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○ 주요학과로는 사회학, 법학, 비즈니스, 정보기술, 전기, 전자공학, 계리학, 재무학, 영화학, 스포츠과학 등이 명성이 높으며 미국 캘리포니아 주립대, 프랑스 소르본대, 중국 홍콩대학, 한국 고려대 등과 파트너십을 맺고 있음

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ABSTRACT

In the discussion of the Public Understanding of Science (PUS), the contextual model is considered to give more weight to the lay public as the subject in dealing with scientific knowledge and information, in comparison to the deficit model. Yet, acknowledging the fact that applying the contextual model to practice requires a lot of realistic conditions, is crucial. Bearing such facts in mind, the aim of this dissertation is to examine the practicality of the contextual model through a case study of the Public Deliberation Committee on Shin-Gori Nuclear Reactors No.5&6 in South Korea. Nuclear power generation is a scientific issue with an extreme public sensitivity, as well as economic and political complexity, and the case was an unprecedented attempt by the government which enabled the public effectively engage to the issue. The findings from this study suggest that the Public Deliberation Committee can be interpreted as the successful use of the contextual model in South Korea. The results also highlight the lay public was enabled to understand complex scientific knowledge and empowered to make real decisions through the process of contextualization.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. Introduction

Science is one of the most powerful driving forces of the modern civilized society. Most lives of contemporary society exist within the magnetic field of science and technology, and their influence continues to grow. Not only have science and technology historically functioned as core elements which guide social advancement and civilization, but also played pivotal roles in the orderly operation of today's social systems. Furthermore, as the role of science and technology expands in terms of economic growth and national development, the lay public consumes and absorbs science and technology in daily lives. Yet, there is a strong tendency to deem science and technology as specialized knowledge which only belongs to minor expert groups. In the discussions over science and society in the past, the lay public was considered as ignorant beings, unable to accept rapidly developing scientific knowledge. Since the 1960s, however, the situation changed as social problems of science and technology, such as nuclear power generation and environmental pollution became major public concerns[1]. Hence, the process of discussion on the Public Understanding of Science (PUS), an academic approach to the relationship, communication and mutual understanding between science and the lay public, began to take shape.

There are two main points of view in PUS, one of which is the deficit model, which regards the lay public as passively accepting scientific knowledge provided by

[1] Skalak, Samuell, *Science and its Credibility, The 1960s VS. Today* (2006), < https://www.scq.ubc.ca/science-and-its-credibility-the-1960s-vs-today/> [accessed 02 August, 2019].

scientist-experts. In the deficit model, scientific knowledge is considered as a universal, objective, and nature-guaranteed truth in a self-complete structure. It is taken for granted that superior scientific knowledge spreads to the lay public. The opposite of this view is the contextual model. What matters in the contextual model is, to pay attention to how the lay public understands and reacts to scientific knowledge in a given circumstance. The lay public, as a heterogeneous group, has different views on science, does not simply accept, and sometimes reinterpret the given knowledge[2]. Putting a greater weight on 'what the public wants to know' rather than 'what the public knows,' the contextual model sounds a lot more persuasive in the contemporary society. This is because the public today is involved in various personal and collective interests. Especially as, with the Internet and social media making it easier to acquire information power and to express one's thoughts, the lay public's opinion must be taken seriously when policy decisions are made on complex scientific issues.

Moreover, the era of the 4th Industrial Revolution, in which Information and Communications Technology (ICT) convergence and advanced technologies such as Artificial Intelligence (AI), robots, and the Internet of Things (IoT) bring about a wide range of changes, is approaching. Looking back at the previous industrial revolutions, the 1st industrial revolution, which enabled full-scale production with steam engines and machine, the 2nd, when technological innovations in chemistry, electricity, and steel industry took place, and the 3rd one that brought social innovation with computer,

[2] Lock, Simon, *Successful science communication: telling it like it is*, (Cambridge, Cambridge University Press, 2011) p.21.

semiconductor and the Internet, science and technology acted as the powerful driving forces in all of those processes[3]. In the meantime, such innovations driven by science and technology have not only brought about positive outcomes on humans; science and technology, like double-edged swords, offer convenience and benefits whist also having unexpected negative effects. For example, nuclear power generation, which has made economical and clean electricity available to humans, presents challenges such as the issue of radioactive waste disposal and the risk of radiation leak due to reactor accident[4]. Therefore, having ahead the era of the 4th Industrial Revolution, when cutting-edge technologies are deep in our lives, it is time for the public to improve their understanding of science and technology and to actively share the need for scientific solutions to various social matters.

In this regard, this study focuses on the Public Deliberation Committee on Shin-Gori Nuclear Reactors 5&6, in 2017 of South Korea. It was the case that the lay public participated in the scientific policy-making process and drew a conclusion on resumption of nuclear reactors constructions. This is an example of how the lay public was enabled to make practical decisions after having provided and contextualized relevant knowledge on a complicated scientific issue. In this sense, this dissertation examines the practicality of the contextual model in the case of the Public Deliberation

[3] Min Xu, Jeanne M. David and Suk Hi Kim, 'The Fourth Industrial Revolution: Opportunities and Challenges', *International Journal of Financial Research*, 9.2 (2018), 90-95 <doi:10.5430/ijfr.v9n2p90> [accessed 27th July, 2019].

[4] Futter, Andrew, *The double-edged sword: US nuclear command and control modernization* (2016), <https://the bulletin.org/2016/06/the-double-edged-sword-us-nuclear-command-and-control-modernization/> [accessed 15 July 2019].

Committee on Shin-Gori Nuclear reactors 5&6. To meet this end, it begins with historical reviews of the deficit and contextual models of PUS, popularization of science, and nuclear power generation in South Korea. It is followed by the overview and closer look at the Deliberation Committee on Shin-Gori Nuclear Reactors 5&6, the main case of this study. Further to this, the role of the public and the government during the process and the reflections of South Korean press are investigated. Through this analysis, the implications of the Public Deliberation Committee from the perspective of the contextual model will be drawn out as the conclusion; such an examination is expected to be a meaningful consideration that analyzes the Public Deliberation Committee on Shin-Gori Nuclear Reactors 5&6 from the viewpoint of PUS and science communication in South Korea.

2. Literature Review

2-1. Historical Review of the Public Understanding of Science

The notion of popularization of science refers to a series of activities or movements that educate or spread scientific knowledge to the lay public, whilst no consistent definition exists. Academic writings and sociology of scientific knowledge focused on the relationship between science and the public in 1970s[5]. Major incidents

[5] Steven Shapin, 'Here and Everywhere: Sociology of Scientific Knowledge', *Annual Review of Sociology*, 21(1995), 289-321 <doi:10.1146/annurev.so.21.080195.001445> [accessed 5 July, 2019].

such as the Chernobyl nuclear accident in Russia and Bovine Spongiform Encephalopathy (BSE) epidemic in the UK occurred in the 1980s subsequently[6]. Such conditions led science, including energy technology and bioscience emerge as serious social issues. A lot of people paid attention especially to side effects, lying behind the appearances of abundance and comfortableness provided by the development of science and technology. In 1985, the Royal Society published a research paper called 'The Public Understanding of Science', also known as the Bodmer Report. It served as a momentum to establish the terminology of PUS; the title became widely used as a term for the concept. The report highlights the importance of science and technology because '(they) play a major role in most aspects of our daily lives both at home and at work. Our industry and thus our national prosperity depend on them[7].' Therefore 'improving the public understanding of science is an investment in the future, not a luxury to be indulged in if and when resources allow[8].'

Along with this, the Royal Society argues, whilst a number of issues surrounding us are closely related to science and technology, the scientific basis of the issues can often be overshadowed by other factors. For instance, subjects such as 'economic constraints, environmental worries, ethical concerns, local aesthetics, social commercial issues, diplomatic factors, fear about the power of large organizations and the defense of individual freedom' can be overwhelming at first, thus an objective

[6] Triscott, Nicola, 'Performative Science in an Age of Specialization: The Case of Critical Art Ensemble', in *Interfaces of Performance*, ed. By Maria Chatzichristodoulou, Maria, and others (Abingdon, Oxon: Routledge, 2016), p.155.
[7] The Royal Society, *The Public Understanding of Science*, (London: The Royal Society, 1985), p.6.
[8] Ibid., p.9.

decision making 'requires an understanding of all aspects of a given (scientific) issue[9].'

The Bodmer report is founded on the proposition that the lay public has insufficient knowledge in science and technology. The majority of public are unfamiliar with or misunderstand the contents of science; that is, a lack of scientific literacy. Because the public is neither trained to become scientists, nor possessed an interest in acquiring scientific knowledge or information. From the perspective of the report, the public is under biased influences in commercial mass media such as television, radio and newspapers, as far as scientific issues are concerned.

In this traditional view of PUS, the lay public is enabled to reason more rationally by correctly learning scientific knowledge thus science-related social issues would be resolved without unnecessary conflict or difficulty. Such an assumption persists in these days as well; scientists and policy makers assume that educating or spreading scientific knowledge to the lay public can resolve irrationalities in a society. Therefore, 'scientists must learn to communicate better with all segments of the public,' and 'it is clearly a part of each scientist's professional responsibility to promote the public understanding of science[10].'

Furthermore, the lay public should learn not only scientific facts, but also 'the method and its limitations as well as an appreciation of the practical and social

[9] The Royal Society, 'Public Understanding of Science: The Royal Society Reports', *Science, Technology, & Human Values*, vol. 11, no. 3, 1986, p.53 <doi:10.1177/016224398601100306> [accessed 10 July, 2019].
[10] The Royal Society (1985), p.34.

implications[11].' It implies the ultimate goal of PUS is cultivating so-called enlightened citizens who have acquired practicality based on the power of knowledge.

Although there have been controversies and disagreements on interpretations, which will be discussed later in this paper, the Bodmer Report fully addressed the significance of science communication and became a touchstone for elevating it as a topic of social discourse. Regarding the Bodmer report, Richard Watermeyer says[12]:

> A highly influential report by the Royal Society in 1985, "The Public Understanding of Science" or Bodmer Report, identified a crisis of public trust and public understanding in the governance of science in the United Kingdom. The report is widely regarded as the genesis in the United Kingdom of the public understanding of science movement (Gregory & Miller, 1998).

Nonetheless, the features demonstrated through the Bodmer report signify a dichotomy and hierarchy[13]. When it comes to the subject of science, two groups exist: the scientist-specialists and the lay public, and there lies a bottom-line premise: the public's intellectual deficiency. By calling it the deficit model, Brain Wynne argues[14] scientists must produce scientific knowledge and propagate it to the lay public, assumed to be ignorant of science. The public, consumers of knowledge, can enjoy prosperous

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[11] Ibid., p.6.
[12] Watermeyer, Richard. 'Measuring the Impact Values of Public Engagement in Medical Contexts.' *Science Communication*, 34.6(2012), <doi:10.1177/1075547011432804> [accessed 10 July 2019], p.753.
[13] Fernando Vidal, 'Accuracy, Authenticity, Fidelity: Aesthetic Realism, the "Deficit Model" and the Public Understanding of Science', *Science in Context*, 31.1(2018), 129-153 <doi:10.1017/S0269889718000078> [accessed 10 July, 2019].
[14] Brian Wynne, 'Knowledges in Context', *Science, Technology, & Human Values*, 16.1 (1991), 111–121, <doi:10.1177/016224399101600108> [accessed 9 July 2019].

lives thanks to the scientist-producers. Scientists fill the ignorant public with scientific knowledge, so the public is forced away from the status of deficiency; the hierarchy occurs at such a difference in position. In the same vein, Martin W. Bauer views the deficit model as follows[15]:

> The critique of PUS again focused on the deficit models of knowledge or attitude: Negative attitudes are neither an expression of lack of knowledge nor of good judgment. However, the attribution of a public deficit expresses the timidity or even 'institutional neuroticism', the diffuse anxieties and condescendence of scientific actors vis-à-vis the public. The public deficit model is in fact a self-fulfilling prophecy: the public, a-priori deficient, cannot be trusted. Mistrust on the part of scientific actors will be paid back in kind with public mistrust. Negative public attitudes then confirm the assumption among scientists: the public is not to be trusted. This circularity called for 'soul searching' among scientific actors

The deficit model implies a complete separation of scientists and the lay public, and the unidirectional stream of knowledge and information which flows from one to the other. This type of absolute separation indicates that there exists a gap between them. As a result, scientist-specialists have an obligation to increase the scientific literacy to dedicate to a social and scientific advancement, regardless of the nature of the gap. Given the unidirectional trait, scientists are entitled to a superior position over the lay public. The superiority appears when scientists reproduce a spacing with the public, in

[15] Martin Bauer, 'The Evolution of Public Understanding of Science-Discourse and Comparative Evidence'. *Science Technology & Society*. 14.2(2009). <doi: 10.1177/097172180901400202> [accessed 8 July 2019]. p.225.

the process of promoting public understanding of science through diffusing fruits of scholarly scientific activities. Scientists do not consider the lay public's standpoint, characteristic or perception. If a diffusion of knowledge blocks, that's not because a scientist can't deliver but because the lay public can't appreciate the information. In the deficit model, the role of a scientist is to assert scientific knowledge and educate the public, with language that 'must be simple and free of jargon, without being condescending,'[16] not any further[17].

For traditional PUS, as Mike Michael notes, the lay public is considered 'as assimilator of knowledge, that is, cognitive repositories or deposit boxes in which can be stored the requisite information[18].' Since the public is appeared to be subjects who should raise the level of literacy, their duty is to accept scientific knowledge preached by scientists. Assuming the lay public as homogeneous and atomized individuals is in line with the concept of application of universal science; that is, such a homogeneity is a factor which enables scientific knowledge to disseminate unhindered by other elements. Being homogenous, the lay public's understanding of science simply suggests a learning science, from traditional PUS[19].

Brian Wynne, on the other hand, criticizes the traditional perspective of PUS

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[16] The Royal Society, p.24.

[17] Ahteensuu, Marko, 'Assumptions of the Deficit Model Type of Thinking: Ignorance, Attitudes, and Science Communication in the Debate on Genetic Engineering in Agriculture', *Journal of Agricultural and Environmental Ethics*, 25.3 (2012) 295-313 <doi:10.1007/s10806-011-9311-9> [accessed 11 July, 2019].

[18] Mike Michael, 'Comprehension, Apprehension, Prehension: Heterogeneity and the Public Understanding of Science', *Science, Technology, & Human Values*, 27.3 (2002), 357-378 <doi:10.1177/016224390202700302> [accessed 13 July 2019].

[19] Ibid., pp.357-378.

and presented the new PUS discourse: it is called the contextual model, constructive or critical PUS[20]. According to Wynne, the propositions of the deficit model can be summarized as follows: First, science is single, universal and self-evident. Second, the lay public is deficient in scientific knowledge. Third, the lay public would become more rational, if provided with adequate amount of scientific knowledge[21]. Whilst the traditional perspective of PUS focuses on public understanding, the contextual model centers on science. It is 'what is the science that the public should understand?' rather than 'why should the public understand science?' In this respect, a conceptual diversity, the heterogeneity of the lay public, and reliability of science for traditional PUS can be examined.

First, a conceptual diversity signifies that science holds various meanings. Science is neither always universal nor produced in a single method. Presenting the natural world as a scientific activity, through the procedure of observation-hypothesis-experiment-verification[22], is story of the past. Science is reconstituted through viewpoints of scientists, and scientists' viewpoints are socially constructed; Since science presents a specific perspective and methodology that view the natural world, it should be comprehended as an ongoing process. Thus, science is a set of heterogeneous entities. As the boundary of science appears opaque, science may signify various

[20] Bauer, Martin, 'Survey research and the public understanding of science', in *Handbook of Public Communication of Science and Technology*, ed. By Massimiano Bucchi and Brian Trench (Abingdon, Oxon: Routledge, 2008), pp.111-130.
[21] Wynne, (1991), pp. 111–121.
[22] Science Daily, *Scientific Method* (n.d.), <https://www.sciencedaily.com/terms/scientific_method.htm> [access ed 13 July, 2019].

meanings such as scientific knowledge, a series of scientific processes, or scientific viewpoints. Second, the lay public is not homogeneous. Made up of the mass of individuals, the public is in different situations and has different dispositions. That is, the degree of the public's deficiency should not be quantitatively measured. Furthermore, scientific knowledge that is lacking in the public in the Bodmer report, refers to formal knowledge[23]. Since this formal knowledge does not play a significant role in everyday life of the public, lacking it is not concluded to an insufficient comprehension or problem solving abilities. Yet, the traditional PUS grants a privilege to formal knowledge, recognizing a lack of formal knowledge as a deficiency[24]; in other words, the public is viewed heterogeneous, a single object. Third, a matter of reliability on scientific knowledge or method is brought into question. Basically, the lay public has a range of opportunities to acquire knowledge and information other than formal knowledge, via direct or indirect experiences based on varied interests.

For this reason, reliability to science would not automatically emerge, unlike the way scientists and science policy makers assume. People have a knowledge system built up through their own experiences, and determine the degree of reliability in the given knowledge accordingly. As Wynne argues, the public's non-acceptance to scientific information is often based on judgement of either not useful or not fitting

[23] Harris, Stephen, *Bridging policy and delivery with knowledge: the case for intervention* (2014), <https://www.sciencedirect.com/science/article/pii/B978184334653150007X> [accessed 15 July, 2019].
[24] Hilgartner, Stephen, 'The Dominant View of Popularization: Conceptual Problems, Political Uses,' *Social Studies of Science,* 20.3 (1990), 519-539 <https://doi.org/10.1177/030631290020003006> [accessed 02 August 2019].

one's own experience[25]. For example, if a nuclear reactor, which scientists have claimed to be safe, causes an accident, it is inevitable that the public's reliability on scientists' viewpoints would decrease[26]. Notwithstanding the criticisms, Martin W. Bauer et al. assert as follows[27]:

> The critique of the public deficit model as a common sense prejudice among experts is valid, for certain, but its identification with the protocol of survey research is dysfunctional. Breaking this unfortunate mind frame of linking model and protocol will help to liberate and expand the research agenda.

Regardless of the consensus on the reason for the need of the deficit model as above, the critical arguments to the traditional PUS, the deficit model, resulted in emerging the contextual model. The contextual model does not judge the scientific literacy with a criterion of formal knowledge, but rather accentuates the importance of tacit knowledge. As Ziman argues, when it comes to the issue of understanding science, 'what the public wants to know' should be discussed. That is, the full context of understanding should be focus of discussions; because scientific knowledge may have aspects of inconsistency and practical inadequacy, and scientific activity refers to a description of how the public can express or accept certain knowledge[28].

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[25] Wynne, pp. 111–121.
[26] Myungjin Kim, 'Public Understanding of Science, theoretical flow and practical implications', in *Public and Science Technology*, ed. By Kim and others (Seoul: Ingul, 2001), pp.29-51.
[27] Martin W. Bauer, Nick Allum, Steve Miller, 'What can we learn from 25 years of PUS survey research? Liberating and expanding the agenda', *Public Understanding of Science*, 16(1), (2007), <http:// https://hal.archives-ouvertes.fr/hal-00571116/document> [accessed 02 August, 2019].p.90.
[28] Ziman, John, 'Not knowing, needing to know, and wanting to know', in *When science meets the public*, ed. By Bruce V. Leweinstein (Washington: American Association for the Advancement of Science, 1992), pp.13-20.

In the contextual model, understanding does not mean absorbing scientific knowledge as is, yet restructuring by the public. Michael points out that in the context model, scientific knowledge is an understanding of social relations, saying 'researching the public understanding science refers to taking a look at how the public approaches to the source of knowledge, and how the viewpoint of the public in reconstructing social identities through such approaches.' He calls this process "apprehension".

> To study the public understanding of science is thus to look at how publics assess the status of sources of knowledge, of how that assessment is an aspect of the (re)production of social identity. This we can call apprehension, which carries such connotations as the act of seizing or taking hold of; seizure, especially seizing or taking by legal process, that is, arresting. Furthermore, apprehension is linked to opinion, sentiment, and emotion, particularly in the form of anticipation of things unfavorable, or distrust or fear at the prospect of future evil. What is particularly apt about this term is that understanding is given a new nuance: the grasping of ideas is tied to moral judgment (arresting a felon) and emotional response (fear/anxiety)[29].

As it is based on local understanding rather than universal scientific knowledge, the same information can be interpreted and accepted differently, according to one's own context[30]. The contextual model is the processes by which the lay public understands and constructs one's own science or scientific knowledge. In the case of sheep farmers in Lake District in Cumbria, analyzed by Wynne, the farmers did not trust the scientists because this so-called experts' group could not recognize the local knowledge, unofficial, yet broadly specialized on the environmental conditions and

[29] Michael, pp.357-378.
[30] Ibid., p.367.

sheep's habits and activities, acquired by their long-term experiences and watchful observations. As such, the experts' formal knowledge cannot achieve a reliability by itself, but is judged in the context and experience of the lay public. The experts group setting the formal knowledge at the head lowered their own reliability for a lack of awareness of the local context; because their certainty and standardization on scientific knowledge did not match the sheep farmers' everyday context[31].

> The evidence suggests that the beliefs the farmers construct, including their beliefs about the credibility and trustworthiness of different scientific and other social actors, are functions of the social networks with which they identify. There is nothing intrinsically different in this to the basic structure of scientific belief and commitment. Understanding or knowledge, its precision and resilience, is a function of social solidarity, mediated by the relational elements of trust, dependency and social identity; constructing that 'intellectual' understanding should be seen as process of social identity-construction[32].

From this perspective, one of the best examples which the contextual model is applied is the Nanoscience and nanotechnology case. It refers to the report named produced by the Royal Society in July 2004, and related activities accordingly, prior to the full introduction of nanotechnology to the British society. The report, Nanoscience and nanotechnologies: opportunities and uncertainties, emphasizes active dialogue between science and the lay public, acknowledging doubtfulness associated with the

[31] Brian Wynne, 'Misunderstood Misunderstanding: Social Identities and Public Uptake of Science' *Public Understanding of Science*, 1.3 (1992), 281–304, <doi:10.1088/0963-6625/1/3/004> [accessed 6 July, 2019].
[32] Ibid., p.283.

potential human and environmental hazards of the technology[33].

As the National Consumer Council highlights[34], consumers, the lay public, should be involved in setting up a problem framework that scientists must answer; if no contextual reflection is considered in conjunction with various situations and consumers, a definite limitation to the policy decision occurs, since scientific analysis is conducted only for a given problem. In this regard, DEMOS, a British cross-party think tank organization, placed importance an upstream participation by the public, the report suggests implementing action plans as follows[35]:

< Table 1: Methods of public involvement >

Method	Content
Deliberative Polling	A large demographically representative group of people conducts a debate, and is polled on the issue before and after the debate
Focus Groups	As a qualitative method used widely in commercial market, a group of eight to ten people is invited to discuss the issue under review, usually guided by a trained facilitator. The group is not required to reach any conclusions, but the contents of discussion are studied for shared understanding, attitudes and values

[33] The Royal Society and the Royal Academy of Engineering, *Nanoscience and nanotechnologies: opportunities and uncertainties* (London: The Royal Society, 2004).
[34] National Consumer Council, *Deliberative Public Engagement: nine principles* (National Consumer Council, 2008).
[35] DEMOS, *See-through Science: why public engagement needs to be upstream*, (DEMOS, 2004), pp.41-43.

Citizen's Juries	A small group of lay participants (12-20) receive, question and evaluate presentations by experts on a particular issue
Consensus Conference	A group of 16 volunteers is selected for a consensus conference. The members meet first in private, to decide the key questions they wish to raise, hears and interrogates expert witnesses, and draw up a report.
Stakeholder Dialogues	Generic term applied to processes that bring together affected and interested parties to deliberate and negotiate on a particular issue
Internet Dialogues	Any form of interactive discussions that takes place through the internet
Deliberative Mapping	Both expert and citizen panels are convened and interact with each other, allowing participants to interrogate each other's views and knowledge, and exposing framing assumptions made by both sides

Accordingly, the UK government promoted programs to increase public awareness and reliability on science and health, safety, environment, ethics and social issues by raising the budgets. This led to a launch of Nanotechnology Issues Dialogue Group, to discuss on nanotechnology policies, Research Co-ordination Group, to review on required studies, and Nanotechnology Engagement Group, to assess possibilities of public participations [36]. In addition, SmallTalk, led by Think Lab, a science communication company, held a total of twenty public lectures for three years, so as to

[36] Tim Fry, *HORIZON SCANNING INTELLIGENCE GROUP UPDATE ON NANOTECHNOLOGY* (2006), <http://www.hse.gov.uk/nanotechnology/sr002p1.pdf> [accessed 14 July, 2019].

various opinions on nanotechnology were exchanged and discussed. SmallTalk presented that the lay public was more or less positively adopting nanotechnology as similar to other new technologies, and concerned with the regulatory system of how to manage potential risks[37]. That is, the nanotechnology was contextualized through perspectives and stances of the lay public, in the course of participations and dialogues. Nanojury UK was also formed. Sixteen members of citizen jurors were recruited, went through dialogues, discussions and in-depth questionnaires so as to produce a policy recommendation report[38]. As Chris Toumey asserts a significance and positive role of the nanoscience and nanotechnologies case, from the lay public's perspective in a thesis article of *Nature Nanotech* in 2015 as follows[39]:

> …the 2004 product of the Royal Society and the Royal Academy of Engineering remains a solid, helpful introduction to 'nanoscience and nanotechnologies'. It is worth recommending when non-experts ask you how they could begin to learn about this science. Don't do what I did: let it gather dust for a decade in a filing cabinet.

Along with this, the practicality of the contextual model, especially the public engagement, is not always attainable. There lies a lot of issues which should be considered, and obstacles in the process of adopting this method. Richard Jones points

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[37] Melanie Smallman and Adam Nieman, *Discussing Nanotechnologies* (Think-Lab Ltd, 2006), <https:// sciencefestivals.org/media/evaluation_and_reporting/Evaluation_SmallTalk.pdf> [accessed 16 July, 2019].

[38] Gavelin, Richard, and others, *Democratic technologies? The final report of the Nanotechnology Engagement Group* (NEG), (London: Involve, 2007).

[39] Toumey, Chris. 'Thank you, Royal Society'. *Nature Nanotech,* 10 (2015), <https://doi.org/10.1038/nnano.2015.62> [accessed 8 August, 2019]. p.292.

out practical constraints such as lack of clarity about the purpose and role of engagement, and institutional capacity and structure to benefit from engagement, a need to reach more people, and difficulties to communication and understanding[40]. He also argues the possibility of infringement of an independent territory, saying "some scientists will oppose any infringement of the sovereignty of the "independent republic of science" …[and] of the principles of representative democracy[41]. That is, although the nanoscience case displayed a highly recommendable lens on a science and technology subject matter, drawing a definite conclusion that the contextual model is applicable all the time, is not realistic. What can be said with a certainty is that the arguments in PUS is in the developing stage from the deficit to the context model, "often described along an evolutionary continuum[42]," thus feasibility of the given situation should be reviewed with all possibilities remaining open; the arguments of PUS, is contextual as well.

In the contextual model, PUS does not recognize asymmetry between science and the public, experts and the lay people. It can be interpreted that the contextual model does not acknowledge the authority of scientist-experts when it comes to discussing science. Within the premise of the contextual model, the lay public takes part in science on equal footing with scientists, explicate scientific knowledge in their own language, thus construct science[43]. That is, the public is not a homogeneous group, but a group of

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[40] Jones, Richard, *The UK experience of public engagement and nanotechnology: what have we learned?* <file://C:/Users/USER/Downloads/RichardJones.pdf> [accessed 8, August, 2019].
[41] Jones, Richard, *What has nanotechnology taught us about contemporary technoscience?* (Amsterdam: IOS Press, 2011) 11 <http://eprints.whiterose.ac.uk/43375/> [accessed 21, July, 2019].
[42] Hetland, Per, 'Models in Science communication policy,' *Nordic Journal of Science and Technology Studies*, 2.2(2014), 5 <https://doi.org/10.5324/njsts.v2i2.2144> [accessed 15 July 2019].
[43] Brian, Wynne, 'Public understanding of science', Jasanoff, S., Markle, G. E., Peterson, J. C., & Pinch,

heterogeneous people with varied knowledge, experiences based on diverse situations. And they are not objectified to receive knowledge due to their ignorance, but rather beings who partake in the process of constructing knowledge. Here, the characteristics of the lay public can be defined as uniqueness and symmetry[44].

In this model, the lay public holds an originality, which refers to that the masses are not homogeneous lay people, but local people with originality of their region, socio-economic background, culture and gender. Michael defines this type of public as local and cultural stakeholders[45]. The public is unique, so even the same scientific knowledge is accepted and digested differently depending on the interests in which and how it is placed. Such a recognition has contributed greatly to scientific research and scientific policy research, including science and technology, gender and cultural studies of science.

Whereas the relationship between scientists and the lay public has hierarchical and dichotomous traits in the deficit model, the contextual model is rather epistemologically symmetrical[46]. The public may obtain higher utility from knowledge acquired in the social environment in which they actually have belonged, than formal and specialized knowledge. It is supplementary knowledge, that contextualizes and bridges formal knowledge and the lay public. Supplementary knowledge is necessary when specifying content that includes customary or social knowledge and judgement in

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T. *Handbook of science and technology studies,* (Sage Publications, 1995), 361-388, https://methods. sagepub. com/book/handbook-of-science-and-technology-studies/d24.xml>[accessed 20 July, 2019].

[44] Ibid., pp.371-378.

[45] Michael, pp. 357–378.

[46] T.W. Burns et al. 'Science Communication: A Contemporary Definition.' *Public Understanding of Science*, 12(2), 183-202 (2003), <http://doi.10.1177/09636625030122004> [accessed 20 July, 2019].

addition to knowledge that applies only to specific situations. Making use of supplementary knowledge, the public can solidify their symmetry. Even if there exist more cases where asymmetric relations between science and the lay public appear, it is due to the politics of realistic inverse relations, not cognitive asymmetry. Hence, the public can scientifically increase their persuasive power by applying supplementary knowledge[47].

As the lay public has originality and plays the role of a contributor in the construction of science based on their symmetry with science in the contextual model[48]. On the other hand, in the deficit model, the public becomes the object of receiving knowledge unilaterally, whereas the public is emphasized as a partaker in the process of creating scientific knowledge in the contextual model. In sum, science is translated and restructured in accordance with its own context, and those actions of the lay public do not seem to make scientific knowledge disappear or degraded, yet is a course of building one's own knowledge on the basis of faith and reliance[49].

This perception provides a rationale for public participation in science and technology. In this regard, Wynne makes a statement in his article *Knowledges in Context* as to the lay public's contextualization of scientific knowledge[50]:

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[47] David J. Bennet and Richard C. Jennings, *Successful Science Communication: Telling It Like It Is*. (Cambridge and New York: Cambridge University Press, 2011), pp.20-21.
[48] Helen Crompton, 'Mode 2 knowledge production: Evidence from orphan drug networks', *Science and Public Policy*, 34(3), 199–211 (2007), <https://doi.org/10.3152/030234207X197066> [accessed 19 July, 2019].
[49] T.W. Burns et al., pp. 191-196.
[50] Wynne, (1991), p.113.

> These contextual studies do not merely add color or interesting embellish- ments to the data derived from national quiz-type surveys, but they represent in themselves a point of entry to the real-world encounters within which scientific knowledge is reconstructed to make it fit real situations in all their rich complexity (or rejected if it cannot). Understanding this general process of contextualization is crucial to understanding the social authority (or lack of authority) of science.

There exists also criticism of the PUS of the contextual model, an attempt to escape the asymmetry between science and the lay public. The major criticism lies on the fact that science and the public are still considered separately, and when a heterogeneous public belongs to a specific group, they can seem homogeneous within the group[51]. Which implies that an imperfect symmetry subsists, and from the perspective of epistemology, it signifies that the pubic and science have not yet achieved symmetry. In other words, the position of the public has only transformed from an object receiving scientific knowledge to an object in conflict with science.

In response, Michael attempts to recognize the boundaries between the professional and the public, the scientific and the general, the facts and the fiction, and comprehend the two groups as so-called heterogeneous networks. Also, it is argued that the scientific composition of each individual constituting the group should not be overlooked as the interests of individuals may differ even within the group to which the public belongs. In this regard, Carina Cortassa (2016) argues as follows[52]:

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[51] Bensaude-Vincent, Bernadette. 'A Genealogy of the Increasing Gap between Science and the Public', *Public Understanding of Science*, 10,(1) 99–113, (2001), <http://doi:10.3109/a036858> [accessed 20 July 2019].

[52] Cortassa, Carina. 'In Science Communication, Why Does the Idea of a Public Deficit Always Return?

> Science communicators are among the most important, sometimes the exclusive, suppliers of this kind of detail – the agents responsible to make available every piece of information that could help the public adopt a reasonable stance…one of their basic roles in the epistemic interaction is to search, check and provide people with the relevant information needed to assess the reliability of a scientific source. Acknowledging this key function in the process of credit attribution raises new questions concerning science communication practices. Which and why are those more appropriate for the knowledge exchange under the constraints of the epistemic asymmetry? What are the best strategies to develop the critical judgement thus reframed?

According to the argument, as far as the gap between science and the public would never disappear, there always lies an epistemic distance and so does the persistence of the deficit model in PUS. That is the reason why 'at least that is what seems to be the case in the light of the wide range of compelling and exciting questions that arise as soon as we are ready to abandon the byzantine discussions that it has imposed for too long'[53].

2-2. Historical Review of the Popularization of Science in South Korea

The popularization of science in South Korea began with so-called a "scientization movement" of the early 1900s, systematized from the 1970s, and expanded after 1990s. In the 1920s and 1930s, intellectuals at that time promoted early

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The Eternal Recurrence of the Public Deficit,' *Public Understanding of Science*, 25(4), 2016, <http://doi.10.1177/0963662516629745> [accessed 21 July 2019], p.427.

[53] Ibid., p.427.

forms of popularization of science, recognizing the spread of science and technology development as the key to the nation's advancement. It was small-scaled activities centering on mass media and science related organizations. In the 1930s, various projects started with the slogan of "scientization of life, and science becoming a part of life," under the leadership of Scientific Knowledge Supply Society, launched in July 1934 and carried forward events for Science Week, as well as campaigns to establish a science museum[54]. In 1934, 19th April was appointed as Science Day and related ceremonies for Science Week were held in a large-scale. The Science Week affairs from 1934 to 1938 demonstrated the characteristics of multi-events on popularization of science, including open lectures, presenting motion pictures and factory tours[55].

After being liberated from the Japanese colonialization in 1945, the South Korean society put a lot of efforts to construct an independent ability and identity in science and technology, with establishment of the National Academy of Sciences, the Korean Institute of Industrial Engineers and the Korean Science and Technology Alliance. In 1966, the Korean Federation of Science and Technology Societies was founded, emphasizing the necessity of science and technology development, strengthening of science and technology education, and importing the technology from advanced countries[56]. The Korean Atomic Research Institute in 1959 and the Korea

[54] Encyclopedia of Korean Culture, *Scientific Knowledge Supply Society* (n.d.), <http://encykorea.aks.ac.kr/ Contents/Item/E0004641> [accessed 11 June, 2019].
[55] Lee, Dukhwan, *Establishing tradition and concept of science and technology culture* (n.d.), < file://C:/Users/ USER/Downloads/ABAA-1997-005-009.HTM> [accessed 11 June, 2019]
[56] The Korean Federation of Science and Technology Societies, *About KOFST* (n.d), <https:// www.kofst.or.kr/kofst_us/01_about_kofst.html> [accessed 6 June, 2019].

Institute of Science and Technology in 1966 were established, based on the government support, and it brought an active research and intellectual interchanges amongst scientists. Along with those changes, a few scientists maintained the existence of science magazines and mass media covered science issues such as nuclear power generation and space, for the purpose of popularization of science. After the liberation of the country, Science Week event was completely ceased for the reason of clearing away of remnants of colonialism, and scientific exhibitions, nuclear exhibitions were organized instead. At the Science Fair hosted by the government starting 1946, teenagers' scientific inventions and works were presented, and the qualification of participation was expanded to the general public, since 1949. The National Science Museum was reopened in 1962, after a reconstruction due to the ravages of the Korean War. The Nuclear Exhibition had been held every year from 1960 to 1970, as well as an exhibition on the peaceful use of nuclear energy in 1956[57].

A so-called project of creating science and technology climate was promoted as a major task of science and technology policies in the 1970s. As the basic system of popularization of science was founded, a variety of science and technology enlightenment activities were conducted for the lay public, under the leadership of the government. In 1967, the Ministry of Science and Technology, as the first singular ministry in charge of science and technology, was inaugurated. Accordingly, 21st April

[57] Song Sungsoo, 'Evolution and Challenges of Korean Science and Technology Cultural Activities', *Policy Data of Science and Technology Policy Institute* 3.4(2003), 2-5 <https://www.stepi.re.kr/app/report/view.jsp?cmsCd=CM0013&categCd=A0202&ntNo=159&sort=PUBDATE&sdt=&edt=&src=&srcTemp=&opt=N&currtPg=18> [accessed 8 June, 2019].

designated as Science Day, various science popularization events and scientists of national merit award have taken place since 1968.

< Figure 1: Newspaper article on the 1st Science Day[58] >


오늘 第1回「科學의 날」
科學行政 1年
科學技術處 業績과 앞으로의 問題點
産業応用部門에만 置重
基礎科学育成 손도못대

In September 1971, a department in charge of creating science and technology climate was established within the ministry. As the then President Park advocated "the national scientization movement" in a press conference of 1973, the popularization of

[58] Science On, *Science Day, seen in the old newspaper*, (2010), < http://scienceon.hani.co.kr/?document_srl=28317&mid=media&m=0> [accessed 8 June, 2019].

science activities spread across the nation[59]. The national scientization movement originated from an awareness of cultivating favorable attitudes of the lay public towards science and technology, and outstanding scientists would be a shortcut to accomplish an economic growth efficiently. The main contents were the creation of scientific environment in daily routine, the acquisition of technological ability of all citizens, and the promotion of industrial technology development. Besides, diverse science popularization activities were carried out by public institutions such as the Korean Science Advancement Foundation and the Korean Federation of Science and Technology Societies. The major activities included the public enlightenment on science and technology, support of science related organizations, and scientific exhibitions and public experiences through science museums. In particular, the Korean Science Advancement Foundation promoted programs specifically targeting housewives and teenagers: the publication and distribution of science books, screening foreign science films and documentaries, and lecturing tours of blue-chip scientists were representative programs. Especially for housewives, the foundation opened lectures on life sciences such as the necessities of life, health hygiene and cultured hobby, and produced articles and television programs on science in life[60].

In the 1980s, similar to the 1970s, the project of creating science and technology climate continued, yet the targeting was focused on especially teenagers. As fostering

[59] Korea Foundation for the Advancement of Science and Creativity, *The Story of the Foundation* (n.d), <https:// www.kofac.re.kr/50new/sub_story/s_02.html> [accessed 6 June, 2019].
[60] Song Sungsoo, 'The Rise and Fall of Scientification of All Nation Movement', *Journal of Korean Study of Science History*, 30.1 (2008), 171-212.

high-quality science and technology manpower for promoting high-technology industries began to be emphasized, the education system for science prodigies was developed. Starting with Gyeonggi Science High School in 1983, fifteen science high schools were established nationwide, and University of Science and Technology and Pohang University of Science and Technology were founded in 1986. Enlarged science popularization projects for teenagers included a campaign for science book reading, awards for best scientific children, and the national youth science competition went off.

Since 1982, a project called ‘science car,’ referring to an actual bus installed twenty kinds of scientific equipment, conducted various experiments, guided scientific crafts and screened science films, had been promoted. In addition, science school inspectors received a special education and gave science lectures to teenagers while touring around the country. What’s more, one week before and after Science Day was designated as a science week, and festivals and events were intensively taken place since 1981. Also, the National Science Museum carried out programs to promote teenagers’ scientific activities, besides exhibitions. The museum has hosted the national student scientific invention competition since 1979, in order to invigorate teenagers’ inquiry activities on life science, science toys and study materials. It also ran youth computer labs and student science labs on a regular basis, and special experimental programs during vacation periods. Additionally, as mass media played a vital role in popularization of science, reporters with high interests in science and technology gathered and launched the Korean Science Journalist Club in 1984. The Korean Science Advancement Foundation began the science journalist supporting projects starting

1985[61].

Emphasized the significance of public relations on science and technology, government projects in enhancement of public understanding of science and technology targeting the whole country were actively promoted during the first half of the 1990s. Especially as, social issues related to environment and nuclear energy being highlighted, improving public understanding in scientific knowledge became one of the most significant national tasks. With the enactment of the Science and Technology Promotion Act in November 1991, the legal basis for popularization activities of science and technology was in place, and the Korean Science Advancement Foundation was appointed as an agency for full responsibilities.

From 1991 to 1996, not only public institutions but also private organizations became enthusiastically involved with popularization of science and technology activities. The Korea Information Culture Center and the Korea Nuclear Energy Foundation were established, and various forms of non-profit science organizations emerged. During a lot of activities for teenagers continued to be proceeded, changes were made to meet the latest needs such as supplementing overseas training to the outstanding science children award, providing young children the opportunity to experience advanced science culture of foreign countries.

Starting 1991, outstanding scientists' visit to alma mater event had been held to

[61] Korea Foundation of the Advancement of Science and Creativity, *KOFAC 50-year History*, 75-83 <https://www.kofac.re.kr/50new/book.html> [accessed 6 June, 2019].

give open lectures and have dialogues so that young students could have a future vision and career as global scientists. In 1993, the city of Daejeon had the World Expo, where South Korea's scientific development and major achievements were introduced to the world, and accordingly Daejeon turned itself into the city of science[62]. The Family Science Competition was added to annual Science Week affairs since 1995, creating an atmosphere which all of the family members could enjoy science. During this period of 1990s, the governmental support for scientists and engineers increased as well.

The Korean Academy of Science and Technology was founded in 1994, and held lecture meetings and roundtable discussions on various scientific issues. Later in 1998, the academy published the Science and Technology Glossary for the first time. For the purpose of expanding domestic and international exchanges of industrial technology policies, National Academy of Engineering of Korea was established in 1996. Further to these, rewards to people with distinguished service to the state in science and technology was strengthened, in addition to the existing awards, thus the Korea Engineering Award, the Award for Scientist of the month, and the Young Scientist Award were newly set up[63].

As 'science and technology culture' became a general terminology, the popularization of science and technology policy system was overall improved in the late 1990s. The Korea Science Advancement Foundation changed its name to the Korea

[62] ExpoMuseum, *1993 Taejon*, (n.d.) <http://www.expomuseum.com/1993/> [accessed 10 June, 2019].
[63] Ministry of Science and Technology, 'A Study on the System of Science & Technology Culture Promotion', *MOST Working paper*, 2007-7 (2007), 31-33.

Science and Culture Foundation, going through reorganization. Proclaimed 1997 as the first year of popularization of science, the government enacted special laws for science and technology innovation and intensely promoted the spread of science and technology culture. While the existing projects expanded, science and technology related issues placed in primary interest of the society. For instance, so-called the crisis of science and engineering fields, signifying phenomena that many students would be reluctant to enter schools of natural sciences or engineering, first emerged in 2001, thus a lot of programs immediately were designed and carried forward; it was to encourage students to consider their future careers in science and technology and raise the pride of scientists and engineers. There was also a controversy over bioethics in conjunction with emerging roles of civil society organizations; discussions and activities were conducted regarding the social responsibility of science and technology.

The involvement of mass media was significantly enhanced during this period. From 1999, diverse types of science programs such as documentary, quiz show and drama appeared, and became highly popular. Some of daily newspapers weekly assigned a good deal of space for science and technology subject matters, especially on the crisis of science and engineering fields. In case of publishing industry, the best science book certification system has been implemented since 1999, so high-quality science books supplied to schools and local libraries. In April of the same year, a website specialized on science and technology culture, called Science-All, started its service,

and an online science broadcasting station was opened[64].

The most representative feature of popularization of science in the 2000s is that combining science and technology with other sectors have been dynamically made. As the internet becomes common, a variety of online games and entertainment video clips integrated with science-themed contents were created. Competitions for science fiction film scenarios and novel have been held, and the finalists debuted as writers or involved in real filmmaking process. A wide range of entertainments have combined science such as science theater, street science festival, science café and science podcast, so that the public can enjoy, instead of studying the subject of science. Such a feature has gradually brought about a change in subject of contents creation, from the government to the public. In particular, the emergence of various media based on the Internet has provided an environment where the public produces and spreads science related contents on their own.

As projects for teenagers, the science ambassador project was newly added in 2002, which selected opinion leaders and celebrities with backgrounds in natural science or engineering, designated them as science ambassadors, provided opportunities to communicate with the public through open lectures. Award of Wannabe Scientists and Engineers was also made, by annually selecting ten famous figures from academia, industry and culture, to offer role models for youngsters. A systematic research on popularization of science officially started during this period. Every two years, a

[64] Song, pp.19-23.

national survey on public understanding science and technology has been conducted by The Korea Foundation of the Advancement of Science and Creativity, and continued to this day[65].

2-3. Historical Review of Nuclear Power Generation in South Korea

Nuclear power generation has long had a great influence in South Korea, in both terms of weapon and energy source. The South Korean government was established on 15th August 1948, three years after Japan lost the Pacific war in 1945. Japan's declaration of surrender was the result of atomic bombing in Japan in August of the same year. Two atomic bombs, Little Boy and Fat Man, the outcomes of the Manhattan Project were detonated over Hiroshima and Nagasaki and induced an unconditional surrender from Japan, as well as the independence of South Korea[66]. In this way, South Korea became one of countries most directly affected by the first war utilized nuclear energy as weapon. It was also nuclear energy that offered one of the motor forces to enable South Korea to emerge from the ashes of the Korean War and Japanese colonization to a rapid economic growth.

The economic feasibility of nuclear energy secured a foothold for South Korea to leap to a country with the tenth largest economy, survived from two global oil-shocks

[65] Korea Foundation of the Advancement of Science and Creativity, pp.109-119
[66] Burr, William, *The Atomic Bomb and the End of World War II* (2015), <https://nsarchive2.gwu.edu/NSAEBB /NSAEBB162/index.htm> [accessed 17 June, 2019].

in the 1970s. Nuclear energy has been a subject of massive controversy in South Korea at the same time. Social concerns have gradually increased not only due to a constant threat of nuclear weapon from North Korea, but also nuclear energy's lack of sustainability which causes serious environmental payback[67].

As a matter of fact, South Korea's interest in nuclear energy initiated as global community showed its interest in the peaceful use of nuclear energy. After the end of World War II, in September 1948, the X-10 graphite reactor in Oak Ridge, Tennessee, succeeded in lighting a bulb and it was the beginning of the nuclear fission-based power plant operation: the era of peaceful uses of nuclear energy has started[68]. The United States' president Eisenhower suggested the establishment of an international organization for the peaceful uses of nuclear energy including safe storage and protection of nuclear materials at the United Nations General Assembly in 1953. He claimed to make the peaceful energy out of nuclear generation, as a driving force for development of industries, rather than destructive weapons. In 1956, eighty member states of the United Nations including South Korea, joined the Charter of the Establishment of the International Atomic Energy Agency (IAEA), and the IAEA was established on 29th July, 1957[69]. Two months later, the first meeting was held in Vienna,

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[67] Euisoon Shin, 'The impact of the first oil crisis on energy demand in Korea' *Energy Economics*, 4.4 (1982), 259-267, < doi.org/10.1016/0140-9883(82)90007-X> [accessed 17 June, 2019].

[68] Sherrell R. Greene, 'A diamond in Dogpatch: The 75th anniversary of the Graphite Reactor Part 2: The Postwar Years' in *Nuclear News*, 61.13 (2018) 28-31, <http://www.ans.org/pubs/magazines/nn/featur es/> [accessed 16, June, 2019].

[69] International Atomic Energy Agency, *History*, (n.d.) <https://www.iaea.org/about/overview/history> [accessed 16 June, 2019].

Austria, where the IAEA headquarter is based.

Since then, most of South Korea's nuclear energy related activities have been conducted in close conjunction with the US and IAEA. In February 1956, South Korea-US Nuclear Cooperation Agreement was officially signed. In the same year, the first administrative unit in charge of nuclear energy research, development and utilization was installed, and the Atomic Energy Act was enacted in 1958. The Institute of Atomic Energy Research was launched in 1959, and the first research reactor Triga Mark 2 started its operation in 1962. After the Korean War, South Korea accelerated economic growth to join the ranks of the developed country based on the state led industrialization policy. Yet, with a strong influence resulted from the two rounds of oil shocks, the South Korean government cast new attention on nuclear energy as alternative energy source, instead of fossil fuel energy[70].

In 1978, with completion of Gori No.1, South Korea became 21st country with nuclear power plant in the world. During its first operation, it produced 4.7 billion kilowatts, more than the annual electricity consumption of Busan city, the second largest city in South Korea, of 3.1 billion kilowatts; its productivity appeared groundbreaking[71]. In the 1980s, the next big push came in South Korea's nuclear energy industry as nuclear energy played a pivotal role in the nation's electrical supply, with completion of several power plants in a row. The government concentrated on securing its own nuclear plant

[70] Korea Nuclear Society, *Korean nuclear historiography for 50 years* (National Research Foundation of Korea, 2010), pp.1-2

[71] Korea Nuclear Power Times, *Korean nuclear energy history 40 years, Hommage to Gori No.1* (2016) <http:// www.knpnews.com/news/articleView.html?idxno=11525> [accessed 17 June, 2019].

technology in the 1990s. The first Korean standard nuclear power plant OPR-1000 was developed in 1995, and four different power plants were completed one after another[72].

Notwithstanding a sustained growth and expansion, anti-nuclear activities began to take shape as the democratic process moving forward. With growing concerns in environment and safety, the government faced obstacles thus could not push ahead an expansion of nuclear power plants at this time. As the technology of nuclear reactor development and operation advanced in the 2000s, the number of power plants production increased, including completion of Shin-Gori No.1 and 2 in 2012 and construction commencement of Shin-Gori 5 and 6 in 2016. The peak of the nuclear power plant history of South Korea is the export of four nuclear power plants of APR-1400 to the United Arab Emirates in 2009[73]. Selected as the finalist out of an international open bidding competition, it was considered a cornerstone of emerging as a nuclear powerhouse in the global industry. South Korea has constructed a total of twenty-five nuclear power plants, with twenty-four units currently in operation. Starting with 7.4% of the total power generation in 1978, it occupies 37.5% of the entire quantity, as of 2017[74].

However, the movement to expand nuclear power plants in South Korea slowed due to the Fukushima Daiichi accident in 2011 and increased public fear in this regard,

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[72] Ministry of Trade, Industry and Energy, *Nuclear Power Generation White Paper* (Ministry of Trade, Industry and Energy, 2016), pp.82-84.
[73] Ibid., p.72.
[74]South Korea National Index, *Analysis of Nuclear generation* (2017) <http://www.index.go.kr/potal/main/EachDtlPage Detail.do?idx_cd=1339>[accessed 17 June, 2019].

combined with a controversy over radioactive waste disposal and the inauguration of a new government with a skeptical stance on nuclear energy. What's more, as South Korea's energy dependence on nuclear energy increases, the government's concern on nuclear waste disposal continuously grows. Nuclear power produces electricity by running steam turbine through boiling water, generated by heat from uranium nuclear fission. Uranium used as raw material becomes nuclear waste: that is, spent nuclear fuel or high- level radioactive waste.

Because high-level radioactive wastes contain highly concentrated radioactivity, those materials should be enduringly isolated from the ecosystem. The problem is, there are no independent storage installation or permanent disposal facilities for spent fuel in South Korea at the moment. In fact, more than 15,000 tons of high-level radioactive wastes are stored in dry facilities inside each power plant. Those spaces in nuclear power plants will reach to the saturation points sooner or later. Whilst the saturation level of radioactive storage varies plant by plant, some are almost full, with Wolsong plant of 88%, Hanul 77.4%, and Gori No.1 76.6%[75].

Notwithstanding the government's constant attempts since the late 1980s, local residents and environmental organizations vehemently opposed and frustrated any plans to construct a facility for spent fuel. As massive clashes between citizens and the police force have occurred in the course of propelling a new construction, just one radioactive waste disposal facility is in operation since 2015, which treats only low and

[75] Today Energy, *Spent fuel saturation percentage* (2018), < http://www.todayenergy.kr/news/articleView.html?idxno=207 142> [accessed 18 June, 2019].

intermediate-level radioactive waste. Though the government's plan is to select a site for high-level radioactive waste disposal facility by 2020, it has not been never the nearer. It seems inevitable for the government to pursue a new radioactive disposal site due to the large amount of radioactive waste discharged from industrial and medical radiation facilities as well as nuclear power plants.

Noted and being frightened at the Chernobyl incident in 1986, the public can never accept a nuclear related facility near where they reside. Since the first official attempt to build the facility was overturned by the fierce opposition of the public in March 1989, the government began to select candidate sites in secret. In this condition, a news report disclosing an eastern island area being nominated as a disposal site, was released. The minister in charge explained at a press conference that the island would be a site for a science and industry research complex, including a branch of nuclear energy research institute which would mainly study on nuclear period of low and intermediate radioactive waste. Although the minister underlined that the institute would be far different from a disposal facility, the citizens' rage was on the verge of explosion. Opposition demonstrations took place throughout the area and acts of violence broke out between the protestors and police, resulting in heavy casualties. The government cancelled the plan, promising a transparent policy on the radioactive waste disposal facility, including open dialogue with citizens, from then on[76].

[76] Kwon Taehyun, *A Study on Policy Change of Locating Radioactive Waste Depository Facilities in South Korea using a Multiple Streams Perspective*, MPP Dissertation (Oregon State University, 2010), pp.15-23.

It was quite a while after the issue of radioactive waste disposal facility emerged, since the government's several attempts to select a candidate site had failed, as Buan county, in southeast part of South Korea, submitted its bid to hosting a facility construction site. It was the governor's sole judgement in the name of regional development, which evoked strong oppositions from the citizens. The citizens refused to send children to schools as a token of resistance, worked on a citizen recall on the governor, and forty-three environmental and social organizations from the whole country conducted anti-nuclear campaigns. With ten-thousand riot policemen positioned around the county, numerous physical collisions had arisen, and hundreds of citizens were injured. After seven months of painful conflict since the bidding, the Buan incident was over with 91% opposition of the referendum[77].

In 2005, the government enacted a special law on regional supporting of low and intermediate radioactive waste disposal facility, including providing compensations and holding referendums. Prior to this, the government decided to separate low and intermediate, and high radioactive waste, such as the spent fuel, in disposal facilities, in 2004. It was because no local government or citizen to agree on constructing a facility which would not split two different wastes, for public concern on high-level radioactive waste persists. In addition, the policy decision method as to radioactive disposal site selection was transformed from a government and specialist led approach to the public opinion centered open procedure.

[77] Ibid., pp.41-46.

In this regard, the government also formed a committee composed of sixteen members from various social sectors to ensure the transparency of selection processes. As a result, a public announcement was officially presented in 2005, and Gyeongjoo city became the finalist site for a low and intermediate radioactive waste disposal facility, with 89.5% of local citizens' favor. The Gyeongjoo facility construction completed and started operation in 2010[78]. Even though it was settled at last after many twists and turns, the site management has not been all smooth sailing. Reports on radioactivity data errors of one third wastes brought in between 2015 and 2017 were revealed, thus a large amount of wastes were suspended in 2018. With the Gyeongjoo facility construction, the South Korean government fastened the first button of deducing a solution as to the matter of radioactive waste disposal.

Yet, the real issue of radioactive waste disposal is still outstanding: the problem of spent fuel disposal. It has become more and more challenging to resolve, not only because of increased questioning on sustainability of nuclear energy, but also an explosive growth of public anxiety caused by the Fukushima nuclear accident in 2011. As a new government was inaugurated in 2017, President Moon's administration manifested an alteration of energy policy with a firm determination to lead the country to the "nuclear free era," and yet, radioactive waste disposal is an urgent problem as long as nuclear power plants are in operation.

The government once tried to resolve this matter based on a collective

[78] Ibid., pp.45-54.

intelligence by organizing a committee composed of specialists groups in 2015. The committee suggested an installing a pre-disposal facility and an environmental monitoring center at each research facility site, and paying a compensation for the given region. According to the plan originally set up by the committee, area selection by 2020, verification research of the area by 2030, and the facility operation by 2051 should complete. However, considering the current situation, the plan seems highly unlikely to be realized.

3. The Public Deliberation Committee on Shin-Gori Nuclear Reactor No. 5&6

3-1. The Background to the Committee

After the Fukushima Daiichi nuclear accident in 2011, nuclear power development policies were reexamined in a lot of countries. Germany declared to close all of its nuclear reactors by 2022 and Switzerland decided to phase out nuclear electricity production based on the Energy Strategy 2050[79]. With an immediate suspension of all the nuclear power plants operation from September 2013 to August 2015, Japan reviewed a national energy plan from an entire point of view. China

[79] Reilly, Michael, *Switzerland votes to Phase out Nuclear Power* (2017), <https://www.technologyreview.com/s/ 607920/switzerland-votes-to-phase-out-nuclear-power/> [accessed 4 July 2019].

established a new safety plan and amended its a long-term plan, whilst suspending a new project approval. On the other hand, South Korea maintained the policy of expanding nuclear power generation. Prior to the Fukushima incident, in 2009, the South Korean government published its National Energy Plan focused on rising of nuclear energy out of the total power generation up to 41%. According to the 2nd National Energy Plan, announced in 2014, the government took a stand on sustaining nuclear energy, setting the proportion of nuclear energy to 29%, suggesting a constructing 43 gigawatts of nuclear energy equipment by 2035[80].

Based on such a policy direction, a construction plan of new power plants, Shin-Hanwool 1and 2 was officially approved in 2011, as well as a plan of Shin-Gori 5 and 6, in June, 2016. Shin-Gori 5 and 6 were South-Korean-type reactor, APR-1400, and their power generation capacities would be 1,400 megawatts respectively, costing 8.625.4 billion Korean won (5.65 billion GBP). With each reactor's expected completion year of 2021 and 2022, the government and public institutions related to nuclear power plant continued to carry forward their current policy after a short adjustment period upon the Fukushima incident.

On the other hand, the public was taking seriously of potential hazard of nuclear power generation in the wake of the Fukushima incident. The fear toward nuclear power generation was massively amplified when a 5.0 magnitude in July and 5.8 magnitude earthquake in September 2016 occurred in southeast of South Korea. Especially as, with

[80] Energy Newspaper, *The 3nd National Energy Plan* (2018), <http://www.energy-news.co.kr/news/articleView. html?idxno=53424>[accessed 4 July, 2019].

six commercial power plants already being operated and two more plants constructed, local residents had a strong reaction to such a policy. Residing 3.82 million people in 30 km radius of the nuclear power plant complex, Gori immediately became the center of an anti-nuclear movement[81]. Starting with a signature-seeking campaign, the anti-nuclear activists demanded a complete cancellation of Shin-Gori power plants construction.

Along with this, as the former president Park Geun-hye was impeached and ousted from presidency in 2017 thus an early presidential election was to held, all candidates announced a suspension or cancellation of Shin-Gori 5 & 6 constructions. Elected as the 19th president of South Korea, Moon Jae-in declared that he would review the nations' nuclear energy policies in full, so as to lead the nation to the nuclear-free era, at the ceremony of permanent suspending Gori 1 power plant, on 19th June, 2017, soon after his inauguration. Yet, regarding Shin-Gori 5 & 6, president Moon mentioned that the projects needed to be meticulously considered and reached to a social consensus, from the viewpoints of safety, process rate, input cost, compensation expense and power reserves altogether. It seems that president Moon's policy stance was shifted from a total suspension, as a candidate, to a reconsideration based on a social consensus, on account of the fairly advanced construction status.

[81] Yonhap News, *It will be catastrophic if accident occurs* (2016), <https://www.yna.co.kr/view/MYH20160407 013300038> [accessed 4 July 2019].

3-2. Overview of the Reactors and the Committee

As of July 2017, the total process rate was 28.8%, costing 1.163 trillion Korean won (762.5 million GBP), taking up 19.6% of the total budget. Thus, the cabinet decided to temporarily suspend the construction of Shin-Gori 5 & 6 units on 27th June, 2017 to give shape to the president's statement of producing a social consensus. The progress of construction was to be determined through a public discussion thereafter. Accordingly, the prime minister instruction was enacted and the Public Deliberation Committee on Shin-Gori Nuclear Reactors No.5 & 6 was established on 24th July, 2017[82].

The Committee consisted of a total nine members, including a chairperson and two representatives for each sector of humanities and social science, science and technology, research and statistics and conflict management. One of the major factors considered in selecting committee members was an impartiality; the members should not be from nuclear energy or interest group whilst had gained a certain amount of public trust. The Committee would not hold any authority to make a decision in the deliberation process. Major tasks were to support citizen jury's deliberative procedures and manage public debates to reflect diverse opinions justly.

Thus, the Committee played the major role in executing the overall public

[82] The Public Deliberation Committee on Shin-Gori Nuclear Reactors No.5&6, *The White Paper of the Deliberation Committee of Shin-Gori Nuclear Reactors No.5&6* (2017), pp.48-61

discussions and established four subcommittees centered on key issues: legal matters, polling, critical deliberation program and communication. In addition, a stakeholder communication council and advisory committee were established as well, so as to ensure fairness and objectivity of the process. The Office for Government Policy Coordination timely supported the activities of the Committee by creating a team to take follow-up measures of public discussions. Since the Committee emphasized on formulating a model that social issues would be examined and resolved not by experts but by the public, most likely affected by the given issue in daily lives.

Therefore, the operation of the Committee was focused on the citizen participation group throughout the entire process. The citizen participation group was able to form and present a range of opinions via deliberation process and public opinion surveys. The reason of conducting public surveys was to confirm what would be the major public opinion through the citizen participation group's in-depth discussions, when enough information regarding the clashing views and arguments on the specific issue was given. This method was due to the fact that other countries had utilized a similar way in resolving a rather controversial subject matter, such as Germany's site selection of nuclear waste disposal, UK's Nanoscience and nanotechnology and Japan's choice of energy environment issue.

The deliberation process had been carried out in the following stages: First, public opinion surveys targeting random people were conducted. Second, the citizen participation group was provided with sufficient information and discussion opportunities in advance. Third, the stakeholders of the power plants construction

project and citizen participation group attended a television debate, and the final decision would be made based on the final survey[83].

A primary public opinion survey was conducted from 25th August to 9th September, 2017. 20,006 adults over nineteen years' old were randomly selected after stratified sampling. The citizen participation group recruitment was carried on between 11th to 13th September. Among the primary 20,006 respondents, whom notified one's willingness to take part in were chosen after stratifications based on gender, age, its original standpoint on the power plants construction. Afterwards, five hundred people were proportionally extracted as the citizen participation group. On 16th September, an orientation for the citizen participation group was held. A month-long learning and deliberation period was given to the participants after the orientation till the general debate, a core of the entire deliberation process, would begin.

Online based learning programs including eleven lectures, information packages of both sides of the issue, Q&A sessions, television debates and regional touring debates were available during this period. From 13th to 15th October, the general discussion was held, with 98.5% attendance rate. During two nights and three days' discussion period, a variety of deliberation processes was covered: opinions and effects on the pre-study opportunity were argued, followed by in-depth discussions on controversial issues surrounding the construction, including environment, safety, power supply, economic efficiency and social acceptance.

[83] Ibid., pp.62-107.

A supplementary Q&A session was added after every single discussion. On the last day of the discussion period, a comprehensive discussion and survey were conducted to determine the final choice of the citizen participation group. Five days later, the final result was announced on 20th October, 2017[84].

Major results will be introduced in the next chapter. Some of the main activities of the Committee can be summarized as follows[85]:

< Table 2: Summary of major activities of the Committee >

Date	Main Activities
19-07-2017	President Moon implied of pursuing a social consensus on Shin-Gori 5 & 6 Power Plants Construction
27-06-2017	The Cabinet meeting decided on temporary halting on construction and forming the Public Deliberation Committee
07-07-2017	The Office for Government Policy Coordination set to work in necessary organization principle and procedures for the Committee
24-07-2017	The Deliberation Committee officially launched
27-07-2017	The Committee confirmed the size and methods of selecting citizen participation group
08-08-2017~ 22-08-2017	Public bidding on a service supplier for public participation surveys for the Deliberation Committee
10-08-2017	Public meeting with the negative side on construction
11-08-2017	Public meeting with the positive side on construction
25-08-2017~ 09-09-2017	The primary survey period

[84] Ibid., pp.99-114.
[85] Ibid., pp.32-37.

13-09-2017	A five hundred of the citizen participation group was confirmed
16-09-2017	Orientation and the 2nd survey conducted
13-10-2017~ 15-10-2017	The general discussion period
13-10-2017	The 3rd survey
15-10-2017	The 5th survey
20-10-2017	The final proposal of recommendation was presented
24-10-2017	The proposal was reviewed and the government's policy was settled

3-3. Final Decision of the Committee and the Government follow-up

The proposal of recommendation's major contents can be summarized as follows: first, Shin-Gori 5 & 6 nuclear reactors construction would be resumed. In the final survey, 59.5% of the respondents chose to resume construction, with 19% point higher than 40.5% who chose the suspension. The ratio of resuming construction was substantially higher than suspending construction from the primary survey, and the difference had become higher as surveys continued. Second, the Committee recommended that the South Korean government would execute a policy of reducing the ratio of nuclear power generation in the entire energy policy. According to the final survey, 53.2% of the respondents agreed with reducing nuclear power generation, 35.5% with the maintaining, and 9.7% with the expansion. Third, as a complementary measure of the power plants construction resume, the government should produce a tighter safety standard and practical solution of spent fuel processing. Adds to this, the government

should expand its investment in renewable energy industry.

<Figure 2: Final decision announcement of the Committee[86] >

The Committee appended further comments: The public deliberation process has a huge significance in demonstrating a possibility of policy making procedure solely based on participation and agreement of citizens, as direct energy consumers, rather than unilateral decision making by the government. Especially as, with nuclear energy related issues being distanced from the lay public on accounts of the subjects' high technology related complexity, such a discussion amongst citizens implies a momentous step forward. Furthermore, the deliberation process, as a democratic opinion gathering,

[86] KTV, *Final decision announcement of the Committee*, (2017), <http://www.ktv.go.kr/content/view?content_id=543638&unit=151> [accessed August 4, 2019].

has provided an opportunity to make up for the weak points of representative democracy in South Korea; That is, it has paved a way to carry out deliberate democracy. Besides, it has presented a model of conflict resolution, which drew consensus by substituting a dispute situation to a discursive field. Therefore, the Committee requested follow-up supports of the government so that the Committee's experiences can be utilized as a means of creating a win-win relationship in the South Korean society[87].

The proposal stated all the names of 471 participants in order to signify a submission in the name of the South Korean public. On 24th October, the president and ministers had a cabinet council to review the Committee's proposal of recommendation, and fixed government policies of both resuming Shin-Gori 5&6 Nuclear power plants construction and reducing nuclear energy dependence. Further to this, the cabinet council passed a governmental roadmap of changing energy policy centered on renewable energy[88].

4. Practicality of the Public Deliberation Committee Activities

4-1. The Role of the Public in the Course of the Committee

The first orientation was held for 478 people of the citizen participation group on 16th September, 2017. It consisted of explanations on the purpose and meaning of

[87] Ibid., pp.117-138.
[88] Ibid., pp.142-147.

the Committee, presentations of the both pro and against construction sides, and Q&A session. Afterwards, citizen participants received Shin-Gori 5& 6 Reactors Deliberation sourcebook by postal service. As the most basic material that helped citizen participants' comprehension and deliberation on the issue, the book covered various topics such as an outline of the deliberation committee, understanding of nuclear power generation, and arguments of suspending and resuming the constructions. For the purpose of ensuring the objectivity and fairness of the data contained therein, the drafts of each side's claim were cross-examined by the opposite side, went through experts-data verifications and finally confirmed by the Committee before printing out.

Notwithstanding the scrutinized verification procedures, some parts of the contents and data turned out to be inconsistent with each side's arguments, thus the citizen participants became confused[89]. Such errors seemed to occur due to sharp conflicts between two sides, so it was pointed out that the Committee should have been more active in coordinating the material writings of the sourcebook. The Committee also provided an online platform with lecture materials on the core issues of both sides, as well as communicating methods with experts group. This system was opened on 21st September, available on personal computers, tablets and smartphones, with an exclusive access for citizen participants. The online lectures displayed a high usage rate, as showed in the following table[90].

[89] Ibid., p.175.
[90] Ibid., p.505.

<Table 3: Online lecture attendance rate >

Theme	Attendance Rate	
Lecture 1 (Understanding Deliberation)	96%	
	Resumption	Suspension
Lecture 2 (Nuclear Reactors and Safety)	95%	95%
Lecture 3 (Power Supply and Electricity bill)	92%	90%
Lecture 4 (Effects on national industry)	93%	90%
Lecture 5 (Prospects on Energy Policies)	92%	91%
Lecture 6 (Overall opinion)	90%	88%
Total Usage Rate	92%	

In addition, a total of seven times' open debates were held not only for the citizen participants but also for the general public, from 1st August to 11th October, sponsored by academic societies such as the Korean Association for Conflict Studies and Korean Association for Local Government Studies. Therefore, the citizen participation group went through so-called a pre-deliberation period by studying the sourcebook, taking online lectures, Q&A sessions, watching or participating in television debates, regional touring discussions and future generation debate.

Afterwards, the general discussion for two nights and three days was held, with 98.5% attendance. Apart from the quantity and quality of knowledge, the representativeness of the citizen participants deemed fairly high. As citizen participants in the general discussion venue were composed of a variety of people, they could be

called a miniature of the nation. In an interview, a participant says as follows[91]:

> It was the first time I've seen so many different people in one place…amazing to see with my eyes that so various people living in this country, from senior citizens to small business owners, entrepreneurs, professors, blue and white collars…it was fantastical that such different citizens came together and talk about a policy making…
>
> < An interview with a citizen participant, 30th May, 2015>

One of the key elements of public opinion gathering is to secure the representativeness of the sample, and when it comes to a national matter, the importance must weigh higher. The Committee put a special effort in securing a representativeness of the citizen sample, and a desired achievement was made. Through the various information methods, the citizen participants learned and became well acquainted with the controversial issue, showed somewhat changes in opinion. In the first survey conducted before the deliberation process showed that 27.6% of suspension, 36.6% of resumption and 35.8% of deferring judgement. Yet, the final survey on the citizen who took part in the pre-study and general discussion showed that 40.5% of suspension and 59.5% of resumption, thus the resuming constructions was dominated by the ratio of six to four.

Another crucial factor which decides success or failure of public opinion survey is a social acceptability to an outcome through the related procedures, as well as the

[91] Son Youngdal, *A Study on the Success Factors of Participatory Decision Making for Public Conflict Management*, MA Dissertation (City University of Seoul, 2018), p.79.

appropriateness and transparency. More than 90% of the citizen participation group who directly partook in the surveys expressed their opinions that they would respect the result of the final survey even though it differs from one's own stance. Such a receptiveness was due to the fact that the participants perceived that the whole process was fair and just. 90.4% of the citizen participants answered the entire process was fair, and 93.7% said the moderators of the general discussion was fair.

Similarly, 97.4% of the participants answered division discussions' moderators were fair. Those are other indicators which confirmed the fairness of the deliberation process. Such a fairness brought about a stronger acceptability to the result[92]. One of the citizen participants expressed her acceptability in the citizen participation group memoir.

> You may choose the direction that you think is appropriate according to the situation or circumstance…when you reach the result through the process that most people can understand and accept…although the result is different from my belief, but I am willing to agree with and support it because we came up with the result together.
>
> < From the memoir of the citizen participation group[93]>

According to the citizen participant's opinion, a result against one's knowledge or belief can be accepted as far as the process is fair, and it promotes public interest; it signifies that both the knowledge and decision are contextual. One of the most important

[92] The Public Deliberation Committee on Shin-Gori Nuclear Reactors No.5&6(1), pp.263-288.
[93] The Public Deliberation Committee on Shin-Gori Nuclear Reactors No.5&6(2), *A Supplement of the White Paper of the Public Deliberation Committee on Shin-Gori Nuclear Reactors No.5&6* (2017), p.263.

reasons why a lot of people showed a great interest and high attendance in the process of the deliberation was that the government gave citizens the authority to make a major policy decision. “The fact the result of the public surveys was actually reflected in the policy” has a significant meaning. In particular, the decision making of the nuclear industry, a high-science and technology related field led exclusively by scientists and experts, was conducted by the lay public, who used to be “objects of education and enlightenment through active engagements demonstrating a great citizenship,” was highly valued[94].

Moreover, the process of the public deliberation is a case of transforming an authoritarian administrative paradigm by applying the contextual model, based on the public engagements. Whilst the scientific agenda conflicts surrounding the Shin-Gori Reactors 5&6 was greatly sharp, the public opinions were gathered in a way that the clashes were alleviated and the majority agreed. It is noteworthy that the public engagement achieved a significant precedent in South Korean society in the course of the public deliberation.

4-2. The Intention and Integrity of the Government

There lied a political background for the South Korean government’s attempt to conclude the Shin-Gori Reactors 5&6 matter by mobilizing the lay public for the purpose of publicizing, without discussing in parliament or a presidential decision. Until

[94] Son, p.111.

the Fukushima nuclear accident in 2011, the nuclear energy subject matter had been relatively regional in South Korea. Anti-nuclear and environmental organizations were active regionally, and government measures were established centered around nuclear reactors. Although the nuclear issue had not yet recognized as a problem of their own, the Fukushima accident dramatically changed the lay public's perception; it was a perception change that oneself would be also within the risk range of nuclear reactors, and become a potential victim. Furthermore, due to the unprecedented corruption of the former government, a national resistance movement so-called the candlelight protest was carried out nationwide, so the impeachment of the former president was occurred. President Moon Jae-in government could not ignore the public mind crying for popular sovereignty and democracy, even in dealing with a nuclear reactor construction matter.

The Public Deliberation Committee began with the political intent of the Moon Jae-in government on this background. At the time of the presidential election, Moon Jae-in pledged to secure the nation's safety so that argued a nuclear-free nation and suspension of Shin-Gori 5&6 reactors constructions. The presidential campaign promise was promptly materialized into zero-nuclear reactor policy by 2080, cancellation on new reactor construction plan, prohibition on nuclear life extension, and early closure of currently working rectors.

However, the Moon Jae-in administration soon faced strong oppositions of the major press and pro-nuclear energy groups insisting on stable electricity supply and potential impact on industries. The opposition against the suspension of Shin-Gori Reactors 5&6, which already reached 28.8% of the total construction rate as of July

2017, was the most severe. The government could not help but feel the burden of potential economic and social costs including compensation, liability and impacts on the local economy due to the suspension.

The Moon Jae-in administration needed an exit; a justifiable measure to resolve the gap between the presidential campaign promise and the reality, without a conflict. The conclusion was 'let the public decide,' that is, the public deliberation. When the final decision came out to the resuming constructions, President Moon announced the following statement[95]:

> …According to the result, the government will resume the construction of Shin-Gori Nuclear Reactor 5&6 as soon as possible…I believe that democracy is completed when we have the right to discuss and completely go along the result…I would like to ask the people who support my pledge to stop the construction to respect the decision of the Public Deliberation Committee and embrace it with a broad point of view…I will push forward the alteration of energy policy including nuclear free policy…We will halt new constructions of nuclear reactor altogether and to accelerate the expansion of natural gas and renewable energy industry so that even the next government can maintain the base of nuclear free policy…

< President's announcement on the final result of the Committee, 22nd October, 2017 >

That is to say, President Moon made clear his willingness to accept the outcome of the Committee, yet to continue the nuclear-free policy in the meantime. A great deal of criticisms occurred as to the announcement. The conservative side criticized the president and administration for deliberately breeding disbelief in the nuclear energy

[95] The Public Deliberation Committee on Shin-Gori Nuclear Reactors No.5&6(1), pp.143-144.

industry and splitting the public opinion.

Moreover, the president was blamed for abusing the authority and made a bad use of democracy as pretext, so as to implement his campaign promise without disturbance. The leading opposition party, Liberty Korea party made cutting remarks in this regard, with the following comments[96]:

> …President packaged the national energy policy, which should be based on a high professionalism, under the name of democracy, and created an organization to shift a responsibility…Notwithstanding the president's order which pushed ahead the plan of suspending constructions, claiming it as the will of the people, the decision of the people was to resume the construction…
>
> < Liberty Korea party commentary, 20th October, 2017 >

They pointed out that the government, which insisted the nuclear free policy, faced a different result than expected, so determined to go its own way, pretending to respect the decision of the public. There was another criticism that it was a contradiction to accept the result of resuming the construction but to continue the nuclear free policy simultaneously. The People's Party, the second opposition party, criticized as follows[97]:

> …The conclusions of the Public Deliberation Committee, which included opinions on the issue of nuclear-free policy, exceeded its authority. The final result and its recommendation, which appeared that the Committee can make a

[96] Liberty Korea Party, *Comments of Spokesperson* (2017), <http://www.libertykoreaparty.kr/web/news/briefing/delegateBriefing/readDelegateBriefingView.do?bbsId=SPB_000000001242193> [accessed 22 July, 2019].

[97] People's Party, *Commentary and Briefing* (2017), < http://people21.kr/kr/news/briefing.php?bbs_data=aWR4PTM4MzAmc3RhcnRQYWdlPTEwJmxpc3RObz01OTgmdGFibGU9Y3NfYmJzX2RhdGEmY29kZT1uZXdzX2JyaWVmaW5nJnNlYXJjaF9pdGVtPSZzZWFyY2hfb3JkZXI9||&bgu=view> [accessed 22 July, 2019].

> decision of the future direction of the nation's energy policy, is contrary to the government initial stance of excluding discussions on the part of the nuclear-free policy, but of covering only whether or not Shin-Gori Nuclear Reactors 5&6 construction should be discontinued…
>
> < People's Party commentary, 20th October, 2017 >

According to the commentary, it cannot be assumed that the public has chosen to go for the nuclear-free policy altogether, though the item was included in the survey questionnaire, and the majority of the participants answered yes. Consensus on nuclear-free policy in general and consensus on the timing and conditions of nuclear-free policy are completely different matters. With regards to the nuclear-free policy enforcement, it is necessary to first raise a point then discuss the issue with the public; it was not a subsidiary matter to interpose in the questionnaire mainly asking as to Shin-Gori reactor's resumption.

On the whole, the government gave full support to the fairness of the Committee's entire process with integrity. Prime Minister Lee Nak-yeon said at the appointment ceremony for the Committee members, "The success and failure of the Committee is solely dependent upon fairness and transparency[98]." The fairness and integrity of the overall deliberation procedures can be confirmed by a survey result of the citizen participation group. To a question of 'will you respect if the final result would be different from your own opinion,' 93.1% of the respondents answered yes[99].

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[98] Asia Economy, *The Success depends on a fairness* (2017), <http://www.asiae.co.kr/news/view.htm?idxno= 2017072417191998352> [accessed 23 July, 2019].
[99] The Public Deliberation Committee on Shin-Gori Nuclear Reactors No.5&6(1), p.289.

Additionally, it seems that the citizen participants were satisfied with the overall process of the deliberation; this implies that fairness and democracy in the process are closely connected with acceptance of results. In particular, according to the survey, most of the citizen participants evaluated positively the fairness of the Committee as shown in <Table 4>[100].

< Table 4: Evaluation on the Fairness of the Process >

Fairness of the deliberation	Fair	Decent	Unfair
(1) Source book	63%	25.5%	11.5%
(2) E-learning visual materials	64.8%	23.5%	11.7%
(3) Moderator	93.7%	5.4%	0.9%
(4) Division Discussion Moderator	97.7%	2.2%	0.2%
(5) Overall Deliberation	90.4%	7.1%	2.6%

As presented in the <Table 4>, 90.4% of the citizen participants in the deliberation assessed the overall process fair. The acceptance of the final result and the high degree of satisfaction with the process is due to the high confidence in the procedure. The Chairperson of the Committee commented that “neither of the two sides of the resumption and suspension of the construction is entirely right or wrong, nor does it have a final goal to distinguish between good and bad, or victory and defeat,” and

[100] Ibid., pp.306-307.

they seek “integration and co-prosperity beyond division and confrontation by pursuing ways to make the whole society as winners[101].”

Therefore, the Deliberation had been consistent with the principle of non-intervention of the government, balanced participation of various stakeholders, and transparent and fair progress, thus confirming the integrity of the government.

5. Press Reflections to the Public Deliberation Committee

5-1. Overview of the Press Topography of South Korea

The stance of South Korean press to the Committee was divided by the political viewpoints of conservative and progressive ideology. In order to examine reactions of the press, it is necessary to first understand their political stance. The political landscape of South Korea is composed of Liberty Korea Party, representing a conservative ideology, Democratic Party of Korea, representing a moderate leftist ideology, and other minor parties. In the national assembly, the Democratic party which produced the current president, is the ruling party and the Liberty party is the first opposition party. The similar trait appears in the press topography as well. In case of newspapers, political orientations of each newspaper clearly reveal.

Representatively, Chosun Ilbo, Donga Ilbo and Joongang Ilbo present

[101] Ibid., p.135.

conservative tones, aligned with Liberty Korea Party. On the other hand, Hankyoreh, and Kyunghyang Shinmoon display progressive viewpoints, agreed with the political values of Democratic Party of Korea. For this reason, the South Korean newspapers have exhibited an opposing relation of conservatism versus progressiveness. When it comes to broadcasting, there are three terrestrial broadcasting companies including KBS, MBC and SBS. Amongst a great many cable broadcasting channels, five total programming channels provide news programs, and four are analyzed to have a strong inclination towards conservatism. Yet, in case of terrestrial broadcasters, it is difficult to define one's political orientation since it seems to change as government power transfers.

5-2. Perspectives of Press in Nuclear Power Generation

Prior to reviewing on the press reflections regarding the Committee, it is critical to examine the current position and perspective of conservative and progressive press in nuclear power generation. The committee was an ad-hoc organization to decide whether or not the construction of Shin-Gori Nuclear Reactor 5&6 should resume. On this account, looking at press reflections on subjects like the basic position towards the committee, and any changes in tones and manners of articles after the final decision, would provide a meaningful clue to analogize if the decision of the committee had been free from a political view.

Nuclear power generation is a typical issue that the development discourse of

the conservative collides with the environment discourse of the progressive. Such tendency has been fairly consistent with the conservative and progressive press in dealing with a lot of nuclear energy issues such as nuclear reactor life extension, constructing additional reactors and radioactive waste disposal.

One of the most recent cases displayed the difference in viewpoints of the South Korean press as to nuclear energy was the Gori nuclear reactor blackout incident in 2012. The incident took place at 8:34pm on 9th February 2012, when the reactor was completely powered off. As the emergency generator stopped, the cooling water circulation came to halt, which last for twelve minutes due to a complete power failure. It was a period when the public hostility to nuclear energy was high after Fukushima nuclear accident in 2011, thus the conservative and progressive were in sharp confrontation over the subject. Based on the press analysis[102] for six months after the blackout, the basic positions of the conservative and progressive showed stark differences. It turned out that the incident occurred due to a lack of employee's safety consciousness, so the entire press was quick to point out to clarify where the responsibility would lie.

However, the conservative press showed a high portion of framing on economic efficiency and the government's will on nuclear energy. The progressive press gave weight to the topics on environmental safety instead. The tone of reporting also

[102] Jinwoo Park, Hyungmin Lee and Dongsub Han, 'A Comparative Analysis of News Frames across Different Media Outlets: News Coverage of the Blackout Accident at the Nuclear Power Plant in Gori', *Journal of Communication Science*, 14.2(2014), 31-74 <doi:10.14696/jcs.2014.06.14.2.31> [accessed 24 July, 2019].

appeared to vary according to the nature of the press. Whilst the conservative press had a fairly balanced distribution of positive, neutral and negative articles, the progressive press accounted for almost 90% of negative articles on the incident. Such outcomes supported the assumptions that the basic positon of the conservative and progressive press differs on nuclear energy subject matter.

Once the investigation of the blackout incident was closed, differences in reporting tone had become evident. Made a high use of government officials and nuclear energy specialists as news source, the conservative press considerably focused on the incident, investigation, and the government policy.

> It was confirmed that the power plant managers and executives of Gori nuclear reactor No.1 not only concealed the station blackout accident that occurred on the 9th of last month, but also manipulated the record even though the emergency diesel generator broke down just before the reactor restarted at the end of last month. The Nuclear Safety Commission announced on the 21st, "The executives such as the power plant manager held a meeting immediately after the incident, and agreed not to inform the superior authority. "They wrongfully documented that all was under control, even though an emergency generator malfunction occurred again on 26th February," the commission said after the investigation.
>
> <Emergency generator breakdown after nuclear power failure, 22nd March 2012, Chosun Ilbo[103]>

[103] Chosun Ilbo, *Emergency generator breakdown after nuclear power failure*, (2012), < https://www.chosun.com/site/data/html_dir/2012/03/22/2012032200224.html?news_Head2> [accessed 07 August, 2019].

The progressive media, on the contrary, massively expanded reporting through covering environmental and citizens' group after the incident, thus produced negative articles regarding nuclear energy[104]. Whilst the conservative press took a rather passive stance in raising a problem of utilizing nuclear energy, concentrated on the case per se, the progressive media continuously strived to create a negative atmosphere on nuclear energy generation, as representatively shown in the following article:

> During the plant blackout at the Gori Unit 1 nuclear power reactor on the 9th of last month, one of the two emergency diesel generators that had to be supplied with power was under maintenance, and one was in a state of failure. The emergency diesel generator is a 35-year-old generator that has been in operation with Gori Unit 1, which began operation in 1977. Initially, the risk of failure was relative high…This power outage is a reminder of the financial costs and risks that must be covered by extending the old nuclear power plant. This is the reason for criticism of the extension of the lifespan of old nuclear power plants should be fundamentally reviewed.

< To extend the Gori reactor for 5 years, only the replacement of the emergency generator is spent 22.9 billion won, 19th March, 2012, The Hankyoreh[105]>

In short, it is clear that the conservative press indicates a positive position and the progressive press shows a negative position on the issue of nuclear energy.

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[104] Ibid., pp.64-66.

[105] The Hankyoreh, To extend the Gori reactor for 5 years, only the replacement of the emergency generator is spent 22.9 billion won, (2012), < http://www.hani.co.kr/arti/society/environment/524210.html#csidx5cd158649d38a3a9c63f91623486d26> [accessed 07, August, 2019'].

5-3. Press Reflections to the Public Deliberation Committee

After the confirmation of launch of the Committee on 27th June 2017, a total of 1,702 articles were produced in 10 major daily newspapers for six months, according to BIG KINDS[106], a news big data and analysis system of the Korea Press Foundation, and website of each press. In this analysis, how the conservative and progressive press reported on the Committee's formation, activities and results are investigated, by selecting two most representative press of each: Chocusn Ilbo and Joongang Ilbo for the conservative, and Kyunghyang Shinmoon and Hankyoreh for the progressive.

5-3-1. Reflections of the Progressive Press

Kyunghyang Shinmoon, a nationwide progressive daily newspaper posted a total of 357 articles, the largest number during the given period. The Kyunghyang expressed a high expectation for the launch of the Committee through the editorial, a morning after the launch was decided.

> This process is significant in that citizens who have been alienated from the discussions regarding nuclear reactors will be able to participate, discuss and reach to a conclusion to a policy decision making by themselves…it is citizens who consume electricity, pay taxes and take risks of nuclear reactors yet neglected in decision making processes…If citizens participate and come up with a conclusion on debate over nuclear reactor, who would raise an objection? Let's make this opportunity of public deliberation a milestone of the South

[106] https://www.bigkinds.or.kr/

Korean participatory democracy.

< 'Citizen's deliberation for nuclear-free is necessary', 28th June, 2017[107]>

Through an editorial titled 'Exaggerated voices of bluffing a catastrophic result if reactors construction is suspended' on 13th July 2017, Kyunghyang Shinmoon also criticized groups which harbored suspicions on the role and fairness of the Committee, and supported the government's nuclear-free policy as follows: '…There is a social consensus in the nuclear-free policy…the shutdown of Shin-Gori reactor 5&6 units is only the first step towards the nuclear-free policy…procedures which forms the committee for active discussions and draw a conclusion accordingly. Thus, it is an exaggerated argument that the Committee should not be left to non-experts, the lay public[108].' Following that, Kyunghyang Shinmoon carried on its effort to support the government's nuclear-free policy stance and the role and significance of the Committee by creating a number of articles and editorials. Also, special series articles titled 'Searching for the way of nuclear-free era' and an individual section called 'NGO podium,' for exclusively anti-nuclear organizations' voices were published accordingly. Right before the Committee inaugurated, one of the most representative environment related NGO, Green Korea's secretary general asserted through this corner as follows:

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[107] Kyunghyang Shinmoon, *Citizen's deliberation for nuclear-free is necessary* (2017) <http://news.khan.co.kr/kh news/khan_art_view.html?code=990101&artid=201706282102015> [acessed 07 August, 2019].

[108] Kyunghyang Shinmoon, *Exaggerated voices of bluffing a catastrophic result if reactors construction is suspended* (2017) <http://news.khan.co.kr/kh_news/khan_art_view.html?artid=201707132146035 &code=99010 1> [accessed 07 August, 2019].

> The South Korean public looks forwards to the suspension of Shin-Gori reactor No.5&6, the closure of the Wolseong Unit 1, and a declaration of nuclear zero era in South Korea. Instead of THAAD, we claim a declaration of peace in East Asia. Instead of green growth, we insist a declaration of symbiosis in a sustainable society. We look forward to the eco-nomics declaration, in which issues of respect for economy, jobs and labour are managed from the perspective of environment and life. We desperately look forward to the new example of the president of the Republic of Korea.

< Expectations for the Environment president, 4th, June, 2017[109]>

The Hankyoreh, the other daily newspaper representative of the progressive in South Korea, produced a total of 202 articles during the given period, also showed similar tone and manner. The Hankyoreh voiced its full support in the Committee through an article titled 'Expecting to see the deliberative democracy of the Public Deliberation Committee' on 28th June[110]. The main theme of the article was a support of the nuclear-free policy, as well as an emphasis on the role of the Committee.

> If Shin-Gori 5&6 would be built as planned, the timing of stopping all of the nuclear reactors in South Korea becomes considerably slow even if constantly promoting the nuclear-free policy. The construction of Shin-Gori No.6 is expected to be completed by 2022, and its lifetime is sixty years...If proceeding the nuclear-free policy is righteous way, then we should search for a way to move up the date as well.

<Expecting to see the deliberative democracy of the Public Deliberation Committee, 28th June, 2017>

[109] Kyunghyang Shinmoon, *Expectations for the Environment president* (2017), < https://m.khan.co.kr/v iew.html?art_id=201706042119015&nlv#c2b> [accessed 07 August, 2019].
[110]The Hankyoreh, *Expecting to see the deliberative democracy of the Public Deliberation Committee* (2017) <http://www.hani.co.kr/arti/opinion/editorial/800672.html> [accessed 07 August, 2019].

Likewise, the Hankyoreh sustained the same tone in articles and editorials supportive of the government's nuclear-free policy through numerous outputs, including 'The Committee must become a role model of the deliberative democracy' on 24th July, 'Has the public been correctly informed of atomic energy,' and 'No one can make the Committee crippled' on 25th September. However, the progressive press revealed a sense of frustration with the final result of the Committee, resumption the reactors' construction.

This can be interpreted as an indication which the Committee did not make a decision that fit the government's current nuclear-free policy or the pro-government press' tendency. After the decision was announced, the Hankyoreh presented an editorial which respected the decision of the Committee, still being persistently supportive of the nuclear-free policy.

> The resumption of constructions on Shin-Gori 5&6 reactors, with a sixty-year designed lifetime signifies that the actual nuclear-free era can be realized at least by 2082 and beyond. Notwithstanding the regretful result, it is highly meaningful that the Committee proposed the decrease of nuclear energy in the entire nation's power supply. The government, as well as political circles and social organizations must respect this 'public opinion.'
>
> < 'Construct reactors, continue nuclear-free, the will of the people', 20th October, 2017[111]>

Kyunghyang Shinmoon expressed its regret over the Committee's decision of resuming the construction, via an article titled 'Although the construction would resume,

[111] The Hankyoreh, *Construct reactors, continue nuclear-free, the will of the people* (2017) <http://www.hani.co.kr /arti/opinion/editorial/815393.html> [accessed 07 August, 2019].

the nuclear-free policy must proceed,' shortly after the decision was made. What's more, they turned their criticism toward the ruling party for not having been passionate enough to draw a conclusion of suspension on the construction, in an editorial titled 'The ruling party had been passive in the process of suspension on the reactors' construction' on 22nd October.

As they could not accept the result of the Committee, Kyunghyang Shinmoon presented its intention to underline the limit of the Committee arguing 'experts pointed out that when the president's core promise is abolished due to the citizens' opinion, a serious problem of the accountability on policy emerges. One of the major drawbacks is putting a value for the future generation, like environmental issue, behind the interest of the current generation[112].'

The Hankyoreh also indicated a weakness of the Committee through articles including 'As for the result…civic groups argue it was an uneven playing field in the first place,' on 20th October.

> One of environment NGOs, Going back to Square one Citizenship behavior, announced that they would accept the result. And yet, they asserted that the deliberation committee period was so short that the public discussion was too short compared to the situation in which the entire public had been unilaterally exposed to information on the necessity, safety, and economic feasibility of nuclear power plants. They also argued "We have to take it heavily that the committee came up with an opinion to reduce nuclear power generations". Also, The Citizen's Alliance for Economic Justice announced the acceptance of the result and said, "With this decision of the Public Deliberation Committee, the

[112] Kyunghyang Shinmoon, *News Depth View* (2017), <http://news.khan.co.kr/kh_news/khan_art_view.html? art_id=201710221845001> [accessed 07 August, 2019].

energy policy to reduce dependence on nuclear power should not be stopped".

<Decisions from the uneven field, 20th October, 2017>

Despite the fact that the progressive press did not agree with the final result of the Committee, they clarified their positons of fully respecting the final result of the Committee. In particular, the Hankyoreh named 471 citizen participants to 'sages' in an article titled 'What made 471 people sage' on 3rd November, arguing that citizens' participations must increase in social conflict issues, highlighting 'although some voice of complaint came out…471 sages' decision and its consensus spirit were accepted…a magical phenomenon if we recall that they named nuclear as enemy and even evil…[113]'

5-3-2. Reflections of the Conservative Press

The conservative press adhered to the negative position on nuclear-free policy, prioritizing the development discourse focused on economic growth. That was why they concentered on examining in the downsides of the Committee including the procedural irrationality and unprofessionalism. Chosun Ilbo, a representative conservative daily newspaper, produced a total of 301 articles for six months from 27th June, when the launch of the Committee was officially confirmed. Chosun Ilbo persistently stood its

[113] The Hankyoreh, *What made 471 sage* (2017) <http://www.hani.co.kr/arti/society/society_general/817419.ht ml> [accessed 08 August, 2019].

ground of being critical by producing articles, columns and editorials right after the decision to launch the Committee. On the day after the decision, Chosun Ilbo presented its critical viewpoint in 'Nuclear reactors of 1.60 trillion Korean won, temporary construction suspension,' 'Public deliberation of nuclear-free policy, 25 years for Germany and 33 years for Switzerland,' on 28th June. Adds to those, Chosun Ilbo made their position clear by an editorial.

> There even lies a legal problem when the government entrust the citizens with a task of judging whether to suspend the nuclear reactors…two hundred thirty professors in energy department announced a declaration of objection…it is preposterous that the energy policy of a nation can be decided in such a shame way…
>
> < 'The following provision the government cannot explain', 28th June, 2017[114]>

Most of the articles in this regard consistently criticized the government's nuclear-free policy, suspension of the reactors construction and the role of the Committee, as in 'Thirteen scientist from the US environmental groups delivered the letter asking for the president to reconsider the nuclear-free policy, on 5th July, 'Nuclear industry ecosystem collapse concern' on 6th July, 'What is the legal basis for the suspension, constructors resisted' on 10th July and 'No energy expert in the Committee' on 25th July.

[114] Chosun Ilbo, *The following provision which the government cannot explain*, (2017) <http:// news.chosun.com/ site/data/html_dir/2017/06/28/2017062803324.html> [accessed 08 August, 2019].

> The administration announced on the 24th that the Shin-Gori Nuclear reactors 5&6 Public Deliberation Committee, and it did not include any energy related experts such as nuclear power plants…There were 8 committee members, many in their 30s and 40s, and majored in administration, education, physics, statistics…etc., with no direct relevance wit nuclear power reactors. Shortly after the announcement, one member said, "I don't know why I was chosen." The Public Deliberation Committee will design a process for public debate, including the formation of a jury that will decide whether to suspend construction of Shin-Gori nuclear reactors 5&6 over the next three months.
>
> < No energy expert in the Committee…one said don't know why being chosen' on 25th July, 2017>

As the Committee was officially launched, Chosun Ilbo cast doubts on the function indicating 'the deliberation committee caused much confusion in the opening research process.' The critical tone was continued through raising a question on a survey company involved in the Committee, and focusing on the citizens in favor of the construction resumption. As the final decision was announced on 20th October, Chosun Ilbo swung slightly from being negative to supportive, stating 'the result…came out as resumption of the construction…thank God', whilst maintaining the existing position of being critical of the Committee's legitimacy arguing 'can you solve advanced math with public polls...the government should not make the nuclear reactor issue a dogma like religious doctrine[115].'

Since the result was consistent with the stance, Chosun Ilbo gave major coverage on the decision as in 'The citizen's ration put the brake on nuclear-free drive',

[115] Chosun Ilbo, *Conclusion of resumption, so should nuclear-free be wrapped* (2017) <http://news.chosun.com/ site/data/html_dir/2017/10/20/2017102003392.html> [accessed 08 August, 2019].

'Whilst the other side emotive, the pros stayed logical and data-oriented' on 21st October, 'A significant milestone to the nuclear energy history' on 21st October, and 'Support the choice of the citizen participation group' on 26th October, emphasizing that the government failed to persuade 471 citizens thus stop wasting national assets to maintain the nuclear-free policy. Adds to those, Chosun Ilbo kept up criticism on one of the Committee's policy recommendations for reducing the ratio of nuclear power generation and expanding the portion of renewable energy, as an exceeding the Committee's authority, in editorials of 'President Moon, for whom being intransigent for the nuclear-free policy' and 'Damage from nuclear-free obstinacy exceeded three trillion Korean won' on 23rd October.

> The president said, "The plan to build new nuclear reactors will be completely suspended". If the Shin-Gori nuclear reactors 5&6 under construction are the last ones, it would become a serious problem. By itself, the nuclear industry has no future. Which student are willing to study nuclear power? Related university departments and research institutes wither away. Not to mention exports, the supply and demand of manpower to manage the safety of existing nuclear reactors will also be broken. Nuclear research, the basis of security, is virtually halted. Is the president reviewing such undertakings?
>
> < President Moon, for whom being intransigent for the nuclear-free policy, 23rd October, 2017[116]>

Joongang Ilbo which produced 300 articles during the same period, had stuck

[116] Chosun Ilbo, President Moon, for whom being intransigent for the nuclear-free policy, (2017), <https://www.chosun.com/site/data/html_dir/2017/10/22/2017102201647.html> [accessed 08 August, 2019].

to the tone and manner of concerns, questioning, criticism and accepting the consequence. Starting with 'Asking non-experts for long-range project of the state' and 'Leaving the national matter's maintenance or abolition to the lay public' on 28th June, Joongang Ilbo indicated its opposite stance by 'Controversial and hasty decision on suspending the reactors construction' on 12th July, 'Electricity is sinless' on 15th July, and 'A majority of scientists and engineers argue the nuclear-free policy unrealistic' on 21st July. Joongang Ilbo questioned the Committee's credibility, prospecting the final decision as foreseeable, as the Committee highly likely would come out with the result responsive to the government nuclear-free policy.

> In fact, the Committee is built on an uneven playing field. President Moon not only pledged the suspending the reactors' construction as a candidate, but also clarified his position by inducing the cabinet members to a temporary suspension on the reactors' construction…he even made a speech revealing a possibility to suspend Wolsong nuclear reactor no.1 in perfect operation.
>
> < 'The Committee built on an uneven playing field', 25th June, 2017[117]>

Joongang Ilbo continued to question the credibility of the Committee and government through similar articles such as 'The chairman concerns on miscommunication and confusion of the Committee' on 28th October, 'The Committee changes its opinion and will deliver the decision to the government' and 'Nuclear policy which goes back and forth, what's the government's true intention' on 29th October. However, when the Committee decided on resuming the construction, Joongang Ilbo

[117] Joongang Ilbo, *The Committee built on an uneven playing field* (2017) <https://news.joins.com/article/ 21785587> [accessed 08 August, 2019].

produced its contentment with 'Citizens put on the brake on the Moon administration's nuclear policy' on 20th October, and 'President Moon's nuclear-free policy was put a halt' on 21st October. Especially in an editorial on 21st October, Joongang Ilbo highly appreciated the role of the Committee, complimenting the decision as the collective intelligence:

> It cost 4.6 billion Korean won to run the Committee…pricey to experiment with a new policy making method. Yet it is a big achievement to confirm that the collective intelligence level is high enough to keep the future in mind but not forget the reality. Now the government, political circles and ayes and nays all must accept the result and strive to minimize social disputes.
>
> < 'Decision to resuming construction, collective intelligence exhibited', 21th October, 2017[118]>

As examined, the progressive and conservative press maintained the opposite viewpoints from the Committee's composition and activities to conclusion. The progressive press started with active support for the Committee, anticipating the Committee would reach a decision to suspend the reactors' construction as well as buttressing the government's nuclear-free policy after all. On the other hand, the conservative press fired concerns and criticisms on the fact that the government entrusted the lay public with a crucial policy making decision task.

After the Committee came up with the result of resuming the construction, whilst both press indicated that all should respect the decision, the progressive press

[118] Joongang Ilbo, *Decision to resuming construction, collective intelligence exhibited* (2017) <https://news.join s.com/article/22034753> [accessed 08 August, 2019].

focused on limitations and a sense of frustration, and the conservative press highlighted the collective intelligence, public reason and going along with the result. Furthermore, given that the Committee took a decision obviously contrary to the government's nuclear-free policy, it can be assumed that the Committee was able to make an independent conclusion unaffected by the government's influence.

6. Conclusion

The purpose of this study is to examine the Public Deliberation Committee on Shin-Gori Nuclear Reactors 5&6 in 2017 of South Korea, by applying the contextual model of PUS. The analysis so far can be concluded with the following aspects:

First, this case study clearly demonstrated that scientific knowledge is contextualized. The subject matter of PUS has rather been one-directional in the South Korean society. As investigated through the historic review, the popularization of science in South Korea has been conducted according to the deficit model, the lay public lack scientific knowledge thus the government and expert groups must enlighten them. In other words, the lay public has been guided and followed in unilateral policies led by the government and groups of scientist-experts. Such government-led popularization of science methods have given the lay public the perception that science and technology, although critical to national and economic development, are quite distanced from individuals, and within the realm of expert groups.

Yet, the lay public increasingly began to take on the role of the subject, along with various social factors including the change of media environment caused by the Internet. Science and technology have gradually transformed from the realm of supplier-centered minority specialists to the realm of cooperatives of supplier and consumers. In this regard, the public deliberation on Shin-Gori reactors 5&6 demonstrated a successful case of the contextual model in which the lay public comprehended and digested complicated scientific knowledge in accordance with their own context so as to partake in the policy-making process. That is to say, the lay public is no longer so-called marginal people deficient in scientific knowledge, but rather prime movers who contextualize the given knowledge based on their role and circumstances, with the aim of making a decision.

Second, the citizen participants were enabled to understand a complex scientific agenda and empowered to make real decisions by being provided with sufficient knowledge and educational contents. One of the most striking changes of the participants was, that the number of those who reserved one's judgement was 161 before the deliberation process, yet the number was dropped to 15 afterwards. The reserve opinion, which was 35.8% in the first survey, decreased to 24.6% in the 2nd survey, and massively decreased to 3.3% in the final survey[119]. In other words, after the citizen participation group had received and comprehended scientific knowledge, the opinion of 'I don't know' sharply decreased so opinions were formed in either direction

[119] The Public Deliberation Committee on Shin-Gori Nuclear Reactors No.5&6(1), pp.508-510.

was one of the most significant attainments. Regarding this, Young Min, a Media Studies professor from Korea University argues that "the most meaningful element of deliberation is to be exposed to various opinions, and provided with fair discussion opportunities", and from this deliberation experience, we can see that "deliberation process could positively act on opinion formations." A lot of citizen participants had reserve opinions in the early stage due to relatively low involvement in the issue. Yet, they gained not only enough knowledge to make judgements but also interest and understanding on the issue, as the deliberation proceeded. Professor Min added "It is positive for individuals to be exposed to more information and diverse opinion to make a reasonable judgement[120]."

Adds to this, there were 96 citizen participants who turned their positions from the suspension to the resumption of the construction. Thus, the citizen participants were able to redefine their positions and perspectives in order to participate in the complex science-related policy making process, as provided with sufficient knowledge and involvement opportunities. As a result, the response to the resumption showed a statistically significant difference than the suspension, hence the final decision was distinctly drawn.

Third, notwithstanding a positive result of the case, the contextual model is not applicable to every situation because there are a lot of elements which should be thoroughly considered and mapped out. For example, who decides if the contextual

[120] Ibid., pp.206-207.

model is applicable to a particular scientific issue, how to define the size of the public, to what extent public engagement would be allowed, how to utilize outcomes of the engagement, and how to afford the costs and spatial needs are some of the major questions to be answered to begin with. In order to apply the contextual model in practice, there are a lot of practical considerations and limitations. As Patrick Sturgis, a professor from University of Southampton asserts, "a number of dilemmas are encountered which problematizes the notion of public engagement as a potential solution to the 'wicked' problems of science governance[121]."

That is, in spite of the advantages of the contextual model, practicality and methodological design could be difficult to attain in reality. Especially in case of the Public Deliberation Committee on Shin-Gori 5&6, the selection of the citizen participation group was pointed out as one of the practical limitations. The criteria for selection of the citizen participation group was equal in principle, since anyone over the age of 19 could participate.

However, levels of degree that individuals are affected by the reactors would be regionally different; unless a participant resides around the area where the reactors are actually constructed, it is possible to have an indifferent standpoint. Due to such differences in position according to regional base, some experts commented that the deliberation program should have designed to better reflect the interests of local

[121] Sturgis, Patrick, 'On the limits of public engagement for the governance of emerging technologies', *Public Understanding of Science*, 23.1(2014) 38-42 <doi: 10.1177/0963662512468657> [accessed 14 August, 2019].

residents.

Additionally, it is necessary to emphasize that the model was brought in because a political solution was needed to resolve a controversial issue without conflict. In other words, it was an attempt to seek mediation through the judgement of the lay public, so as to avoid a direct clash between anti-nuclear civil organizations, the progressive press and the government ruling party, and the opposition groups. The key question was, how to deal with new nuclear reactors already under construction. From the government's point of view, minimizing the criticism of whether to invalidate already invested capital emerged as a top priority, thus a relatively non-political means was introduced, through the concept of deliberative democracy.

Nevertheless, the Deliberation Committee could not help but become a political issue. The conservatives immediately argued that launching the Committee was a trick to stop the reactors' construction, and criticized the Committee as the government's advocate. On the contrary, the progressive press, supportive of anti-nuclear policy, stood up for the Committee, asserting that they would expect a decision of mature civil society.

Then again, after the Committee's final decision to resume the constructions, the progressive press, which described the Committee as the quintessence of deliberative democracy throughout the entire period, suddenly wrote a series of critical articles pointing out the limitations of the Committee. The conservative press, on the other hand, made a dramatic shift from the critical point of view to the frame of enlightened citizen's wise decision. Such shifts in both sides addressed that they viewed

the Committee as a tool to represent their own political position.

In conclusion, the Public Deliberation Committee on Shin-Gori nuclear reactors 5&6 is considered a case which the contextual model was successfully applied to a complicated scientific issue, based on the particular political background of the South Korean society. Whilst the agenda regarding the two reactors' constructions was highly controversial, through the process of the Deliberation Committee, conflicts were eased and the public opinion was gathered in a way that the majority agreed. The Public Deliberation Committee on Shin-Gori nuclear reactors 5&6 has set a highly significant precedent from not only the angle of the history of popularization of science, but also policy making through deliberative democracy, in South Korea.

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