Sociotechnical Imaginaries and the Cultural Politics of Science and Technology

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Outline

- Politics of Science and Technology
- Sociotechnical Imaginaries
- Politics of Nuclear Power in South Korea

Politics of Science and Technology (I)

Conventional Approaches

- **Linear Understanding of S&T**
  - Science ➡ Technology ➡ Society
  - Clear boundaries between S&T and Society/Politics
- **Politics of S&T revolves around:**
  - Societal Priorities for S&T
  - Impacts of S&T on Society
    - ⇨ ***How much, how fast, how efficient, and how fair?***
  - ※ Unintended consequences // Uncertainties?
    - ⇨ Deficit model: scientific literacy will resolve problems
- **Society and Politics?**
  - Social and political categories and identities, and the epistemic assumptions and discursive practices that underpin them
    - ⬅ Not problematized

Politics of Science and Technology (II)

Early Challenges

- **Philosophers' Discontent**
  - Mumford, Ellul ⇨ *Dominance of technology over humanity?*
- **Frankfurt School**
  - Marcuse, Habermas ⇨ *S&T as ideology // expression of an inhuman instrumental rationality // form of domination*
- **Other Critical Perspectives**
  - Social responsibility in S&T movements ⇨ Implicitly highlighted *socio-political judgments within S&T*
  - Radical science movements ⇨ *ideology of/in S&T*
  - Feminist critique ⇨ *S&T as products and agents of patriarchy*
  - Langdon Winner ⇨ *Artifacts do have politics*
  - David Noble ⇨ *Social choice in tech design & innovation*

Politics of Science and Technology (III)

STS (Science & Technology Studies)

- **Constructivist Understanding of S&T**
  - Open up the black boxes of S&T by revealing complex socio-cultural dynamics in:
    - ⇨ the production of scientific claims // the design of technological artifacts // the assessment of risks and benefits // the formation of expert knowledge and cultures // etc …
  - Political analysis extends to:
    - ⇨ the products and practices of scientific labs, clinics, and other professionally bounded spaces // how knowledge gets made, evaluated, and used in regulatory standard-setting, litigation, expert consensus-building, and other contexts // etc …
- **Cultural Politics**
  - Particularly attention to the ways in which meanings/boundaries are constructed and negotiated, and how power relations are defined, stabilized, or contested through these processes

Politics of Science and Technology (IV)

STS (Science & Technology Studies)

- **Problems and Limitations?**
  - While constructivist STS rejects the internalist-externalist dualism, there is still a strong tendency to focus on the ***production*** of knowledge and its practices / artifacts at recognized sites of technoscientific activity.
  - Relatively less interest in the promotion and reception of S&T by non-scientific actors and institutions in society.
    - ⇨ Might overlook more complex relationships among knowledge, its applications, and power.
- **How do we take into account:**
  - Co-production of S&T and the broader socio-cultural and political order?
  - Cross-cultural / cross-national variations?

Sociotechnical Imaginaries (I)

Background

- **Cross-national comparison** (⇦ Jasanoff)
  - Studies of the regulation of technological risks in the 1980s revealed that there are cross-national differences.
    - ⇨ As already noted, however, they did not problematize socio-political categories and epistemic assumptions.
  - Ontological politics of biotechnology (Jasanoff 1995, 2005)
    - ⇨ US: Product *vs.* UK: Process *vs.* Germany: Programme
      - ➡ What makes such differences?

- **Dominant sociotechnical vision in S. Korea** (⇦ Kim)
  - Entanglement of a strong instrumentalist view of S&T with nationalism, statism, and developmentalism?
    - ⇨ Where does it come from, and how has it shaped the cultural politics of S&T in Korea?

Sociotechnical Imaginaries (II)

NSF Project

- **Sociotechnical Imaginaries and Science & Technology Policy: A Cross-National Comparison**
  - NSF Award No. SES-0724133 (2007-2010 / PI: Sheila Jasanoff)
  - Aim ⇨ To develop a new, empirically grounded, theoretical framework for understanding the politics of S&T

- **Organization of Research**
  - ***"(national) sociotechnical imaginaries"***
    - imagined forms of social life and social order reflected in the design and fulfillment of (nation-specific) scientific and/or technological projects
  - S&T policy ⇨ site and instrument of meaning- or sense-making
  - Three countries: US // Germany // South Korea
  - Three S&T projects: nuclear // stem cells & cloning // nanotech

Sociotechnical Imaginaries (III)

Similar Concepts?

- **Frame & Framing**
  - "basic frameworks of understanding available in our society for making sense out of events" (Goffman 1974)
    - ⇨ collective action frames, master frames, …
- **Ideology**
  - "value" dimension often neglected in framing analyses
- **Discourse**
  - a set of statements, stories, metaphors, representations, images, … that organizes meaning making practices in a particular way
- **Cultural Repertoire**
  - "meaningful historical events and narratives that are invoked to interpret new political struggles and to provide maps for future action" (Hess 2007)

Sociotechnical Imaginaries (IV)

Why imaginaries?

- **Co-production of science, technology and the broader socio-cultural and political order?**

- **Cross-cultural / cross-national variations?**

Sociotechnical Imaginaries (V)

Imagination / Imaginaries

- **Benedict Anderson**
  - **nation as an *imagined political community*** ➡ "It is imagined because the members of even the smallest nation will never know most of their fellow-members, meet them, or even hear of them, yet in the minds of each lives the image of their communion."
- **Charles Taylor**
  - ***social imaginary*** ➡ "… a set of foundational understandings and assumptions that allow people imagine their collective social life – that is, how they "imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations …"
- **Arjun Appadurai**
  - **imagination as an *organized field of social practices*** ➡ "The imagination is now central to all forms of agency, is itself a social fact, and is the key component of the new global order."

Sociotechnical Imaginaries (VI)

Imagination / Imaginaries

- **Edward Said**
  - ***imaginative geographies***
- **George Marcus**
  - ***technoscientific imaginaries***
- **Cornelius Castoriadis**
  - ***imaginary institution of society***
- **Sociology of Expectations in S&T**
  - ***Borup, Brown, Hedgecoe, Martin, …***
- **Political Economy of Promise**
  - ***Wynne, Sunder Rajan, …***

Sociotechnical Imaginaries (VII)

- Social imaginaries always have technoscientific dimensions. ⬅➡ Technoscientific imaginaries are simultaneously also social imaginaries.

- ***(National) Sociotechnical Imaginaries***
  - "collectively imagined forms of social life and social order reflected in the design and fulfillment of (nation-specific) scientific and/or technological projects"
    - ⇨ through and within which the meanings, purposes, and priorities of science and technology are *co-produced* with ideas of public good, risk-benefit, citizenship, democracy, nationhood, etc …
  - Not simply sets of ideas and visions held by certain influential social groups, but *collectively shared*, deeper notions that are *simultaneously descriptive and normative.*

Politics of Nuclear Power in South Korea (I)

- 20 units (17,716 MW)

Plant		Reactor Type	Capacity (MW)	NSSS Supplier	Plant A/E	Commercial Operation
Kori	#1	PWR	650	W/H	Gilbert	Apr. '78
	#2	PWR	587	W/H	Gilbert	July '83
	#3	PWR	950	W/H	Bechtel/KOPEC	Sep. '85
	#4	PWR	950	W/H	Bechtel/KOPEC	Apr. '86
Wolsong	#1	PHWR	679	AECL	AECL	Apr. '83
	#2	PHWR	700	AECL/DOOSAN	AECL/KOPEC	Jun '97
	#3	PHWR	700	AECL/DOOSAN	AECL/KOPEC	Jun. '98
	#4	PHWR	700	AECL/DOOSAN	AECL/KOPEC	Sep. '99
Yonggwang	#1	PWR	950	W/H	Bechtel/KOPEC	Aug. '86
	#2	PWR	950	W/H	Bechtel/KOPEC	Jun '87
	#3	PWR	1,000	DOOSAN	KOPEC	Mar. '95
	#4	PWR	1,000	DOOSAN	KOPEC	Jan. '96
	#5	PWR	1,000	DOOSAN	KOPEC	May. '02
	#6	PWR	1,000	DOOSAN	KOPEC	Dec. '02
Ulchin	#1	PWR	950	Framatome	Framatome	Sep. '88
	#2	PWR	950	Framatome	Framatome	Sep '89
	#3	PWR	1,000	DOOSAN	KOPEC	Aug. '98
	#4	PWR	1,000	DOOSAN	KOPEC	Dec. '99
	#5	PWR	1,000	DOOSAN	KOPEC	July. '04
	#6	PWR	1,000	DOOSAN	KPPEC	Apr. '05

NSSS: Nuclear Steam Supply System, A/E: Architectural Engineering

Uljin Nuclear Power Plants 3~6

Politics of Nuclear Power in South Korea (II)

- 8 units 9,600 MW

Project		Reactor Type	Plant Type	Capacity (MW)	Commercial Operation	Remark
Shin-Kori	#1	PWR	1000	OPR1000	Dec. 2010	Construction
	#2	PWR	1000	OPR1000	Dec. 2011	
	#3	PWR	1400	APR1400	Sep. 2013	Planning
	#4	PWR	1400	APR1400	Sep. 2014	
Shin-Wolsong	#1	PWR	1000	OPR1000	Oct. 2011	Construction
	#2	PWR	1000	OPR1000	Oct. 2012	
Shin-Ulchin	#1	PWR	1400	APR1400	Dec. 2014	Planning
	#2	PWR	1400	APR1400	Dec. 2015	

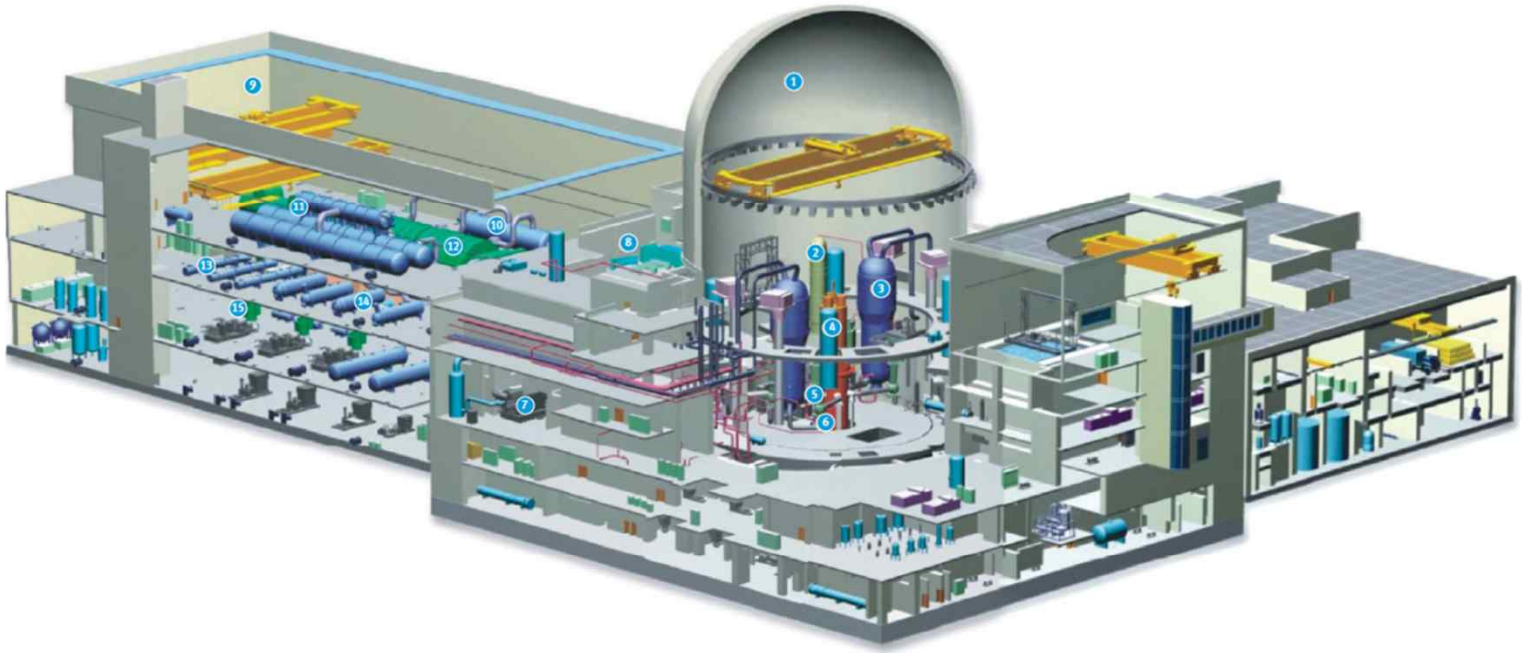
** OPR : Optimized Power Reactor, APR : Advanced Power Reactor*

APR 1400 to the U.A.E.

APR 1400

FEATURES OF APR 1400

SYSTEM OF APR 1400



1. Containmetn Building
2. Pressurizer
3. Steam Generator
4. Safety Injection Tank
5. Reactor Coolant Pump
6. Reactor Vessel
7. Diesel Generator
8. Main Control Room
9. Turbine Building
10. Moisture Separator Reheater
11. Deaerator
12. Turbine / Generator
13. LP Feedwater Heaters
14. HP Feedwater Heaters
15. Feedwater Pumps-Turbine Driven

DESIGN & MAJOR FEATURES

Nuclear Steam Supply System

Number of Coolant Loops	2
Primary Circuit Volume, including Pressurizer	453.6m³
Steam Flow Rate at Normal Conditions	8,141,940kg/hr

Reactor Coolant System

Primary Coolant System Flow Rate	7.56x10⁷kg/hr
Operating Pressure	158.2kg/cm³
Coolant Inlet Temperature, at RV Inlet	290.6°C
Coolant Outlet Temperature, at RV Outlet	323.9°C

Reactor Core

Active Core Height	381cm
Equivalent Core Diameter	365cm
Average Linear Heat Rate	18.38KW/m
Number of Fuel Assemblies	241
Number of Control Element Assemblies	93
Operating Cycle Length(Fuel Cycle Length)	18 months

Containment Building

Type	Prestressed Cylindrical Concrete with Steel
Insie Diameter	45.7m
Height	75.7m

Politics of Nuclear Power in South Korea (III)

Key Moments in Development Trajectories

- **Atomic Energy Act** (1958)
  - ⇨ Building South Korea's nuclear capability
- **Plan for the Promotion of Nuclear Power Generation** (1962) / **Long-term Plan for Research, Development and Use of Nuclear Power** (1969)
  - ⇨ Nuclear energy as tools for national survival and development

Politics of Nuclear Power in South Korea (IV)

- **Nuclear Safety in the 70s and 80s**
  - Despite a marked increase in NPPs, nuclear safety did not emerge as an issue of major public concern.
  - Largely because Park and Chun military regimes suppressed dissident voices, but also because they were often quite successful in garnering mass consent for their growth-first policies.
    - ⇨ A large segment of the Korean public, and even many opposition politicians and dissident intellectuals, shared the vision of *developmental nationalism* espoused by the military regimes.
    - ⇨ The failure to escape from underdevelopment and to catch up with advanced industrial nations, economically and militarily, was perceived as one of the most serious risks for the nation.

Politics of Nuclear Power in South Korea (V)

Tonga ilbo, January 1, 1947

Atoms for National Development

… What did the atomic bomb that defeated Japan in this war teach us? … the only thing that would make our fatherland wealthy and strong is the power of science. Even if we are politically independent, without scientific independence, we will be enslaved again. The total mobilization of science-technology, scientification of production, scientific planning and establishment in all areas … are the only ways to place our beloved nation on a stable foundation. …

- Distinction between atoms for peace and atoms for war
  - ➡ relatively less important in the (South) Korean context

Politics of Nuclear Power in South Korea (VI)

Seeing Like a Developmental State

- **Historical Roots**
  - Late 19th century // Colonial modernization & industrialization
  - Sense of urgency to secure national survival & development
  - ⇨ S&T: Conceived primarily as a form of power and an instrument to achieve a "wealthy and strong nation"
- **Park Chung-Hee Military Regime** (1961-1979)
  - S&T ⇨ "source of power for accelerating economic development"
  - State ⇨ responsible for planning & directing S&T activities
  - Scientists ⇨ "motive power for national development"; "pride of the nation"
  - Publics ⇨ dutiful members of the nation
  - ➡ *Nation-building through S&T // Technological self-reliance*

Politics of Nuclear Power in South Korea (VII)

Key Moments in Development Trajectories

- **Atomic Energy Act** (1958)
  - ⇨ Building South Korea's nuclear capability
- **Plan for the Promotion of Nuclear Power Generation** (1962) / **Long-term Plan for Research, Development and Use of Nuclear Power** (1969)
  - ⇨ Nuclear energy as tools for national survival and development
- **1982 Amendment of Atomic Energy Act**
  - ⇨ Nuclear safety issues largely seen as technological obstacles to be mastered in the course of localizing nuclear power technology
- **Plan for Self-reliance in Nuclear Power Technology** (1984)
  - ⇨ Focus on securing South Korea's capability to assess the safety of NPPs, to devise its own technical codes, and to design a safe reactor ...
- **Korean Standard Nuclear Power Plant** (1992)
- **KAREI Vision 2020** (2002) ⇨ Nuclear G5 by 2010 / G3 by 2020

Politics of Nuclear Power in South Korea (VIII)

- **Democratization and Anti-nuclear Movements**
  - Initially, focused on the state's advocacy of national development
    - ⇨ Would state-directed capitalist development lead to the prosperity of the national community or attend only to the private interests for a few?
    - ⇨ Nuclear power as threats to the Korean nation imposed by US imperialism and its client dictatorship
  - Anti-nuclear sentiments slowly gained ground as the long taken-for-granted connection between South Korea's national development and nuclear power continued to be contested.
    - ⇨ Yet, they failed to effectively challenge the imperative to secure the nation's future through domestic ownership of nuclear S&T.
  - Potential environmental and health risks
    - ⇨ Constantly weighed against the risk of failing to develop, and tolerated, if not dismissed, often with public consent.

Dominant Sociotechnical Imaginaries and Their Discontents?

	Dominant Imaginaries	NGO Critics
Future vision	Advanced industrial nation (G7?)	More just & democratic Korea
Pressing societal needs	Developing / Catching up	Deepening of democratization
Risks	Falling behind	Being dominated by developmentalism
Development	Power-centered and instrumental view of development	Alternative, reflexive, or post-development?
S&T	Form of power / Instrument to achieve a wealthy and strong nation	True potentials of S&T suppressed by developmentalism
State	Developmental state / Competition state / Workfare state – though increasingly its neoliberal variant	Should be transformed into a kind of green welfare state?
Expert	Serving the nation	Serving the people
Public	Dutiful members of the nation → should serve the national interest	Informed citizens → backbone of democratic society
Ethics	Zero-sum game / Should not undermine national interest	Protection of human rights / justice
Market	Useful device for national development / Increasingly becoming the model for society	Threats to the public interest