they were developed without considering who would perform them. Therefore, the Korean astronaut had to be fully trained to conduct the experiments without the assistance of those who conceptualized them. In addition, those who proposed the experiments had to ensure the equipment was as simple as possible. It was difficult that Dr. Yi conducted experiments that she did not involve in the design of the experiments, while she was an engineer with a PhD in Engineering. The most important part of scientific experiments is replicating them, However, this can be difficult because conducting an experiment requires the experimenter's skill and tacit knowledge. Furthermore, conducting an experiment in space differs from performing the same one on Earth, and the developer cannot always account for or predict these differences.<sup>263</sup> Therefore, the experiment developers had to ensure the equipment was as simple as possible. One developer of a scientific experiment

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<sup>261</sup> KARI, *The Korean Astronaut Program*. 125; Interview with Dr. Soyeon Yi.

<sup>262</sup> Anonymous, Interviewed with Author, June 9, 2019.; J.H. Lee et al., "An Overview of Korean Astronaut's Space Experiments," *Acta Astronautica* 67, no. 7 (October 2010 2010).

<sup>263</sup> H. M. Collins, *Changing Order: Replication and Induction in Scientific Practice*, second ed. (Chicago: The University of Chicago Press, 1992).

reported that the most challenging part of the project was to make the equipment operable by pushing a button.<sup>264</sup>

Dr. Yi said that her personal academic history in terms of experiments in mechanical, electrical, material, and bioengineering gave her an advantage in terms of conducting the scientific experiments as the first Korean astronaut. However, she was not involved in planning the original scientific experiments and came from a different culture and worldview to those who did.<sup>265</sup> The experiment developers could not include all their perceptions, thoughts, and tacit knowledge in the manual.<sup>266</sup>

Thus, Dr. Yi was expected to perform the experiments as intended without the assistance of those who developed them. Usually, equipment is better operated by the person who regularly uses it. In this case, it had to be ensured that the operator did not need to rely on those who usually used the equipment to reduce problems in successfully completing the experiment. It was the only way to reduce the problem from the experiments' regress.

However, unexpected problems could arise. It was the first time Korea would conduct scientific experiments in space. As such, some experiments were simultaneously conducted by the developers on Earth so that Dr. Yi could ask questions should problems arise.<sup>267</sup> However, she also had to solve problems on her own without assistance. To this end, she considered how the developer would solve the problem and which experiments would be conducted first should time be limited.<sup>268</sup>

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<sup>264</sup> Anonymous, Interviewed by Author, July 14, 2019. By Skype.

<sup>265</sup> Yeonsil Kang, "Space Diary of Soyeon Yi - the 10th Anniversary Interview of Korean First Spaceflight," *Epi*, 2018.

<sup>266</sup> Collins, *Changing Order: Replication and Induction in Scientific Practice*. 16

<sup>267</sup> Anonymous, Interviewed by Author, July 14, 2019. By Skype.

<sup>268</sup> Kang, "Space Diary of Soyeon Yi - the 10th Anniversary Interview of Korean First Spaceflight." 25-29.

Dr. Yi was expected to complete 18 experiments on the ISS on a very limited schedule of five days, which was not sufficient time. She had to board the ISS, adapt to the space environment, complete all her duties, and return to Earth in ten days. A Roscosmos representative reflected that the Korean government had attempted to do too many things in too short a time, and that Dr. Yi would be lucky to complete only half the experiments within that period. Roscosmos asked the Korean government to reduce the number of experiments, but the government refused. An employee at KARI told Dr. Yi that she would not die if she did not sleep for the ten days. It was expected that Dr. Yi learn how to conduct the experiments so well that she would be able to complete them with her eyes closed. The burden to complete all 18 experiments continued until her time at the ISS. She slept and ate less so that she would have more time for the experiments. While stressful, she accepted the responsibility as the first Korean astronaut and representative of Korea in space.<sup>269</sup>

### **Meaning of the Scientific Experiments**

The scientific experiments were considered the most important aspect of KAP, which was defined as a research project. KARI claimed that the goal of KAP was to establish guidelines for preparing a Korean astronaut and to perform scientific experiments in space.<sup>270</sup> KARI emphasized that having the first Korean astronaut complete all experiments at the ISS would be an important step for manned space missions by Korea. Thus, for KARI, the scientific experiments were Dr. Yi's most important job.<sup>271</sup> The institute also emphasized that

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<sup>269</sup> Kang, "Space Diary of Soyeon Yi - the 10th Anniversary Interview of Korean First Spaceflight." 25-29.

<sup>270</sup> Choi, Gihyuck, Interview with Author.

<sup>271</sup> J.H. Lee, Y.K. Kim, S. Y. Yi, K.S. Kim, S.W. Kang, G. H. Choi, and E.S. Sim, "An overview of Korean astronaut's space experiments," *Acta Astronautica* 6(2010):934-941.

Dr. Yi was not a space tourist, but an astronaut because she performed these experiments. The trial was successful, and Koreans considered scientific experiments the core of KAP.<sup>272</sup> As such, the meaning of the scientific experiments became important in the debate around KAP.

Conducting scientific experiments in space had great meaning, as they generated new scientific knowledge for Korea's scientific community. The experiments that had already been conducted by other countries had to be replicated because the results were not usually shared.<sup>273</sup> KAP included basic experiments already conducted by other countries as well as new ones such as research on the Korean astronaut's facial edema by Moiré. The Russian instructor was most interested in the new experiments when Dr. Yi and Ko were being trained in Korea.<sup>274</sup> Some scientific experiments including the KAP 08 synthesis of metal-organic porous materials in microgravity were the first conducted in space and very meaningful. Even after KAP ended, Russia asked to use the equipment at the ISS.<sup>275</sup>

KAP became an important step in microgravity research in Korea, as all experiments were performed under microgravity conditions. The Korean Microgravity Society (KMS) was established based on the results of these experiments at the ISS.<sup>276</sup>

The experiment equipment was another black-box manufactured through combining the various activities of the local network and unique characteristics of the ISS. This was to

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<sup>272</sup> Kang, "Space Diary of Soyeon Yi - the 10th Anniversary Interview of Korean First Spaceflight."Epi

<sup>273</sup> An, *I am a Korean Astronaut*. 233-235

<sup>274</sup> Ibid.

<sup>275</sup> However, Russia wanted to use the equipment without input from the equipment developer, who rejected the request.

<sup>276</sup> Chi-Hwan Lee, "The Status of Microgravity Science Research in Korea," *Journal of Japan Society of Microgravity Application* 27, no. 3 (2010). 125

ensure it was as simple as possible to use by Dr. Yi, who had not developed the experiments. Therefore, the development of scientific experiments in the ISS meant the acquisition of technology and know-how to design the equipment for space experiments in ISS.<sup>277</sup>

However, regardless of these meanings, the experiments and KAP were criticized, and An contended that they were at the core of the debates around the first Korean astronaut and the program. KAP failed to build a strong network with various actors, and the image of Dr. Yi did not align with the image of conducting a scientific experiment.<sup>278</sup> The Korean public claimed that the government wasted money sending Dr. Yi to the ISS to perform educational experiments.

Interestingly, there was a gap between the scientific experiments in reality and their portrayal in the media. The media ensured the Korean public was aware of the selection process, training, and the time spent at the ISS. Koreans learned about Dr. Yi at the ISS through the media. However, not all experiments could be broadcast on television, and TV shows tended to focus only on the interesting ones to attract the public's interest and high ratings for the SBS. As the media usually portrays scientific research and researchers using the image of a scientist in a white lab coat and dropper, the TV shows on KAP needed to concentrate on educational experiments. Consequently, viewers criticized Dr. Yi for performing simple, meaningless experiments at the ISS. The sophisticated experiments were more difficult for the public to understand, and thus, boring to them. Therefore, television showed only the experiments that were easy and would attract public interest, giving the impression that Dr. Yi performed childish experiments for children on which the government

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<sup>277</sup> An, "Is Yi Soyeon an Astronaut or a Space Tourist?: The First Korean Astronaut Debate on the View of ANT." 108

<sup>278</sup> An, "Is Yi Soyeon an Astronaut or a Space Tourist?: The First Korean Astronaut Debate on the View of ANT." 93

had wasted money.<sup>279</sup> This demonstrated the gap between science and public perception, and gap between the two images of KAP presented by MOST and KARI, namely science popularization and space research.

The accusations of KAP and Dr. Yi became a barrier to the development of the scientific knowledge of space experiments. Important about all scientific experiments including those at the ISS is that they are repeatable and replicable.<sup>280</sup> To transform the results of the experiments at the ISS into scientific knowledge, they must be repeated. Based on the results of the first experiment, the next should be planned and conducted. In reality, some projects could be continued after the spaceflight and follow-up experiments conducted. The plan was to use the Japanese module at the ISS, although this made it impossible for the Korean astronaut to conduct the experiments. However, as the Korean public blamed KAP and the social mood was not good for the next space mission, the project was discontinued. Therefore, the results of many of the experiments conducted in space were not translated into scientific knowledge, despite being meaningful and world firsts.<sup>281</sup>

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<sup>279</sup> An, "Is Yi Soyeon an Astronaut or a Space Tourist?: The First Korean Astronaut Debate on the View of ANT."; Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*. 95-101

<sup>280</sup> Collins, *Changing Order: Replication and Induction in Scientific Practice*. 18-19

<sup>281</sup> Anonymous, Interviewed by Author. June 9, 2019.



## Chapter 5. The Success and Failure of What?: After the Flight

Dr. Yi's work as the first Korean astronaut did not finish after the spaceflight, as she had many new roles to perform, which can be delineated into two categories. Based on the vision of KARI, she was expected to be a researcher, and from MOST's vision, a science popularizer and public icon. People evaluated KAP based on several perspectives. Someone claimed that KAP had been a failure and that Dr. Yi was a selfish cherry picker. Others contended that KAP had been successful and Dr. Yi was a national hero or icon of space technology in Korea and a science popularizer.

Dr. Yi was a senior researcher at KARI from 2008 to 2012. She conducted research and published papers on the application of microgravity and spaceflights, and delivered public talks. A KAP white paper stated that Korea's first astronaut should perform research on space science, train herself to be an astronaut, and act as an honorary ambassador of science.<sup>282</sup> MOST and KARI planned many activities to support these roles. MOST supervised activities, and KARI managed them. The committee for the management of the Korean astronaut was established when the final candidates were selected, and KARI's task force for managing the Korean astronaut, which was established in May 2008, supported Dr. Yi's activities.

Many books, articles, papers, and TV programs strengthened the position of the Korean astronaut, and tried to mold her to suit their visions. However, this was not easy. In 2012, she took a leave of absence to earn an MBA in the US, and resigned from KARI when she married. She met all her requirements before leaving KARI and Korea, and KARI achieved all KAP's research goals. Regardless, the Korean media portrayed KAP as a failure and Dr. Yi as a traitor.

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<sup>282</sup> KARI, *The White Paper of the Korean Astronaut Program*. 195.

This chapter describes the muddled sociotechnical vanguards after Dr. Yi's spaceflight and the outcomes of KAP and its expert making process. I examine why the evaluation of KAP and Dr. Yi took two different forms through the analysis of her activities and public discourse in Korean society after her spaceflight. I also explore how the meaning of the first Korean astronaut was constructed through her behavior and that of others, and why the Korean public turned against the astronaut and program.

This chapter describes Dr. Yi's time at KARI and follows her after leaving the institute to move to the US. Furthermore, the public discourse of KAP is discussed. Dr. Yi performed her expected role at KARI as the first Korean astronaut, but escaped these expectations in the US. I explain how KARI used Dr. Yi to create the image of an astronaut based on an analysis of what she did, how she was presented to the public, and how it was decided. Furthermore, I analyze the discourse around gender, the meaning of astronauts, expertization, and KAP's predetermined fate. Finally, the conflict of sociotechnical vanguards and the change of the dominant opinion of Korean society are described.

### **Senior Researcher of KARI, but...**

Dr. Yi and Mr. Ko worked at KARI as senior researchers after Dr. Yi's spaceflight. Ko worked on its International Cooperation Team under Dr. Gi Hyuk Choi, the chief of KAP. Dr. Yi was involved in the Space Science Team under team chief Dr. Joohee Lee, who managed all internal aspects of KAP. Her role differed from that of other researchers. Dr. Yi was a science popularizer as MOST intended, and a researcher and space expert as envisioned by KARI. Dr. Yi claimed that her most important task was to analyze space experiments and understand their results. She tried to learn as much as possible from the experiments, and played her role as a researcher at the ISS to advise the next Korean

astronaut. Mr. Ko also valued his experience and the technology obtained through KAP. He hoped to conduct research on moon exploration and space experiments.<sup>283</sup> Both were committed to research, however, their main responsibility was to popularize science.

Everyone wanted to hear Dr. Yi's story, and her life became filled with public lectures and outreach programs. She delivered 235 lectures, attended 90 science events, and attended 203 public media programs while working at KARI. She spent more than 12 hours a day on public programs for several years. Dr. Yi was drained by the constant activity and had no time for her own research even two years after her flight.<sup>284</sup> The media covered her public appearances, reinforcing her role as a science popularizer. However, she was also a researcher with a PhD and reputation as a space expert. This created conflict between sharing her experience and conducting her research.

KARI gave her a day or day and a half each week for research. However, having the time to conduct her research did not mean she was able to do so, as research needs funding. Korean government-funded research institutes are project-based. Scientists who want to conduct research develop a research proposal before starting their work. The same applied to Dr. Yi. However, her PhD was not in aerospace, and it was also impossible to obtain funding for research in other areas because KARI is a research institute dedicated to aerospace engineering. Consequently, most of her research proposals were rejected. However, KARI allowed her do what she wanted because she was an astronaut, and provided her with research funding from its budget.<sup>285</sup>

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<sup>283</sup> Jooyoung Lee, "<Yonhap Interview> The First Korean Astronaut Soyeon Yi," *Yonhap News Agency* (Seoul) 2008, <https://news.naver.com/main/read.nhn?mode=LSD&mid=sec&sid1=105&oid=001&aid=0002064406>.

<sup>284</sup> Kyungchul Park, "[Interview of 'Rural Doctor' Kyungchul Park] 14, The First Korean Astronaut Soyeon Yi," *JoongAng Ilbo* (Seoul), January 8, 2009 2009.

<sup>285</sup> Anonymous, Interview with Author, June 14, 2017, Daejeon, Korea

She started research to develop a kit for the next space experiments at the ISS. She believed the kit should be developed despite that no plans were in place for other scientific experiments on the ISS. Dr. Yi wanted to send *Caenorhabditis elegans*<sup>286</sup> to space, which the US had previously attempted. However, the US results were rendered meaningless after an explosion on the shuttle *Colombia* upon its return in 2003. Thereafter, no follow-up trial was planned to send *Caenorhabditis elegans* to space. The space science team at KARI cooperated with the KAIST research team. To develop the experiment kit, *Caenorhabditis elegans* were exposed to different gravities through a gravity accelerator and space radiation.<sup>287</sup> Conducted with the Aerospace Medical Center, Republic of Korea Air Force, and KAERI, the project was reported in the media,<sup>288</sup> but did not attract much public interest.

Dr. Yi published 30 academic papers, of which she was the co-author of 17. Many of these papers listed her as an author based on her role as the experimenter. The papers with her as the primary author are based on her experiences.<sup>289</sup> She alternated between two roles, namely as science popularizer and researcher, although she wanted to focus on her research.

Dr. Yi and the other actors including KARI and MOST had no clear idea of how to use her status as the first Korean astronaut and the results of KAP. Some considered Dr. Yi's

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<sup>286</sup> “*Caenorhabditis elegans* is a small, free-living, nematode worm, which has become established as a standard model organism for a great variety of genetic investigations, being especially useful for studying developmental biology, cell biology and neurobiology. ... The potential usefulness of nematodes as tools for genetic research was recognized early,” from J. Jodgkin, “*Caenorhabditis Elegans*,” in *Encyclopedia of Genetics*, ed. Sydney Brenner and Jefferey H. Miller (Cambridge: Academic Press, 2001).

<sup>287</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*.101-107

<sup>288</sup> Hyungkyung Lee, “Soyeon Yi, “I almost become a biologist as I performed space living things experiments”,” *Dong-a Science* (Seoul) 2011, January 7, 2011, <http://www.donga.com/news/View?gid=33768907&date=20110107>.

<sup>289</sup> “The minutes of the 19<sup>th</sup> National Assembly Meeting, the 329<sup>th</sup> Parliament Audit,” The Communication Commission of Future Planning

lectures on her time in space important, and others believed the scientific experiments were the most important aspect of KAP. It was also argued that the role of global representative of Korea should be assigned to the Korean astronaut, although others thought this person should be a role model for the Korean STEM field.<sup>290</sup> No clear guidelines existed regarding the next task for the Korean astronaut. For example, KARI defined the astronaut as a researcher; however, the review of the scientific experiments on the ISS was not properly completed.<sup>291</sup> The committee for the management of the Korean astronaut provided only broad instructions, which were limited to the plan, and evaluated her outside activities. It could not manage the astronaut's research,<sup>292</sup> and as such, provided no support for her role as a researcher.

Thus, the future of the Korean astronaut was not assured for Korean society. Each vanguard only considered the short-term role of the Korean astronaut, and no-one drafted a long-term plan for the role despite molding her in alignment with their respective visions. Three sociotechnical vanguards could not provide a long-term vision of the Korean astronaut, and the status of the role could not be stable unless there was a shared understanding of the term "astronaut."

## **Leave of Absence and Resignation**

### Leave of Absence to Earn an MBA

Debates about Dr. Yi and KAP became more controversial when in 2012 after four years at KARI, she announced she would be taking a leave of absence from KARI to enter an

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<sup>290</sup> Kang, "Space Diary of Soyeon Yi - the 10th Anniversary Interview of Korean First Spaceflight." 42

<sup>291</sup> Soyeon Yi, Interview with author.

<sup>292</sup> "The Minutes of Parliament Audit of 2012 – Education and Science and Technology (Appendix) October 18, 2012.

MBA program in the US. The media and Korean nation were upset that she would leave Korea and not study space science and engineering, but an MBA.

She was extremely busy at KARI after her spaceflight, and found the time difficult. She had to transform from a typical Korean woman into a representative of Korea, national hero, and the person who got enormous benefits from the nation for becoming the first Korean astronaut. The public expected much of her, and she willingly tried to meet these expectations in her role. However, after four years, she was exhausted and wanted a new beginning.

One of her most important considerations was what she would do after the spaceflight as the first Korean astronaut. MOST and KARI did not clarify the role of the Korean astronaut. Being a science popularizer and space expert were simply titles that did not provide guidelines for her life. The specific roles of the first Korean astronaut were not considered, and no meaningful direction for her future was provided. She was only 30 years old, too young to live only to repeat her experience in space. She needed the time to prepare the next step of her life. She based her plans on her contribution to Korean society, contribution to the world as the “Korean” astronaut, and on the personal life she wanted.

Dr. Yi’s role could not be limited to public activities and research. She was one of a small number of people who had been to space and it allowed Korea having own astronaut who is same with astronauts in other countries, heroic astronaut. But this would become less important as time passed. Dr. Yi also had to find a new role in Korean society, similar to NASA’s astronauts who work in other fields including education after their spaceflights. Her original major, biosystem engineering, had little to do with KARI, and it was impossible to conduct research in her field because she had stopped all her research during KAP. She did not want to spend the rest of her life giving talks about her one spaceflight, which would be bad for her life and a waste of resources for Korean society.

The experiences in other countries could not serve as guidelines regarding the role of the first astronaut and her future, as most astronauts continue in different careers after their spaceflight. France's first female astronaut became the Minister of Science and Technology, and Japan's first astronaut is a farmer. Dr. Yi was too young to be a policymaker, but could not engage in minor work because of the meaning of the first Korean astronaut. She had to decide what she would do considering her contribution to Korean society as the first Korean astronaut.

The consideration of her future was not limited to the meaning of the Korean astronaut in Korean society, but extended to the international community as well. She developed herself more as the first Korean astronaut, as she met other astronauts after her spaceflight. At that time, her meaning was only as the 'first' Korean astronaut in the astronaut/cosmonaut society, based on which she believed she would do something meaningful as the "Korean" astronaut. Other astronauts and cosmonauts respected her because of her hazardous return in the ballistic mode, but this differed from respect for her achievement.

Many astronauts and cosmonauts had completed several spaceflights and trained for several years or decades. Dr. Yi had only one spaceflight and trained only for a year for a minimal role in space as a mission specialist. She was not the commander, pilot, or engineer in space. She was a young lady with minimal experience, which was too limited to contribute to international society as an astronaut. She needed to do more.<sup>293</sup>

The last aspect Dr. Yi considered was her life itself. She was exhausted four years after her spaceflight. Everybody knew her, and she had become a celebrity. She could not go anywhere without public attention and her every move became news. She could not live as someone in her 30s, as it was difficult to meet friends or go on a date. This wore her out. The

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<sup>293</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*. 112-113

turning point for her was sitting on an airplane for a business trip, and hearing the inflight announcement: “put your oxygen mask on first and then help other people.” She realized she had to take care of herself before she taking care of other people, and needed the time for the next stage of her life. It was time to leave.<sup>294</sup>

She decided to study abroad. Her mandatory work period had expired two years earlier. After deciding to study overseas, she needed to decide what to study. Two fields could help her improve her ability as the Korean astronaut: science and technology policy and an MBA. Dr. Yi had audited a class at the Graduate School of Science and Technology Policy (STP) at KAIST in fall 2010. The course was taught by a science and technology historian and based on readings and discussion. This format differed from the engineering courses she had taken, and relied on logic rather than numbers. As such, the material could be understood subjectively depending on the person, which made her uncomfortable. She thus considered it unsuitable. However, MBA courses are based on numbers, with which she was more comfortable. She entered an MBA program.<sup>295</sup>

Dr. Yi took a leave of absence in 2012 and left Korea. This represented her decision for her future as the Korean astronaut and as the person Soyeon Yi.

### Life as a Korean astronaut and Korean woman

Life in the US was different. Dr. Yi was 30 years old when she became Korea’s first astronaut. However, she was the first Korean astronaut, not a Korean woman in Korea. In the

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<sup>294</sup> Soyeon Yi, Interview with author; Anonymous, Interview with Author.

<sup>295</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*.



US, she could again be a young woman and study hard, enjoy campus life, meet people, and date.<sup>296</sup> She had a personal life that would have been impossible in Korea.

However, resuming her personal life as a women was heavily criticized. Some said that Korea had lost its astronaut when Dr. Yi resigned from KARI and married a Korean-American. They believed that KAP had wasted money without achievements because Dr. Yi, the only outcome of KAP, left Korea. The news media called her a “*Muktui* (Shirker),”<sup>297</sup> a term still often used to refer to her. However, no one seemed to resent Ko when he left KARI directly after finishing his mandatory year.

Dr. Yi lives with her new experience in the US both as a Korean woman and Korean astronaut, although some argued that Korea had lost its only astronaut. Dr. Yi was asked about science and technology policy or STEM education after her spaceflight, despite not being an expert on either. She was expected to provide solutions or at least a meaningful opinion on issues as an icon of Korean science and technology. However, she did not have a chance to think about the questions before, and naturally, her answers were superficial. However, in the US, she could more seriously consider science and technology and society.

After obtaining her MBA, she did not find permanent employment, but worked in various jobs. She became a lecturer in physics at the University of Washington, assisted students with research, worked part-time for a start-up in Silicon Valley, and gave lectures in various countries.<sup>298</sup> She still attended space-related events, and accumulated her experience as the Korean astronaut as she worked at space camps and the space museum. She

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<sup>296</sup> Anonymous, Interview with Author. July 10, 2015. Daejeon, Korea

<sup>297</sup> Anonymous, Astronaut Dr. Yi resigned, 'Is she a Muktui?' *YTN* 26 June 2014.; Ko, Deukgwan, '[Year 2014 through the news article of portal site] Did you very upset in this year too, the stupid person?' *Maeil Business Newspaper* 31 December 2014. (In Korean)

<sup>298</sup> Kang, "Space Diary of Soyeon Yi - the 10th Anniversary Interview of Korean First Spaceflight." 13-18.; Interview with Dr. Yi.

experienced work on a practical level, which she had not been able to do in Korea because of her position.<sup>299</sup> She prepared for when she would return to Korea as the Korean astronaut not only in the field of outreach and education, but also in the space business. Dr. Yi wanted to bridge business and engineering in the space field after finishing her MBA. She has worked for Loft Orbital Solutions as a Strategic Business Development and International Partner since 2017, and for Studio XID as a business lead since August 2019. She believes she can use her work at the American space company to help build the Korean space program upon her return to Korea.<sup>300</sup>

Dr. Yi's future as the first Korean astronaut and as a person was not clear without the sharing of a sociotechnical imaginary around KAP and the Korean astronaut. The role of a science popularizer and space expert had no long-term future, and was not well accepted in Korean society. Thus, Dr. Yi on her own tried to pave a way as the first Korean astronaut and person.

### **The Given and Accepted Image**

Through KAP, MOST and KARI provided their visions for the program and the Korean astronaut to the public. However, Korean society's image of the Korean astronaut depended on the visions provided and the public's acceptance thereof. The dominant image of astronauts existed in the Korean public sphere before KAP, and this earlier image and those produced by MOST and KARI differed. Therefore, the Korean public rejected the new

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<sup>299</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*. 121-124

<sup>300</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*. 115-119; Dr. Yi's Linked in

images. In addition, the way the image of the Korean astronaut was provided after the spaceflight was problematic.

Although KAP was where two sociotechnical vanguards challenged one existing sociotechnical imaginary, the vanguards lost sight of their goals after the program ended. The conflicts after KAP ended centered on the Korean astronaut's presentation to Korean society, not on what the astronaut would do. This meant that the vision as a science popularizer was emphasized, because it was about how the Korean astronaut was perceived by the Korean public. The role of a researcher would present Dr. Yi as a space expert, not allow her to conduct actual research in the space field.

#### Given Image of the Korean Astronaut: A Public Icon and Space Expert

The imaginary of the Korean astronaut as a public icon and science popularizer was emphasized by MOST from KAP's first proposal to the end of the program. After the spaceflight, Dr. Yi's crucial role was as an honorary ambassador of science and technology. The importance of the role was reiterated in the statements of MOST, Dr. Yi, the Korean media, KARI, and Dr. Yi's activities after the spaceflight.

MEST<sup>301</sup> announced that the meaning of the first Korean astronaut was the start of Korea's space age. It expanded the boundary of the dream of Korea to outside the Earth's atmosphere.<sup>302</sup> Dr. Yi also reiterated the importance of sharing her experience in space with Koreans. Now, it is crucial to provide better conditions for the next Korean astronaut.<sup>303</sup>

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<sup>301</sup> When the administration changed from that of President Moo-hyun Roh to that of President Myung-bak Lee, MOST was combined with the Ministry of Education & Human Resources Development and renamed the Ministry of Education, Science and Technology (MEST).

<sup>302</sup> SBS 2008 Space Korea Office, *The Most Exciting Trip, Space Exploration* (Seoul: Nexus Junior, 2008). 115.

<sup>303</sup> *Ibid.*, 86-88

Dr. Yi attended 528 public events to talk about her flights, and her image was used to publicize science and technology. She was the model for the Christmas Seal in 2008 with *Soyuz* and *KSLV-I*, which was entitled “the first Korean astronaut Dr. Yi and Korean space science technology.” The Ministry of Health, Welfare and Family Affairs said that KAP enabled the significant development of Korean space science technology.<sup>304</sup>

The International Astronautical Congress (IAC), the biggest academic conference in a space-related field, was held in Daejeon, Korea in 2009, the year after Dr. Yi’s spaceflight. The public competition for space experiments for teenagers and university students, “the competition of space experiment items with the first Korean astronaut,” was also held to attract public attention to the conference and space science. Dr. Yi’s picture and name were featured on the announcement poster.<sup>305</sup> Through these events, she was articulated as the symbol of Korean space and Korean science and technology.

Gender is an important part of this image. Because the goal of KAP under MOST’s vision was as science popularizer, it needed a soft and familiar image. This is usually the image of a woman, which was why Dr. Myung Oh initially proposed the possibility of a woman astronaut. The media also used a similar strategy to describe women scientists and engineers. It was emphasized that Dr. Yi was the youngest woman to go to space, and she was described as friendly and family-minded to cement her image in the public eye.<sup>306</sup> This was how the media

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<sup>304</sup> Heungsoo Kim, "'Astronaut Soyeon Yi' Became the Symbol of Christmas Seal in This Year," *SBS* (Seoul) 2008, <https://news.naver.com/main/read.nhn?oid=096&aid=0000077504>.

<sup>305</sup> “Challenge the competition of Space Experiments Items ( Over Forth grade could apply) <https://thenah.tistory.com/129>, Way of Watching the World of Ian, (accessed September 25, 2019)

<sup>306</sup> Anonymous “The Korean First Astronaut Will Be Made Today, - The Interview with Ms. Soyeon Yi One Day Before the Flight, I Am Not a Woman but an Astronaut. I Will Go to Space with the Dream of Korea,” *The Dong-a Ilbo*, April 8, 2008.4.8.; Maroel D. LaFollette, “Eyes on the Stars: Images of Women Scientists in Popular Magazines, *Science, Technology, & Human Values* 13 (1988), p 262-275.”

handled women scientists. Unlike male scientists and Mr. Ko, Dr. Yi and female scientists could not be evaluated on their ability only. They also had to be playful, cute, and family-oriented. As such, she was an intelligent, but approachable superwoman.

Because the image of astronaut under MOST's vision was more feminine, Dr. Yi had to be an ideal woman. Thus, Dr. Yi was attacked, because she did not have a beautiful face and slim body shape. Here, the achievement of women scientists was devalued and they were judged based on non-scientific characteristics. In contrast, Mr. Ko was not.<sup>307</sup>

The other image of the Korean astronaut as a scientist or science expert was emphasized in KAP through KARI's vision. The official position of Dr. Yi and Mr. Ko after the spaceflight was as senior researcher at KARI. As mentioned, Dr. Yi authored 30 academic papers and registered one patent after her spaceflight stemming from her doctoral dissertation. However, the news that she had registered a patent was published without explanation and used to strengthen her image as a scientific expert and researcher.

KARI chose to present Dr. Yi as an expert to the Korean public rather than to encourage her to conduct research to strengthen her image as a space expert. The trials to launch KSLV-1 have continued since 2009. Space experts, usually aerospace engineering faculty and researchers at KARI, were invited to speak on live shows on the launch of KSLV-1. Dr. Yi was invited as a space expert, although she did not know anything about the rocket

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<sup>307</sup> Barbara Ehrenreich and Deirdre English, *Witches Midwives & Nurses: A History of Women Healers*, 2 ed. (New York: The Feminist Press, 2010). 29 ; Anonymous, "The Recent Condition of 26 Billion Won Mucktui Woman, <https://pann.nate.com/talk/327511662> (accessed March 30 2019); "Korea and Japan, the Difference between the First Woman Astronaut, <https://itnewsjapan.tistory.com/entry/%ED%95%9C%EA%B5%AD-%EC%9D%BC%EB%B3%B8-%EC%B2%AB-%EC%97%AC%EC%84%B1-%EC%9A%B0%EC%A3%BC%EC%9D%B8%EC%9D%98-%EC%B0%A8%EC%9D%B4?category=149709>, Blog about Japan, Japanese Language, and Japanese people, Accessed March 30, 2019.

and aerospace engineering. As such, she seemed to have been afforded the same status as these space experts and was treated like other aerospace experts.

She became an adjunct professor in the Aerospace Engineering Department at KAIST on September 1, 2008. Her office was in the same building as other professors in the department around the laboratories, and the students addressed her as professor. She gave special lectures and taught the course “Science, Technology, Space, and Society” in the fall semesters of 2010 and 2011.<sup>308</sup> The course contents dealt with her experience of space and general engineering. However, the classes were open in the Aerospace Engineering department as a major elective, which portrayed her as an aerospace engineering expert. Because she had a PhD, she was addressed as Dr. Soyeon Yi, not as Ms. Soyeon Yi. The title of Dr. in front of her name solidified her position as an expert, especially a space expert, in Korean society.

Although KARI defined Dr. Yi as a space expert, the space field was not a single field. It encompassed aerospace engineering, astronomy, space science, remote sensing, satellite communication, space medicine, space law, and space construction. Each field had its own experts. The Korean space program centered on aerospace engineering;<sup>309</sup> thus, Koreans assumed that a space expert was an expert in aerospace engineering. Therefore, the effort to define the Korean astronaut as a space expert was an attempt to position the incumbent as an aerospace engineering expert. As such, the attempt to strengthen the position of the Korean astronaut as an expert by putting her alongside a traditional aerospace engineering expert made sense.

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<sup>308</sup> “Opening Courses” <https://cais.kaist.ac.kr/totalOpeningCourse> KAIST Academic System. (accessed September 18, 2019)

<sup>309</sup> Seungmi Chung, "Differing Conceptions of Space and Its Consequent Impact in Korean Space Policy" (paper presented at the The 63rd International Astronautical Congress 2012, Naples, Italy, October 3 2012 2012)

The image of an astronaut in KARI's vision was also closely related with gender. In most countries and in most fields, new prestigious positions are reserved for men, who come to dominate, and are then extended to women, other minorities, or those with disabilities. Science and engineering in particular have remained male-dominated fields, as has the role of astronaut. In Russia, the first female cosmonaut, Valentina Tereshkova, went to space in 1963 on *Vostok 6*, two years after Yuri Gagarin. All the Mercury Seven astronauts were men. The first American female astronaut, Sally Kristen Ride, went to Space in 1983, about 20 years after John Glenn, the first American astronaut. Thus, other countries considered it standard practice when Mr. San Ko was selected as the primary astronaut. Korea is a patriarchal Confucian culture, and the first astronaut in most countries was a man. The meaning of being the first astronaut in a masculine field pointed to needing an ideal masculine professional to fill the role. KAP was the rare case of having a woman as a country's first astronaut.

In this way, the images of an astronaut from two sociotechnical vanguards were already problematic. The Korean astronaut had to have both characteristics: an ideal lady and masculine professional. This mismatch caused many controversies regarding the meaning and image of the Korean astronaut, and exposed Dr. Yi to the brunt of much criticism.

#### Accepted Imaginary of the Korean Astronaut

The image of astronauts existed in Korea before KAP, although MOST and KARI eagerly tried to mold this image to align with their visions. Korean society's acceptance of the Korean astronaut was impacted by the preexisting image. The traditional image of the astronaut differed from that envisioned by MOST and KARI, which exacerbated the criticism from the public sphere.

As a latecomer to the space field, most concepts in the space field already existed before Korea initiated the space program based on those in other countries and science fiction

in popular culture. Korean society had access to the news of other countries' success in the space field from the launch of the *Sputnik-1* to Yuri Gagarin's spaceflight and the *Apollo 11* moon landing. Senior engineers in the Korean space field dreamed of space through the space events of other countries.<sup>310</sup>

Science fiction movies are another critical source of the image of an astronaut or cosmonaut. Dr. Yi reportedly liked science fiction movies when she was young and dreamed of becoming an astronaut. In the movies, one female astronaut always existed among many male astronauts on a spaceship.<sup>311</sup> Others also viewed space as occupied by floating blue-eyed astronauts based on the TV news, science fiction movies, and children's books.<sup>312</sup> In a survey on Korean children's thoughts in 2008, the children stated that their first thoughts of space were of the aliens shown in films, and that they mostly want to explore planets (31%), put the Korean flag on the moon (26.6%), and shake hands with aliens (20.5%).<sup>313</sup> All these images were made familiar through movies and videos.

The most popular space movie in Korea was *Armageddon* in 1998, followed by *Independence Day* (1996) and *Deep Impact* (1998).<sup>314</sup> In *Armageddon*, an asteroid the size of Texas was going to crash into the Earth. NASA sent well-trained astronauts to space to save the planet. They finally save the Earth after overcoming many problems. The astronauts use their expertise, behave actively, sacrifice themselves, and solve problems during the process.

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<sup>310</sup> Ibid.

<sup>311</sup> Anonymous, 'I had a dream to be an astronaut through watching SF movies when I was young' *Chungcheng Today*, 28 October 2006.

<sup>312</sup> An, *I am a Korean Astronaut*. 17-20.

<sup>313</sup> Lee, Jaewon, 'Elementary school student, "I will go to space planet exploration"' *Financial News IT Science*, 2 April 2008. (In Korean)

<sup>314</sup> *Armageddon*: 1,170,252 person only from Seoul, *Independence Day*: 923,223 people only in Seoul, and *Deep Impact*: 637,387 people only in Seoul. At that time, there were no national statistics.



*Independence Day* and *Deep Impact* have similar plots. Astronauts or people in a spacecraft solve the problem and save the world or other people as they think, behave actively, and use their expertise. Astronauts are always problem solvers, heroes, and saviors in American popular culture.<sup>315</sup> This is based on NASA's expression of the image of an American astronaut, which has been strengthened by popular culture and extended to Korean society. The success of *Gravity* (2013) and *The Martian* (2015) indicates that the image is still widely shared in Korean society.<sup>316</sup>

Children's books illustrate the image of astronauts accepted by Korean society. Usually, a society teaches to its next generation things they consider fact or those most popularly accepted in the community as a stereotype. As such, children's books provide reasonable evidence of societal norms and expectations. Space has not been a popular topic in Korea, which is reflected in children's books.<sup>317</sup> A survey of 63,845 children's books (educational and storybooks) in a public library in Daejeon revealed that only 133 (0.2%) were about space.<sup>318</sup> Space is a more popular topic in the US: the Montgomery-Floyd Regional Library in Virginia has 34,881 books for children, of which 1,573 (4.5%) are about space.<sup>319</sup> Among the children's books about space in the Korean library, 62 (46.4%) were written by Korean authors and 24 (18%) by British authors. Most of the other books were written by European or Asian authors. Only one book was written by an author from the

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<sup>315</sup> Matthew H. Hersch, *Inventing the American Astronaut* (New York: Palgrave Macmillan, 2012).

<sup>316</sup> *Gravity* drew 3,237,452 people and *The Martian* drew 4,880,800.

<sup>317</sup> Bruno Bettelheim, *Uses of Enchantment* (New York: Vintage Books, 1977); Sharyl Bender Peterson and Mary Alyce Lach, "Gender Stereotypes in Children's Books: Their prevalence and influence on cognitive and affective development," *Gender and Education* 2(2006): 185-197

<sup>318</sup> This research was performed at Hanbat Library in Daejeon, Korea. It is the biggest library in Daejeon.

<sup>319</sup> This search was performed using the online catalog of the Montgomery-Floyd Regional Library website. Montgomery-Floyd Regional Library (<http://www.mfrl.org/>) (accessed on October 2, 2018)

previous Soviet bloc – Poland.<sup>320</sup> American astronauts represent human spaceflight, and the American space program represents space programs. Only three books were about the Russian space program. Many put the NASA logo or American flag on spacecraft and spacesuits in the books, although these do not present the nationality of the space program or spacecraft. This shows that in Korean society, the person in space is an astronaut, not a cosmonaut. The astronaut Korean society understands is a problem solver, hero, and savior of the world. This pop-culture representation constructs the dominant image of astronauts and spaceflight in Korea, and clarifies that Koreans want the kind of astronauts Americans have.

Another image held by Korean society is evident in the response of the Korean public to KAP. When Dr. Yi launched on the *Soyuz*, the Koreans cheered. The media said that Korea entered the space age or was at least not far from it.<sup>321</sup> Dr. Yi was a hero who opened Korea's space age. Dr. Yi also said she would show that Korea could rise in space, which the Korean nation welcomed. This indicates how KAP and space programs were represented in the Korean popular media. As Korea has been a developing country for a long time, space technology has been a national goal. Korea is still a latecomer in the space field, but aims to be a leading country. As in other Asian countries, this is a symbol of national advancement. KAP was evidence that Korea was becoming a global power, and posited this as the historical moment between “before” and “after” becoming a global-level country.<sup>322</sup> For this reason, Dr. Yi, the first Korean astronaut, was important and the only achievement of

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<sup>320</sup> Poland was partially occupied by the Soviet Union during World War II. The first spaceflight of a Polish person was in 1978 aboard *Soyuz 30*. This was part of the Soviet Union's trials to send the first person to space among Soviet allies.

<sup>321</sup> Heo, Buhngoo, ‘Korea Opens the Space Age/President Lee “The goal is to become top 7 country of space technology after 10 years”’ *Segye Ilbo* IT-Science, 9 April 2008; Jeong, Jaepil, ‘Korea started to countdown ‘Space Age’’ *Daejeon Ilbo*, 7 April 2008.

<sup>322</sup> Dick, *Remembering the Space Age*. 27,21

KAP. She would be an astronaut who catapults Korea into the realm of advanced countries. She was a hero and problem solver for Korean society. This was the strong expression of the vision of the existing sociotechnical imaginary, and became the image existing in the Korean public sphere.

The image of hero could not escape the gender issue. Usually, the hero is perceived as masculine. In the media, male characters are mostly “unemotional, aggressive, dominant, and tough,” and females are “passive, needing the help of a male, doing more household work, and performing more nurturing activities.”<sup>323</sup> Thus, male characters are portrayed as problem-solving heroes and the female ones support them. Even when a female character has an important role in the story, this is not explicit. This trend is reflected in popular science fiction movies in Korea. In *Armageddon*, the hero is Harry Stamper, a male. All members of his team—Chick, Rockhound, Max, Oscar, Bear, Noonan, and AK—are male. Grace, the only important female character, is just the hero’s daughter and reason for his sacrifice. Similar characters are featured in *Independence Day* and *Deep Impact*. The main heroes are male and the female characters are their family or girlfriend, or have a supportive role, even if they can be considered heroes as well.

In reality, heroes are usually male. After 1932, the Soviet Union tried to create a “Soviet hero” as “the best person in the Soviet Union.” Although many people have been considered “the hero of the Soviet Union” and have different characteristics, all have been male.<sup>324</sup> In addition, after their spaceflights, the first cosmonauts and astronauts were

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<sup>323</sup> Melinda Aley and Lindsay Hahn, "The Powerful Male Hero: A Content Analysis of Gender Representation in Posters for Children's Animated Movies," *Sex Roles* (2020), <https://doi.org/https://doi.org/10.1007/s11199-020-01127-z>.

<sup>324</sup> Karen Petrone, "Gender and heroes," in *Women and Political Change: Perspectives from East-Central Europe*, ed. Sue Bridger, International Council for Central and East European Studies (Palgrave Macmillan UK, 1999).

considered national heroes. All were male, and their wives were expected to remain in their role of supporting and praying for their husbands.

From the media to real life, the heroes are almost always male. Dr. Yi also said that she wanted to be the one woman scientist among the many males manning a spacecraft in the science fiction movies and animations she watched when she was young. Therefore, a woman Korean astronaut did not fit the image of a Korean hero.

### **The Korean Astronaut: between Astronaut and Cosmonaut, and between Space Tourist and Astronaut**

The struggle in defining the term astronaut/cosmonaut was not KAP's only problem. The program also had to consider how to define the person in space. The US and Russia developed and established their astronauts and cosmonauts in different ways. The concepts of these two countries have been used as common ideas worldwide based on the long history of defining these roles. However, the concepts of astronaut and cosmonaut differ, because they developed separately.

#### Between Cosmonaut and Astronaut

The differences start with a different understanding of space. During the Cold War, the US referred to space programs as "space exploration," and Russia used the terms "conquering and mastering" (*polorenje* and *osvoenie*) of space.<sup>325</sup> They conquered space through the Soviet Union's leading science and technology, and cosmonauts were a symbolic way to

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<sup>325</sup> Slava Gerovitch, *Soviet Space Mithologies: Public Imagies, Private Memories, & The Making of a Cultural Identity* (Pittsburgh: University of Pittsburgh Press, 2015). 4

show the superiority of the country and communist system. For this, it without hesitation invested several billion rubles in the making of its first cosmonaut.<sup>326</sup>

The Soviet Union achieved the first human spaceflight. The cosmonauts became “ceremonial symbols of the important national program” in the Soviet Union. They were the “New Soviet Man,” and provided a critical way in which to promote communism.<sup>327</sup> Thus, the cosmonaut was part of the Soviet technological system. In this sense, there are two characteristics of the Soviet cosmonaut. One is their minimal role as part of a bigger technological system in the space program and the other is strong Soviet patriotism and communism.

Cosmonauts were selected based on the same perspective. The selection criteria had to fit candidates to the technological system.<sup>328</sup> From height and weight to personal ideology, background, and career, cosmonauts were part of a bigger space system. It was preferred that cosmonauts were fighter pilots, but flying expertise was not important. Nor was a background in engineering required, as the fact that most spacecraft were automatic and only a few parts allowed manual control minimized their role.<sup>329</sup> The cosmonauts were expected to be “flying *onboard* a spacecraft, rather than flying a spacecraft.”<sup>330</sup> Yuri Gagarin instructions were: “Do not touch anything!”<sup>331</sup> All he had to do was monitor the automatic flight.<sup>332</sup> This

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<sup>326</sup> Gerovitch, *Soviet Space Mthologies:Public Imagies, Private Memories, & The Making of a Cultural Identity*. 25.

<sup>327</sup> Gerovitch, *Soviet Space Mthologies:Public Imagies, Private Memories, & The Making of a Cultural Identity*. 19

<sup>328</sup> *Ibid.*, 49.

<sup>329</sup> *Ibid.*, 53

<sup>330</sup> *Ibid.*, 48-49.

<sup>331</sup> *Ibid.*

<sup>332</sup> *Ibid.*, 54-55

characteristic was based on the high trust in Soviet technology and mistrust of the person operating it. The cosmonauts were thought likely to make mistakes or misbehaviors, and thus played no major role in the flight. They were considered the weak link to a larger, highly reliable technological system. All decisions were made by machines.<sup>333</sup> Valentina Ponomareva, a backup cosmonaut for the Soviet Union, described the role of the cosmonaut as a small cog in a giant mechanism, and highlighted that the Soviet Union did not trust the ideologies of cosmonauts.<sup>334</sup>

The second characteristic of cosmonauts is their strong patriotism. The space race took place under the rhetoric of war.<sup>335</sup> As soldiers in the Cold War, cosmonauts needed to display selfless patriotism and be "New Soviet men" in the communist country that would win the battle. This was the agenda of the 22<sup>nd</sup> Party Congress of the Soviet Union,<sup>336</sup> which restricted information about cosmonauts and the cosmonaut program. Cosmonauts were expected to protect confidentiality and become the people the communist party made. They lost their identities and were hidden if they made mistakes.<sup>337</sup> Cosmonauts were the men representative of the communist society, and through them, the Soviet space policy was shaped, communist ideology promoted, and the Soviet Union propagated as the best country.<sup>338</sup> The position of cosmonauts was changed in this process. Sometimes they were ordinary citizens in the perfectly functioning Soviet technological system, and at other times,

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<sup>333</sup> Ibid, 53-55.

<sup>334</sup> Gerovitch, *Soviet Space Mthologies:Public Imagies, Private Memories, & The Making of a Cultural Identity*. 43

<sup>335</sup> Gerovitch, *Soviet Space Mthologies:Public Imagies, Private Memories, & The Making of a Cultural Identity*.11-12.

<sup>336</sup> Ibid., 11

<sup>337</sup> Ibid.,19-23.

<sup>338</sup> Ibid., 129, 47

they were flawless heroes.<sup>339</sup> In their public image, common ideas were shared, and as public figures, they maintained a good standing and professional attitude in their daily lives.

This background influenced the perception of modern day cosmonauts in Russia. The Russian space program was run by the air force, and around half the Russian cosmonauts were from the air force. The rest were engineers from Energia and researchers. However, the most crucial difference is not in their origin, but in their selection. Suitability to the role was more important than the desire to be a cosmonaut.<sup>340</sup>

In the US, astronauts were represented as the American ideal and a masculine hero. An astronaut was “a young, fun-loving, vigorous warrior, guided by an older, wiser leader, and showing the nation the path of progress toward a utopian future.”<sup>341</sup> Through the media, NASA and the US government crafted the public image of astronauts and the US human space program.<sup>342</sup>

KAP was based on cooperation with Russia. The candidates took the test following the criteria for Russian cosmonaut training, and the final two candidates, Dr. Soyeon Yi and San Ko, trained at GCTC for one year. From the planning to the flight, all processes followed Russia’s procedures and regulations. As such, the role and position of the Korean astronaut was affected by the Russian imaginary of cosmonauts. However, Korean society was also influenced by US culture, especially in the space field.

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<sup>339</sup> Ibid., 52, 138

<sup>340</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*. 56-57

<sup>341</sup> Roger D. Launius, “Heroes in a Vacuum: The Apollo Astronaut as a Cultural Icon,” paper presented at the Forty-Third AIAA Aerospace Sciences Meeting and Exhibition, January 10-13, Reno, Nevada, [http://klabs.org/histor/roger/launius\\_2005.pdf](http://klabs.org/histor/roger/launius_2005.pdf)

<sup>342</sup> Gerovitch, *Soviet Space Mthologies: Public Imagies, Private Memories, & The Making of a Cultural Identity*. 5

The US was considered closest to an advanced country, and thus the goal for South Korea after its independence in 1945 became to catch up to this ideal. After World War II, the US occupied South Korea and the Soviet Union occupied North Korea. Since then, South Korea has been a democratic country and has been influenced by other democratic countries including the US. In the Cold War era, South Korea and other communist countries did not have good relations, and this was made more serious because North Korea was communist.

The Soviet Union was another world to Korea until the late 1980s. In 1988, two Korean broadcasting companies released TV shows on the Soviet Union: “the Spring of Moscow,” and “News Vision East-West-South-North.” They showcased the culture of the Soviet Union for the first time.<sup>343</sup> The diplomatic relationship between Korea and the Soviet Union started in 1990, when they signed the Basic Treaty, and other agreements from 1992. The relationship between the two countries rapidly improved after President Daejung Kim became president. Korea and Russia agreed to a partnership in 1999. President Roh signed a treaty on science and technology including space technology cooperation in 2004, which rendered the KAP and KSLV-1 projects possible.<sup>344</sup>

The relationship between Korea and Russia was less five years old when KAP was proposed. Russia was still a strange country to Koreans. Given Koreans’ distaste for communism, there was hesitation regarding cooperation with Russia.

The cosmonaut was also an unfamiliar concept in Korean society, as seen in popular movies. According to the Korean Film Council, 909 American science fiction movies were released in Korea until 2017, the first in 1931. Many were about space exploration and alien

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<sup>343</sup> Anonymous, "Introduce the Culture of the Soviet Union Close Firstly," *Kyunghyang Shinmun* (Seoul), May 23, 1988

1988.

<sup>344</sup> MOEF, “Korea-Russia Relationship,” *2013 Overview of Russia*, (Seoul: MOEF, 2013)



attacks. The first Russian science fiction movie was released in 2009: nine were released until 2017. One, *Attraction* (2017), mentioned space and space technologies.<sup>345</sup> As mentioned, Russian cosmonauts were a bizarre concept to the Korean nation, and someone in space was an astronaut based on images from US culture.

One critical point of the critique of Dr. Yi and KAP was her professional role in her spaceflights. Some people argued that she was not an astronaut, but a space traveler, because she did not perform a role and was only a payload in the flight. However, her position in the *Soyuz* rocket was similar to the role of the early Soviet cosmonauts. Misunderstanding around the concepts of cosmonaut and astronaut, and the misuse of terminology without a clear definition caused the unintended criticism from the Korean public.

#### Between Professional Astronaut and Space Tourist

The debate on the Korean astronaut was not only over the difference between the perception of cosmonaut and astronaut, but also about the difference between professional astronauts and space tourists. Dr. Yi, while called a Korean “astronaut,” was different from a professional astronaut or cosmonaut. She was also not a space tourist, although some argued that she was indeed a space tourist funded by the Korean government.

The differences were evident in several ways. First, the embodiment of an astronaut/cosmonaut, space tourist, and the Korean astronaut had different origins. The first professional astronauts and cosmonauts were military or test pilots. Now, they are selected from a pool of experts. NASA requires a bachelor's degree in the STEM field, professional experience, and passing a physical exam to be an astronaut. Russia focused on applicants’

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<sup>345</sup> “Database Search” <http://www.kobis.or.kr/kobis/business/mast/mvie/searchMovieList.do> *Korean Film Council* (Access on October 4, 2017)

expertise. However, there were no criteria for space tourists except that they meet the minimum stipulated physical requirements to go to space.

The sources of funding also differed. Most human space programs are government-funded, and these funds usually come from taxpayers. The state has to justify the need for human spaceflight.<sup>346</sup> In contrast, space tourists pay their own way; thus, they only need to satisfy their own desires. Therefore, space tourists sometimes refer to themselves as private astronauts. From this perspective, the spaceflights of astronauts or cosmonauts had the characteristics of a business trip, but that of space tourists was for pleasure, like a vacation. The Korean astronaut was more like a professional astronaut or cosmonaut, because Dr. Yi's spaceflight was a business trip funded and supervised by the Korean government.

The Korean astronaut, space tourist, and professional astronaut/cosmonaut also underwent different types of training. Space tourists could not spend much time on the training, and the requisite knowledge was limited "to guaranteeing their safety and ability to be part of the flight."<sup>347</sup> They could only participate in the spaceflight as a member.

Roscosmos outlined the responsibilities of a space tourist who wanted to go to space on the *Soyuz-TMA* craft as follows:

- Fly as a member of a professional team on the *Soyuz*
- Be a member of the professional team on the ISS Russian Orbital Segment (ROS)
- Perform tasks as required by the flight program and on-board rules
- Communicate with Mission Control
- Be in charge of their own vital functions during the flight and after landing
- Perform any scientific experiments and other tasks as determined by the flight program

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<sup>346</sup> Won and Yi, *Sitting with Science*, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space. 74-76

<sup>347</sup> "Training Space Tourists to Fly to the ISS at the Gagarin Centre," [https://room.eu.com/article/Training\\_space\\_tourists\\_to\\_fly\\_to\\_the\\_ISS\\_at\\_the\\_Gagarin\\_Centre](https://room.eu.com/article/Training_space_tourists_to_fly_to_the_ISS_at_the_Gagarin_Centre), Room, (accessed December 3, 2018)

- In an emergency situation, perform tasks as required by the on-board regulations and flight captain
- At the Gagarin Training Centre, we undertake the following training regiments with nonprofessional cosmonauts bound for the ISS:
  - Training in the academic foundations of cosmonautics (optional)
  - Academic study of the *Soyuz* spacecraft
  - Practical training using *Soyuz* simulators and training booths
  - Academic study of the ISS ROS
  - Practical training using the ISS ROS simulators and training booths
  - Both academic and practical classes on life support systems of the spacecraft and the ISS ROS
- In preparing for flight, we use the parabola aircraft Ilyushin-76 MDK, a hydrolaboratory, and the TsF-18 centrifuge
- Physically preparing the body for the various specifics of space flight
- Preparation on what to do after landing in different climates or terrain (swampland, sea training, etc.)
- Preparing to conduct science experiments on the ISS (we use both simulators and other methods)
- An intensive Russian course – for all foreign flight candidates<sup>348</sup>

Although GCTC lists various types of training, it was not comprehensive. Space tourists needed only the minimum amount of knowledge to survive in space. Although they take an intensive Russian language course, they do not need to be fluent in Russian and English. They usually spend six months training and do not need to stay at GCTC during the full period.

The professional cosmonaut and astronaut must undergo more rigorous and in-depth training and can carry out repairs on the ISS and *Soyuz*.<sup>349</sup> The Korean astronaut was positioned between these two extremes. The final two candidates for the role of Korean astronaut were trained over a period of one year. They were required to stay at the center during training, which was stricter than that for space tourists. The Korean astronaut was required to know how the *Soyuz* rocket and ISS operate, and how to set and run the

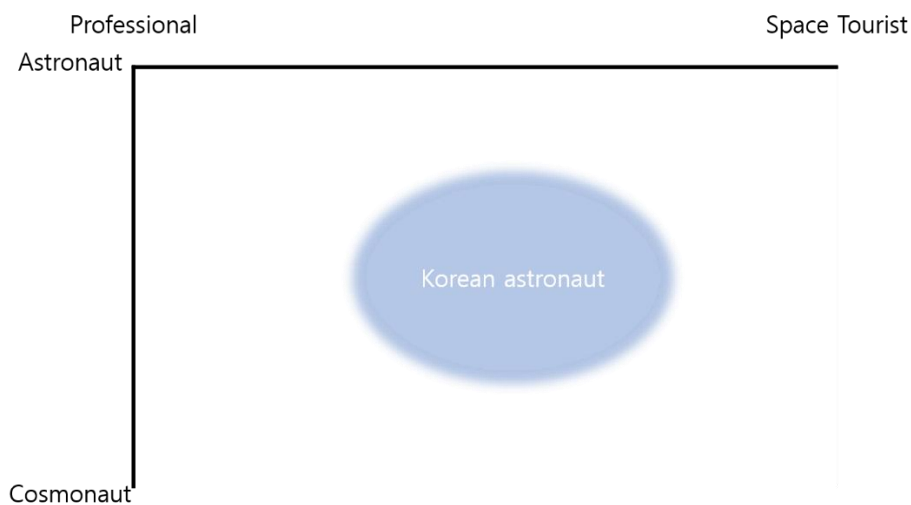
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<sup>348</sup> Ibid.

<sup>349</sup> Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*. 53-60

experimental equipment. Furthermore, while the Korean astronaut was not involved in *Soyuz* or ISS projects, she was also not a guest without any responsibilities.

As such, the Korean astronaut was neither a professional astronaut/cosmonaut nor space tourist. The role was between that of professional astronaut/cosmonaut and space tourist, although its position between these extremes was not clearly defined. Figure 7 depicts the position of the Korean astronaut.



**Figure 5 Position of the Korean Astronaut in Relation to that of Cosmonaut and Astronaut, and Professional and Space Tourist**

Because of the ambiguous position of the Korean astronaut, the Korean media spent much effort on distinguishing the role from that of space tourist. Although they focused on the “astronaut” or “expert” roles, including training, scientific experiments, and other expertise of the two KAP candidates when reporting on the program, they highlighted the role of a space tourist in their reporting.

One example is Charles Simonyi. Charles Simonyi is a Hungarian-American billionaire businessman who went to the ISS twice. His first spaceflight was in 2007. One Korean newspaper reported that Simonyi went to the ISS on the Russian *Soyuz* rocket, and that he

would post the story of a space tour on his blog, get a massage, and watch traditional Russian movies.<sup>350</sup> Their approach differed from that of other countries. BBC News reported on the flight and on his six months of training at the GCTC in Star City, Russia and at the Baikonur Cosmodrome in Kazakhstan. It also focused on “a series of experiments including measuring the amount of radiation ... to help to generate an accurate map of the radiation environment on the space station.” The article added that his plans included “a viewing of the Russian film *White Sun of the Desert*, a tradition for cosmonauts spanning many years,”<sup>351</sup> and highlighted his expertise—including his pilot license for jets and helicopters—and training, referring to him as “the fifth amateur cosmonaut.”<sup>352</sup>

The Korean astronaut does not have an exact position in the system. She was located somewhere between cosmonaut and astronaut and between professional astronaut and space tourist. Therefore, she needed a new definition. However, the Korean astronaut could not define itself in the conflict between the two sociotechnical vanguards and a sociotechnical imaginary. Ultimately, it is almost impossible to be accepted into society when a shared understanding is lacking of what a Korean astronaut is.

### **Opening the Public Image Box: Expertization**

Dr. Yi’s position changed through KAP. Before entering the program, she was a typical Korean woman with an engineering degree. She was smart and obtained a PhD from the best

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<sup>350</sup> Anonymous, "American Billionaire Simonyi, Had 1.86 Billion Won- Space Tour by Russian Rocket," *The Korea Economic Daily* (Seoul), April 8, 2007 April 8, 2007.

<sup>351</sup> Anonymous, "American Space 'Nerd' Blasts Off," news release, April 7, 2007, 2007, <http://news.bbc.co.uk/2/hi/science/nature/6529149.stm>.

<sup>352</sup> Jonathan Fildes, "'Nerd' Outlines Space Ambitions," *BBC News*, October 26 2006 2006, <http://news.bbc.co.uk/2/hi/science/nature/6088460.stm>.

engineering school in Korea. However, that was it. As the first Korean astronaut, she then became the special one, a space expert. Dr. Yi's position as a space expert was not completely finalized, but continuously attacked and doubted. Many people questioning her expertise considered her lucky, a space tourist, traitor, and celebrity. There was no place for her as a space expert in Korea, although she was the first Korean astronaut and people still attended her lectures. Why was she not accepted as an expert in Korean society in the same way other scientific experts are? I argue that it was the openness of the process KAP followed, and suggest a new term: expertization.

Dr. Yi's expertization was unique. Usually, people do not want to know how experts become experts. The controversy pertains to whether they have enough expertise and sufficient tacit knowledge as lay experts. Dr. Yi acquired tacit knowledge from her training and the spaceflight. However, the debate centered on whether she was already prepared when she was selected as the primary astronaut, whether she was an astronaut or space tourist, and whether her activities were appropriate for her role as an astronaut. Here, astronaut was used to mean the same as space expert, similar to other countries' use of the terms astronaut and cosmonaut.

Dr. Yi transformed from a general person as part of the Korean public to someone special: an astronaut. The Koreans watched every step of the expertization of Dr. Yi on television. The promotion of KAP continued, because one goal of the program was to attract public interest in science and technology. A promotion team of KAP worked on publicizing the program, which was promoted on Internet portal sites, events, blogs, KAP websites, and in the media. KARI provided media kits and issued press releases on KAP as well.<sup>353</sup> The media covered Dr. Yi's activities after the spaceflight. Based on this information, the Korean public evaluated each element of her expertization. When something seemed questionable, they rejected it.

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<sup>353</sup> KARI, *The White Paper of the Korean Astronaut Program*. 160-187

Broadcasting the selection process as a survival show also became a barrier to expertization. It resembled *America's Got Talent*. Every detail about the applicants was shown to the public, including who they were, why they wanted to be the first Korean astronaut, how they thought, and what they looked like. People evaluated the applicants, and cheered or criticized them. This became more severe as the number of applicants decreased through various steps of the selection process. The public thought they knew each applicant, and in this process, the meaning of KAP was lost. The program became the privatization of the story of each applicant, whose ability to be the first astronaut was the most critical issue. The Korean public evaluated every aspect of the applicants guised as their "ability." This ability was the responsibility of each applicant, and if he or she was not able to be the first Korean astronaut, it was because he or she lacked the ability to fill the role.

KAP's story was privatized to the story of each individual and finally to one individual, Dr. Yi.<sup>354</sup> The selection of the two final candidates signaled their success, and the spaceflight seemed like a reward for this victory. From this view, Mr. Ko was first the final winner of the selection process with his ability to be the astronaut, and then the miserable person who lost his reward through his mistakes. Furthermore, Dr. Yi became the person to claim the award, despite being perceived as not having sufficient ability.

However, the abilities required to be the first Korean astronaut were not clearly stipulated. The typical astronaut is a professional in excellent physical condition. KARI and MOST provided three guidelines—Ji, Deo, and Che (knowledge, virtue, and physical ability)—to attract candidates to the program.<sup>355</sup> These criteria are also used in the Miss Korea beauty contest. This indicates that the first Korean astronaut is similar to the concept of the "New Soviet Man." Although highlighting the expert role of Korea's first astronaut, the perfect Korean was actually implied. However, the selection

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<sup>354</sup> Park, "A Study on the Korean Astronaut Program as a Media Event Based on Discursive Analysis on SBS Program 'Space Korea'." 1.

<sup>355</sup> KARI, *The Korean Astronaut Program*. 322

process enabled public criticism of Dr. Yi. KARI thought that expanding the target audience would not be a problem, because the selection process was geared toward screening out unsuitable applicants, meaning that the final candidates would be well prepared and suited to taking on the role of an astronaut. However, the public honed in on her origin as a general person.

The privatization of KAP was also cause for concern. KAP's story reduced that of Dr. Yi, and the outcomes of the program were reduced to Dr. Yi, despite having various other achievements. As MOST intended, Koreans developed a strong interest in KAP and discussed the Korean space program by their own will. As KARI intended, Dr. Yi conducted the 18 scientific experiments on the ISS, which included world firsts. However, these achievements were forgotten, as all attention was focused on Dr. Yi. The debate over whether she was an astronaut or a space tourist threatened KAP,<sup>356</sup> and even the scientific experiments were used to fuel criticism of her performance. The Koreans complained that the experiments were too basic, and she was called a Meocktui (shirker) after the privatization of KAP. The full cost of KAP, 26 billion KRW, was thought to be spent only on Dr. Yi. As such, KAP's story became intertwined with that of Dr. Yi. After leaving Korea, she was accused of cheating the country out of 26 billion KRW, the cost of the program. Her 4 years of work at KARI was considered insufficient to repay this 26 billion KRW to the Korean nation.

The more critical problem is that the Korean public thought they were knowledgeable on the expertization of Dr. Yi, despite that the media could not transfer all aspects of this process. The media played an essential in attracting public attention and in popularizing science and technology during the planning of KAP. SBS joined KAP as the primary broadcast company, and made 52 episodes of *2008 Space Korea*, which started with the beginning of KAP, ended with the aftermath of the spaceflight, and included the training process. The selection process was the result of collaboration between KARI,

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<sup>356</sup> An, "Is Yi Soyeon an Astronaut or a Space Tourist?: The First Korean Astronaut Debate on the View of ANT."



MOST, and SBS. Many places at GCTC and the training were open to the SBS team, who showed this process to the Korean public for the first time.<sup>357</sup>

The spaceflight was broadcast in more detail. SBS produced a special episode of *2008 Space Korea* for 27 days, which included the live broadcast of the launch of the *Soyuz* rocket, docking on the ISS, and re-entry and the post-return press conference. The daily life of Dr. Yi on the ISS was also shown to the public through NASA's data. Dr. Yi had four interviews with SBS through a video call from the ISS. Chulho Bae, the director of the Space Korea team at SBS, said he would produce a TV program that would lay bare all details of the astronaut's life on the ISS. As SBS spent vast resources to make the program, and claimed to cover all processes of KAP, the Korean public thought they were learning everything about Dr. Yi and the program.

However, a TV program could not cover everything about KAP and Korea's first astronaut, and what it did show was represented in the way the broadcaster intended.<sup>358</sup> Some parts of the GCTC could not be shown to the public, as Russia restricted what could be broadcast. Thus, SBS could not change the coverage provided. Many security limitations prevented video recordings of the facilities and training of Dr. Yi and Mr. Ko.

In addition, the media had to portray all details in the most interesting way to attract public attention. Because of these limitations, only part of the training and spaceflight was shown to the Koreans in the media. Despite this, the public believed they were watching everything and being told everything they needed to know, because SBS showed strong confidence and did in fact show many things for the first time.

KARI defined the Korean astronaut as a scientific expert in an emerging field, namely human space flight. The first Korean astronaut was positioned as an expert before the Korean public

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<sup>357</sup> Anonymous, Interviewed by author. June 30, 2017, Seoul, Korea

<sup>358</sup> Ibid.

by opening the selection process, training, and spaceflight. Because all steps followed in KAP were broadcast, the expertization of Dr. Yi was open to the public, unlike that for other experts. When people found an element that could not be justified, her expertise was questioned.

## **The First Korean in Space is a Woman**

### Similarities and differences between other women astronauts/cosmonauts

The private project *Mercury 13* comprised a group of American women pilots who passed the physical examination for astronauts.<sup>359</sup> To achieve their dream of being an astronaut, they overcame sexism. They were not understood in society, did not have the proper education to be astronauts, and opposed many incorrect stereotypes of women, including that females are more emotional and cannot think clearly when they menstruate.<sup>360</sup>

However, Dr. Yi's experience was different. First, the gender gap in education was not as large, because KAP was recently launched. Dr. Yi had an ordinary childhood, was a very active person, and had many dreams she hoped to fulfill. She was interested in science and mathematics, and in music, painting, dancing, and exercise. Her dream jobs ranged from being a doctor to Miss Korea.<sup>361</sup> She attended Gwangju Science High School and KAIST, where she majored in mechanical engineering for both her Bachelor's and Master's degrees, and in biosystem engineering for her PhD. Gwangju Science High School is a specialized school for science and technology, and considered the best option for STEM students living in Gwangju. As mentioned, KAIST is one of the best engineering universities in Korea.

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<sup>359</sup> Ibid.

<sup>360</sup> Ibid., 38.

<sup>361</sup> Soyeon Yi, *The Eleventh Axing: The Full Story of the First Korean Astronaut Soyeon Yi* (Seoul: FromBooks, 2012).

While receiving the best education in Korea, she studied, competed, and worked with her male friends and colleagues. While being among the best-educated applicants for KAP, she experienced some difficulties because females are still a minority in STEM fields in Korea.

However, the childhoods of Dr. Yi and Mr. Ko were reorganized to iconize the Korean astronaut candidates after the spaceflight, as was commonly done for other astronauts as well. In children's books on KAP, Dr. Yi had always wanted to be a space hero and Mr. Ko had dreamed of going to space.<sup>362</sup> Every step of their lives was changed into their preparation to be astronauts.

The selection process also differed. KAP did not need to prove that females could be astronauts and guidelines for women already existed in this role. Female applicants had to meet their own set of physical guidelines, unlike the first women astronauts.<sup>363</sup> For example, they had to complete a 3.5 km run within 28 minutes and pass a physical strength test. Men were required to finish the same course within 23 minutes to pass the test.<sup>364</sup>

### The Korean Astronaut as a Woman

KAP as the story of the first woman to enter a new territory of science ahead of any man has an important meaning. Although Dr. Yi did not need to fight against meeting the same requirements as the male applicants, she and KAP were affected by the prejudice about women in the STEM fields.

KAP attracted much interest from other countries after changing the primary astronaut. Dr. Yi experienced much hardship in being, performing the role of, and living as the first Korean astronaut,

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<sup>362</sup> Keumdongbooks, *The Endless Challenge of the First Korean Astronaut, Soyeon Yi and San Ko* (Seoul: Samtoh, 2008). 6-10.

<sup>363</sup> Ackmann, *The Mercury 13: The True Story of Thirteen Women and the Dream of Space Flight*. 38.

<sup>364</sup> KARI, *The White Paper of the Korean Astronaut Program*.

although this was a meaningful milestone in Korean society, the world history of space, and in the story of women in the STEM fields. First, she had to confront a double standard. She studied engineering at a science high school and at KAIST, where males outnumbered females. The rate of women students in KAIST was little over 10% during the 1990s, and she enrolled in 1997. Among the various majors available, her bachelor's and master's degrees were completed in the male-dominated mechanical engineering department. She was expected to act more like a man than a woman as women scientists should do in many previous cases.

However, Dr. Yi also had to project various images as the Korean astronaut. The public expected her to be the ideal woman, because KAP was the public promotion program. Here, her characteristics as a woman became more important than her abilities.<sup>365</sup> Sought after feminine characteristics included excellent cooking skills, a bright smile, and social skills. The media reported how Dr. Yi prepared Korean food for the other astronauts and cosmonauts during her training and on the ISS. Women scientists and engineers were described in a similar way. Some criticized her appearance, saying her appearance were not enough good for being an ideal lady, but it was enough good for being the first Korean astronaut.. At the same time, the public expected her to be a professional, because KAP was also a research program. The criticism due to the two different expectations intensified when she replaced Ko. She was no longer the backup. She was the first Korean in space and had to be prepared for her role.

However, sexism remained a problem. It had kept women from becoming astronauts in the past, and still exacerbated the underestimation of female candidates. The rumor that there was a gender quota for the final two candidates bothered her. It was said that the final candidates had to be one man and one woman to encourage adolescent girls to enter the

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<sup>365</sup> Ehrenreich and English, *Witches Midwives & Nurses: A History of Women Healers*. 90

STEM fields. Furthermore, women's kindness was needed to attract public attention and boost interest in KAP.<sup>366</sup> Many people, even those involved in the planning, thought that a gender quota existed to attract public attention, although there was no quota or advantages for women.<sup>367</sup> Some even provided a rank for Dr. Yi in the selection process, claiming she was selected based on her gender.<sup>368</sup>

The issue of gender resurfaced after she was selected as a finalist. People not only evaluated her ability to be an astronaut, but also her appearance. Her body shape and facial features were criticized, because she was not as slim as idolized singers and her face was not as small or beautiful as that of a movie star. Both these features are not requirements for being an astronaut. Rather, strong physical ability and a bright smile are needed to go to space and become the familiar face the public knows as an astronaut. Interestingly, no one cared about Ko's face or body, indicating that Korean society judges women based on their looks. Dr. Yi represented two contradicting images simultaneously: the feminine and professional, which is usually considered masculine. The professional image is serious, solemn, unsociable, and nerdy. Dr. Yi was expected to be an ideal woman and a professional scientist simultaneously.

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<sup>366</sup> Anonymous, Interview with Author, June 14, 2017, Daejeon, Korea

<sup>367</sup> Anonymous, Interview with Author, August 1, 2017, Sanbon, Gyunggi-do, Korea

<sup>368</sup> "The Controversy of Mucktui about the First Astronaut Soyeon Yi. The Answer is not a Mucktui," <https://blog.naver.com/santaboy1/221254821268>, Santaboy1, (accessed July 5 2019); "The Korean First Astronaut, Soyeon Yi, finally Resigned Her Position in KARI," <https://news.naver.com/main/read.nhn?mode=LSD&mid=shm&sid1=105&oid=001&aid=000706403> Yeonhap News, August 12, 2014.; "There May Be no Legal Issue Although Many People Talked Many Things about Soyeon Yi," <https://www.clien.net/service/board/park/6160926?combine=true&q=%EC%9D%B4%EC%86%8C%EC%97%B0&p=6&sort=recency&boardCd=&isBoard=fals>, Clien, (accessed May 5, 2019); Reportedly, Dr. Yi was ranked fourth, although others said she was eighth. Either way, all claim that while Dr. Yi was not second among the ten candidates, she was first among the female ones.

## **Predetermined Failure and Predetermined Success**

In some perspectives, it is not important to verify KAP's success or failure with evidence. Before a test is run, the tester has a purpose in mind. When the results meet the expectation, the tester considers the experiments a success and if not, a failure. According to Pinch, "similarity and difference relationships that are constituted within a wider framework of culture and action are at the very heart of how truth and falsehood are established in science."<sup>369</sup> As the comparison of experiments and their replication can cause contradictory arguments in terms of problems with an original experiment or difference between it and the replication, it is natural that the comparison of the expectations of each vanguard and outcomes of KAP caused the same difficulty in the program.

The three sociotechnical vanguards and imaginary have different cultures and actions. When they tried to examine KAP, "it can never be clear" whether the examination "has been done sufficiently well to count as a check on the results of" another examination because they have different cultures and visions.<sup>370</sup> The sociotechnical vanguards experienced "experimenters' regress." Thus, they interpreted the outcomes of KAP differently, claimed that the program had failed, and criticized it and Dr. Yi when the results differed from their expectations. Maybe, KAP's success or failure was decided before the program was initiated.

KARI and MOST had to justify KAP after it ended as well as Dr. Yi's departure. To KARI, KAP had achieved its goal. The plan stated KAP's objectives as being to negotiate with Russia regarding sending Korea's first astronaut, as well as the cost thereof and the selection, management, and training of the astronaut; spaceflight; and development of the

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<sup>369</sup> Trevor Pinch, "'Testing- One, Two, Three,.. Testing!': Toward a Sociology of Testing," *Science, Technology & Human Value* 18, no. 1 (1993), Sage Publications. 31

<sup>370</sup> Collins, *Changing Order: Replication and Induction in Scientific Practice*. 2.

scientific mission. It achieved all these objectives. KAP's official report showed that it generated technological know-how about growing Korea's own mission specialist, safety verification technology for space experimental equipment, and scientific knowledge.

To MOST, KAP also achieved its goals of popularizing science and technology through promoting the Korean astronaut and attracting national interest in the STEM fields. The survey after the spaceflight showed that 99.9% of Koreans knew about it, 82.2% reported an increased interest in space, and 59.5% of adolescents wanted to study in an STEM field.<sup>371</sup>

MOST launched KAP in 2004 to solve the science and engineering crisis, and the program successful attracted more students into the STEM fields. As such, MOST's planned goal was achieved through KAP.

However, complaints that KAP was a failure lingered. One significant criticism of the program was that it had been a waste of money, since Dr. Yi had left Korea. Consequently, KARI tried to justify KAP economically. In the second space policy forum, Dr. Heeyoung Heo claimed that the economic value of KAP was 478 billion KRW (about US\$ 514.19 million) based on its ancillary benefit. In a survey of Koreans aged more than 20 years, he asked: "How much would you be willing to pay for KAP voluntarily?" The survey was answered by 1,360 randomly selected people. The average amount given was 14,000 KRW (US\$ 15) per person. Thus, if all Koreans aged more than 20 years paid 14,000 KRW, KAP had a value of about US\$ 514.19 million,<sup>372</sup> much more than the 26 billion KRW KAP spent. This result indicated that KAP was highly profitable. However, the criticism of the program and Dr. Yi did not stop.

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<sup>371</sup> KARI, *The White Paper of the Korean Astronaut Program*.

<sup>372</sup> An, *I am a Korean Astronaut*. 153, ; Heo, Heeyoung, "The Second Space Policy Forum"; The average exchange rate between US Dollar and Korean Won in 2007 was \$1 : 929.61 KRW. <https://spot.wooribank.com/pot/Dream?withyou=FXXRT0016>

KAP's successes and failures were subjective, not objective. They were constructed based on the culture and background of the people. The problems associated with KAP did not stem from the program, but from people. As Pinch said, "If technology is black boxed, ... the user still has to know how to" operate it. However, in an emerging science and technology field, there is no conviction that the user knows how to operate the technology.<sup>373</sup> KAP's expertization process was unboxing the public image box. However, KAP's user was black-boxed. The user of KAP, Korean society, was not tested, but considered as one black-boxed group of people, although they are not such, but three different sociotechnical vanguards and imaginary. Thus, the evidence to verify KAP's success or failure cannot satisfy users of the program. To the person who wanted to believe that KAP was successful, all results provided evidence confirming its success. However, for those who considered KAP a failure, the same results highlight these shortcomings. Perhaps the success or failure of KAP was not the real issue in the program and Korean society. For Koreans, it was predetermined.<sup>374</sup>

Each sociotechnical vanguard and sociotechnical imaginary had its own visions and understood KAP in their own ways. Because these ways differed, they were understood differently, but had the same results, which could be evidence of success for one and of failure for another.

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<sup>373</sup> Pinch, ""Testing- One, Two, Three,.. Testing!": Toward a Sociology of Testing." 35-36.

<sup>374</sup> Pinch, ""Testing- One, Two, Three,.. Testing!": Toward a Sociology of Testing."



## Chapter 6. Conclusion

Korea's military space program began in the 1950s, and its civilian space program was launched in the late 1980s. However, these programs had remained isolated from the public. The only media coverage was on the space program's achievements, of which the Korean public was pleased. As Korea's industry, economy, and science and technology developed, its achievements in the space field constituted another type of national development. Notably, the space program is a symbol of the level of the nation, and its achievements increased expectations that Korea would become an advanced country. However, space was not part of everyday life, and the Korean public could not participate in the discourse on the space program, although they did follow it.

However, KAP and the launch of KSLV-1 changed the role and position of the public. The Korean government and KARI strategically promoted the programs within the public sphere and attracted public interest to the Korean space program. KAP, proposed by MOST with the vision of creating a science-loving Korea, was operated by KARI who envisioned a better Korean society with advanced science and technology and an advanced Korea with a Korean hero. The clash between different sociotechnical vanguards emerged in KAP. The first Korean astronaut, defined as an expert in spaceflight, was rejected by Korean society. Various debates emerged during and after KAP on the meaning of the Korean astronaut and KAP. For the first time, the Korean public was an active participant in the discourse surrounding the Korean space program.

In this process, KAP changed Korean society. As intended, it attracted adolescents to the STEM fields, and changed the image of space programs, inspired Korea's space culture, and strengthened the discourse around KAP and the Korean astronaut.

## Successes of the Goals of the Sociotechnical Vanguard

Each sociotechnical vanguard and sociotechnical imaginary envisioned a different image for KAP and the Korean astronaut, and set different goals to achieve their visions. During KAP, it and the Korean astronaut were criticized for their mismatched visions and goals. However, KAP succeeded in achieving the goals of each sociotechnical vanguard and sociotechnical imaginary.

## Public Interest in Space and the Science and Engineering Crisis

MOST's vision of a science-loving Korea was achieved in various ways. It encouraged public interest in space as well as science and engineering, and created a space culture in Korea. More directly, KAP also achieved the goal of encouraging Korean teenagers to study in the STEM fields after the Asian economic crisis. The number of students who hoped to enter a STEM field increased after Dr. Yi's flight. Furthermore, the Korean public started discussing space in daily life, and space entered the cultural field in society.

After KAP, space entered the public discourse and even the entertainment arena in Korea. Korean society had long not had a space culture. Science fiction is not popular in Korea, and even blockbusters like *Star Wars* and *Star Trek* did not attract large audiences.<sup>375</sup> Although TV shows on the zero-gravity experience and space aired before KAP, these also failed to garner much notice. For example, in 2003, SBS released an episode of *Science Park* in which four entertainers underwent cosmonaut training. They took the physical and completed centrifugal training in GCTC and experienced zero-gravity in IL-76. They performed the missions of drinking water, playing space basketball, and stood in a superman

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<sup>375</sup> Dong-Won Kim, "Science Fiction in South and North Korea: Reading Science and Technology as Fantasized in Cultures," *East Asian Science, Technology and Society: an International Journal* 12, no. 3 (September 1, 2018), <https://doi.org/10.1215/18752160-6975882>.

pose.<sup>376</sup> However, only three articles were published in two newspapers on this, which was considered only an educational program for children to show what happens in zero-gravity. There was no public discourse on space.<sup>377</sup>

After KAP, Korean broadcasting companies started weaving space into programs produced for entertainment purposes. The TV show *Live from Space*, made by National Geographic and NASA, was broadcast in 2014. This was Korea's first entertainment program about space. It was released in the morning because it was broadcast live worldwide. Thus, many people could not watch the program. However, it attracted public interest because it connected to the ISS live. As such, it was a program for both education and entertainment.

The space travel edition of *Infinite Challenge* in 2016 could be considered the first space-related show in Korea made for entertainment only. *Infinite Challenge* is one of the most popular entertainment programs in Korea, and is distributed and syndicated by MBC. It is the most-watched free-to-air television program on Saturday evenings, and the most viewed non-drama program in Korea.<sup>378</sup> The 2015 space travel edition included a Martian episode and a Gravity episode. It demonstrated training for adapting to darkness and zero-gravity with helium balloons and eating food while standing on their head to simulate the eating experience in zero-gravity conditions. Most are crude demonstrations made for fun. However, the team visited GCTC to undergo centrifugal training and experienced zero-

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<sup>376</sup> Kihyun, Kim, "Four Korean Entertainer, including Moon-se Lee, Won-kwan Jung Experienced Special Space Experience in Russia," *dongA.com*, August 25, 2003, <http://www.donga.com/news/article/all/20030825/7976600/1> (accessed October 8, 2019); Younghyun Kim, "Moon-se Lee Experience Zero-Gravity Flight," *JoongAng Ilbo*, August 14, 2003, <https://news.joins.com/article/1792911> (Accessed October 8, 2019).

<sup>377</sup> Big kinds, <https://www.kinds.or.kr/> (accessed October 10, 2019).

<sup>378</sup> *The Infinite Challenge* has five regular members. In 2015, it tried to add a new member to the program, and the edition adopted the format of a parody of the movie *Kingsman*.

gravity in IL-76. They did the same things as the members of *Science Park* in 2003, but this was sold as entertainment and garnered high visibility. The program rating for the space travel edition was 12.8% for the Martian episode and 12.4%, 11.8%, and 13.1% for Gravity episodes 1, 2, and 3, respectively, much higher rating than the average 5% program rating in Korea.

In 2018, the Mars Desert Research Station (MDRS) in Utah in the US became the topic of another entertainment show. In *Galileo: The Space Awakens*, four Koreans—an actress, comedian, and two singers—lived in the MDRS with three experts for seven days. It initially seemed to be a reality show, but differed because of the distinct characteristics of the location. The members had to follow the rules of MDRS, and production staff had no influence on life in MDRS. All their behaviors were recorded and used as data for future Mars explorations. Between an entertainment program and real scientific training for a Mars exploration, the program aimed to provide scientific knowledge and entertainment.<sup>379</sup> While it did not have a large viewership, its expansion of the field of entertainment programs demonstrates that Korea does have an emerging space culture.

The increase in the number of space-related public events also indicates that a space culture has emerged in Korean society. Yuri's Night is an international celebration of Yuri Gagarin's flight on April 12, 1961. Yuri's Night Korea started in 2011. Dr. Yi was a founding member, and over time, more people joined in celebrating Yuri's Night Korea.

KAP also increased the number of students who hoped to enter a STEM field. The increase in the number of applicants to a science high school and major STEM university provides evidence of this. A survey conducted after KAP ended found that most Koreans (98.2% of adults and 99.6% of teenagers) know that a Korean went to the ISS, and 76.3% of

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<sup>379</sup> Duckhyun Jeong, "Ithaca is fun. But What is "Galileo" Doing?" EnterMedia, July 30, 2018, [http://m.entermedia.co.kr/news\\_view.html?idx=8463#cb](http://m.entermedia.co.kr/news_view.html?idx=8463#cb) (accessed October 14, 2019)

adults and 90% of teenagers know who Dr. Soyeon Yi is. More than 80% of respondents (80.0% of adults and 83.3% of teenagers) reported a greater interest in space, and 75.4% of adults and 74.6% of teenagers reported having more interest in science and technology. Although KARI operated many outreach programs for a long time, it did not increase public interest in science, especially in space. Only 0.3% of elementary and middle school students enrolled in KARI's outreach programs. However, KAP achieved a higher increase in public interest in science and engineering.<sup>380</sup>

The increase in interest was not just a temporary bump due to short-lived excitement. In 2015, the number of applicants to the science high school and Science Academy, specialized high schools usually in science, increased.<sup>381</sup> This was six years after Dr. Yi's spaceflight, around the time those who were elementary students when Dr. Yi went to the ISS would apply to high school. Korean students usually decide between general science and liberal arts in high school. Entering high school marks the starting point of their careers. Only high-scoring students can apply and enter these specialized schools. Thus, the increase in the number of applicants to science high school and the science academy shows that students in Korea decided to enter the STEM fields. Specifically, the Korea Science Academy of KAIST is one of its sub-organizations, and many students of the school entered KAIST. The increase in applicants to the Korea Science Academy of KAIST shows that more high-ranking students now plan to study science and engineering than before.

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<sup>380</sup> Seungmi Chung, "The National Space Program, the Most efficient Outreach Program Itself: Case of Korean Astronaut Program" 70<sup>th</sup> International Astronautical Congress, October 21- 25, 2019, Washington D.C. USA.

<sup>381</sup> Kil, Aekyung, "Does the Popularity of Science and Engineering Recover? The Competitive Rate of National Science High School Entrance highly raised," *HelloDD*, May 8, 2014, <http://www.hellodd.com/?md=news&mt=view&pid=48730> (accessed July 8, 2019)

The increased interest in science and engineering, especially engineering, is also shown in the growing number of applicants to STEM majors in universities according to the statistics of the Ministry of Education. The number of applicants for engineering majors decreased to 74,402 in 2007, and the percentage of engineering applicants also dropped to less than 23.25% in 2007.

KAP's influence was apparent. The number of applicants for engineering major increased since 2008, when Dr. Yi went to ISS. The number of applicants for engineering major continuously increased although the total number of applicants decrease. More than 80,000 students applied to engineering field in 2012 and did not drop under 80,000. Even, it reached over 88,800 applicants in 2019. It means 14,418 students more applied to engineering major than 2007. The ratio also increased from 23.25% in 2007 to 28.37% in 2019.

#### Birth of Microgravity Research and Advanced Korea

KARI's vision of a better Korea with more advanced science and technology was also achieved. KARI's goal for KAP was to establish guidelines to select Korean astronauts and conduct scientific experiments in space. Dr. Yi was selected as the first Korean astronaut, and Korea gained experience in selecting, training, and managing its own astronauts. Dr. Yi also successfully finished her 18 scientific experiments on the ISS, some of which were world firsts. Through microgravity research, Korea gained scientific knowledge and technology. In addition, the Korean Microgravity Society was established based on the results of Dr. Yi's experiments. This confirms KAP's strong contribution to creating a better Korea with better science and technology.

However, the attempt to position the Korean astronaut as a space expert failed. Unlike for other experts, the expertization of Dr. Yi was open to the Korean nation. The Korean

public believed they knew everything about Dr. Yi and KAP, and when something deviated from their expectations, they doubted Dr. Yi's expertise. It demarcated the expertization of Dr. Yi. Dr. Yi eventually left Korea without a concrete position in Korean society. However, Dr. Yi as a space expert was the milestone of making a better Korea with better science and technology, although this was not the final goal of KAP in KARI's vision. Although KAP failed to position Dr. Yi as a space expert in Korean society, KARI achieved its vision through KAP's goal, namely a better Korea with better science and technology.

### **Failure to Make a Shared Sociotechnical Imaginary**

KAP succeeded in achieving all goals of each sociotechnical vanguard and imaginary. However, it failed to create a shared sociotechnical imaginary in Korean society. While each vanguard and imaginary used the terms Korean astronaut and KAP, their meanings for these words differed. This leads to the severe criticism of KAP and Dr. Yi, and finally, KAP became a taboo in Korean society.

Many Korean people discussed KAP and Dr. Yi during and after the program. Some considered Dr. Yi unpatriotic, while others criticized the Korean system for not keeping her in Korea. The debate over the meaning of Korean astronaut continues. Dr. Yi was called a space tourist, spaceflight participant, mission specialist, and an astronaut. She was expected to be a science popularizer, national hero as a symbol of a developed Korea, and researcher. Based on the different visions of each sociotechnical vanguard, people debated the meaning and role of the Korean astronaut. However, it is impossible to reach consensus in the debate. A person who replicates experiments experiences experimenter's regress, which can only be identified through hindsight. The debate around the Korean astronaut can be similarly viewed. According to Collins and Evans, the class of experts can be determined only with

hindsight. During a debate, people cannot reach agreement although they try to examine it. Collins and Evans said that “the trouble is that the expert’s regress gives no more positive help with the problem of technical decision-making in the public domain than the experimenter’s regress gives positive help with settling the scientific controversy.”<sup>382</sup>

However, does it really give no positive help? As Korean society experienced “expert’s regress” in KAP, many Korean people were introduced to scientific knowledge, learned how to find information, and how to debate scientific topics. Most Koreans saw that the knowledge was refined and accumulated. It became an experience of society. Koreans learned how to engage in scientific debates and sociotechnical controversies. This can also be considered a national development, in which nations have increased ability as members of a scientific society.

KAP and the Korean astronaut have long been criticized. It was contended that KAP failed and while Korea spent a vast amount of money, does not have an astronaut. However, despite the criticism, KAP attained all its goals and provided valuable achievements to Korean society. Korean society benefited from the experience and scientific knowledge of the human space program, and gained a workforce in the STEM fields, a generation of future leaders of the space society, and a more technologically sophisticated nation. It cannot be denied that KAP was meaningful; thus, all those who participated in the program should be proud of its accomplishments.

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<sup>382</sup> Collins and Evans, "The Third Wave of Science Studies: Studies of Expertise and Experience." 240-241.



## **Soyeon Yi's Generation and Change of Imaginary of the Korean Space Program**

Although KAP is the most controversial event and failed to create a shared sociotechnical imaginary, it cannot be considered a failure. Through KAP, Korean society found a new opportunity to make a future Korea not only with advanced science and technology but also with the dreams based on science and technology and supported by the science-loving public. Through KAP, many Korean children have dreams in a scientifically and technologically sophisticated future Korea, and the program provided the opportunity to find a new imaginary for the Korean space program.

When there are large events or famous people, the generation influenced is called the generation of these events or people. *Sputnik-1* and Yuri Gagarin's space flight drew many people to space science and space engineering. In Russia, the "Sputnik generation" had an important role in constructing the space age.<sup>383</sup>

Korean society did not have this kind of scientific event before KAP. People who studied aerospace engineering had been inspired by space programs outside of Korea. The first generation of the Korean space program such as Dr. Chul Park and Dr. Yeon Seok Chae dreamed of space through the *Sputnik shock* in 1957, and the second generation was inspired by the moon landing of *Apollo 11*. However, the generation that watched KAP and Dr. Yi's spaceflight could dream about space by looking at the Korean space program. They are Dr. Yi's generation, and expected to lead the development of Korea's space programs and the country's science and technology.

Until 2005, Koreans assumed that the Korean space program was a government project. Most aerospace engineering students considered only careers at KARI or the Agency

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<sup>383</sup> Slava Gerovitch, "Stalin's Rocket Designers' Leap into Space: The Technical Intelligentsia Faces the Thaw," *Osiris* 23, *Intelligentsia Science: The Russian Century, 1860-1960*, no. 1 (2008); Gerovitch, "'Why Are We Telling Lies?': The Creation of Soviet Space History Myths." 461

for Defense Development (ADD) to develop satellites, rockets, missiles, and combat planes. Now, Dr. Yi's generation establishes companies that develop private rocket satellites and space rovers by applying satellite images and information in their small venture companies. They use it to launch commercial<sup>384</sup> cube satellites, prepare for future space exploration, and educate the next generation. The image of the Korean space program has already been changed by Dr. Yi's generation, whose achievements have also changed future generations.

Some have claimed that the impact of KAP extended to the future of Korea.

Astronauts and cosmonauts encourage people to dream. Children should be taught to believe that they should always do their best, even if they will not be scientists or engineers. This was the role of the *Apollo 11* moon landing and will be the role of the Artemis project in the US.<sup>385</sup> This will contribute to a better Korea.<sup>386</sup> If Dr. Yi's generation produces scientists, engineers, and leaders in any field, Korea could be the science-loving country MOST envisioned, a better Korea with advanced science and technology, and a better Korea with heroes.

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<sup>384</sup> These are a type of miniaturized satellites usually used for research purposes. They are made up of multiples of 10 cm x 10cm cubit units and weigh less than 1.33 kg.

<sup>385</sup> Jim Bridenstine, "What is the Artemis Generation?" <https://blogs.nasa.gov/bridenstine/2019/09/24/what-is-the-artemis-generation/>, NASA Blog, (accessed October 23, 2019)

<sup>386</sup> Soosung Kim, "The Korean First Astronaut Soyeon Yi's Life in the Earth," *Interview 365*, <http://www.interview365.com/news/articleView.html?idxno=2467> (accessed October 10, 2019); Won and Yi, *Sitting with Science, Pato Jongwoo Won's Science Podcast 10 Dr. Soyeon Yi's Woman in Space*. 125-126

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