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Description	一般講演要旨

Transformative Innovation Policy in the Regions of Japan

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Introduction

As societal challenges mount, particularly those outlined in the SDGs, transformative policy has become central to public policy discussions. Recent studies highlight several shifts in public policy: 1) a broadened scope from sector-specific to cross-sectoral (Schot and Steinmueller, 2018; Chang and Andreoni, 2020, Foray, 2019); 2) a focus on not only economic growth but also social challenges (Boon and Edler, 2018; Kuhlmann and Rip, 2018); 3) an emphasis on the impact of policy mixes rather than individual policies (Magro and Wilson, 2019); and 4) the need for collaborative, complementary policies involving diverse actors (Janssen et al., 2023; Aiginger and Rodrik, 2020).

These changes introduce challenges in implementation due to governance structures that struggle to adapt, leading to issues like institutional silos, coordination failures, and a lack of agility (Weber and Rohrachet, 2012). Understanding how to effectively implement policy interventions is crucial for facilitating transitions (Schot and Steinmuller, 2018).

Regions provide an intriguing context for addressing social and environmental sustainability challenges (Magro and Wilson, 2019). As "wicked" problems arise within complex networks, regional policies can reveal diverse mechanisms at play. Historically, regional STI policy aimed to tackle local issues such as growth and unemployment, differing from national STI policies, which tend to focuse on scientific advancement and enhancing productivity. The recent shift toward transformative STI policies that address social challenges blurs the distinction between regional and national approaches, requiring an integrated and coordinated strategy.

This paper examines Japan's STI policies at both regional and national levels to propose future research areas. It aims to present a conceptual framework illustrating the transition between national and regional policies, ultimately highlighting existing challenges.

2. Conceptual reviews

2.1 Mission oriented Innovation policy (MOIP)

The mission-oriented innovation policy(Mazzucato, 2018) is defined as a "coordinated package of policy and regulatory measures tailored specifically to mobilize science, technology and innovation in order to address well defined objectives related to a social challenge, in a defined time frame" (Larrue, 2021: 12).　In the

"coordinated package of policy"includes: 1) innovation cycle, 2) policy instruments (demand side, supply side, top down bottom up), 3) cross sectoral and cross agency coordination, 4) targeting ambitious goals& time frames (back casting approach) (Ibid, 2021). These elements are organized into three dimensions; 1) strategic orientation (directionality), 2) Policy coordination (coordination) and 3) policy implementation (policy mix) (Ibid, 2021).   Despite the process selection on issues involve engagement of a wide array of public and private actors, MOIP's driving force is the "mission" initiated by the government, leaning towards top-down approach.

2.2 Smart specialization strategy and characteristics of regional transformation

Smart specialization strategy (SSS) is regional innovation strategy implemented by the European Commission to enhance regions through structural change by strengthening the existing capabilities at the regional level (Foreay, 2018).   It bases on the place-based innovation policies with explicit prioritization of activities based on regional capabilities stemming from the local innovation systems. The prioritization of such capabilities is said to increasingly link with the sustainable transitions, addressing in meeting global challenges (Magro and Wilson, 2019). The place-based innovation policy is bottom-up policy, and originally focused on structural transformation of existing local industries, not so broad as transformative innovation policy. Hence, the recent tendencies demonstrated by SSS suggests gradual integration of bottom-up transitional thinking with the top-down incentives made by SSS.   What is not clear is how SSS can be linked with the overarching national policy such as MOIP.
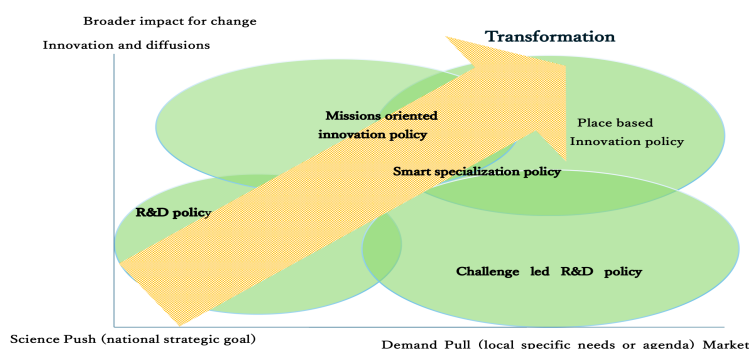
3 Conceptual framework

Transformative policy approach pay attention to coordination across policy, research and stakeholders, these are said to be done under clear directionality and policy mix. The discussion on MOIP is often done at the national level and its extension to region is not well articulated. Given the impact of policy needs to be transformative, it is natural to incorporate the regional level while regions have its local systems specific needs, and its demands embedded in local complexity of local stakeholders.   This requires understanding on how such integration be made to align the both top-down and bottom-up effort towards sustainable transformation.

Given that STI policy at national level had been generated with the intention to strengthen R&D capacity, the natural progression of R&D policy was toward Innovation and diffusion policy. At the regional level, however, the policy focus was given to improve the regional socio-economic conditions while STI was considered as the means to solve local specific policy needs. Hence the recent incorporation of sustainable transition at the regional level open up a space for policy integration with the national level. Below sketches the concept of the scheme where policies that stimulates Science (R&D) , Innovation, and market creation (demand generation) are being coordinated to achieve transformation.

RQs are

1)   How TIP has been materialized at national level?
2)   How this can be transcended to the regional level?

To understand the interaction made by the yellow arrow in the diagram, which demonstrate the attempt to align national 'mission' strategy and regional capability-led transformative strategy in one transformative direction, where both MOIP and SSS serve as the integration space or Boundary Object (Janssen et al, 2024). To see if this framework is policy relevant, this paper reviews the STI policy at national and regional level in Japan to see observe how the two levels are interacting. The analysis was done based on reviewing secondary information on policy documents and reports.

Fig 1. Conceptual framework

Source: author based on literature review

4.Case of STI policy in Japan

4.1Evolution of STI policy at national level

The historical evolution of Japan's STI policy at national level spans three decades since the passing of S&T Basic Law in 1995, requiring elaborating five-year Strategic STI Basic Plans (See Akaike et al several versions). Since the first Basic Plan covering 1996-2000, six Basic plans had been established, each reflecting the STI policy issues of that period. The successive STI Basic Plans are reported to gain following features of MOIP, which is TIP (Larrure, 2021).

1)   Basic Plans being increasingly geared towards social challenges instead of being structured around disciplines or sectors.
2)   Increasing presence of coordinating agency at high level STI councils at Cabinet Office (CSTP to CSTI) spanning the ministries to device overall policy direction and starting to implement the Basic Plans.
3)   The Basic Plans for 5 years that provided general strategic frameworks are followed up with precise annual action plans

In addition to above, more recently following features are also being observed.
4)   Since the 5th Basic Plan with the concept of Society 5.0, the plan tends to aim vision oriented -back casting approach.

4.2 Evolution of STI policy at regional level

While STI policy at national level have evolved through gaining the TIP features over the years, the regional STI policies had divergent origin.   The regional level, STI policy have initially aimed to stimulate local economies and address specific regional needs, utilizing STI as a means (Okamoto, 2017, 20; Jiang & Harayama, 2005). This was particularly prevalent in the first three Basic Plans. These plans primarily enhanced regional S&T infrastructures and built local STI infrastructure and networks. MEXT's Intellectual Cluster Program and METI's Industrial Cluster Program promoted regional economies, while the Cabinet Office fostered University-Industry collaboration. Until 2005, regional policies developed independently of

national policies, which focused more on enhancing R&D capabilities through a discipline- and sector-oriented approach.

The cluster approach gained traction with the **Regional Revitalization Act of 2005**, continuing until 2009 when the government transitioned from LDP to DPJ during the 4th Basic Plan. This coincided with the timing of "radical transition from discipline-based to issue-driven STI policy" (Arimoto and Sato, 2015), the approach of STI policy started have conditions that align more with regional priorities. However, many cluster initiatives were scaled back under the DPJ government (Okamoto, 2017).

In 2012, the **Overcoming Population Decline and Vitalizing Local Economy Act** (or "Town, People, Job Revitalization Act") was enacted, reinforcing regional revitalization and Academia-Industry Collaboration through the **Center of Innovation (COI-STREAM)** program launched in 2013. COI-STREAM targeted social needs with three visions: 1) smart life care for an aging population, 2) high-quality living environments, and 3) active sustainability, hence it focuses on social issues prevalent at the regional level.

Starting from 2016, the 5th Basic Plan referred the regional revitalization reflecting the Act. MEXT launched the **Regional Innovation Ecosystem Development Program** and the **Design-i program** in 2019, engaging local stakeholders to tackle social challenges. Various ministries-initiated efforts to revitalize regions was observed this period, such as METI's university-linked innovation hubs and MIC's smart city initiatives. The Cabinet Secretariat also promoted **SDG Future Cities** and **Super City** initiatives to enhance municipal capabilities with advanced technologies. These programs were influenced with the overarching policy direction shown in the 5th Basic Plan, Society 5.0.

The current 6th Basic Plan continues to promote smart cities under the concept of **Society 5.0**, focusing on regional decarbonization and infrastructure management. The Kishida administration's **Vision for Digital Garden City Nation**, launched in 2021, evolved into a comprehensive strategy in 2022, integrating policies for smart cities, super cities, and SDG Future Cities. Additionally, regional innovation centered on universities was consolidated into the **Program on Open Innovation Platforms for Industry-Academia Co-Creation (COI-NEXT)** starting in 2020.

Discussion

The historical evolution of STI policy at both national and regional levels reveals that policies originating from different frameworks, such as R&D policy and Cluster Policy, have gradually aligned under overarching national policies emphasizing broad themes like "regional revitalization" and "sustainability." The trajectory of regional STI policy in Japan has primarily been characterized by its focus on addressing local needs, with STI serving as a secondary means.

Recently, national policies, including STI, have begun to prioritize regional sustainability and revitalization, introducing several programs that align with these new directions. This alignment has improved the coordination of regional STI policies with national objectives and facilitated collaboration among various

ministries in related areas through an overarching "mission." As the country continues to confront demographic and economic challenges, the evolution of these aligned programs may enhance the effectiveness of science and technology policy at the regional level by allowing for greater flexibility in adapting to diverse local needs (see Figure 2).
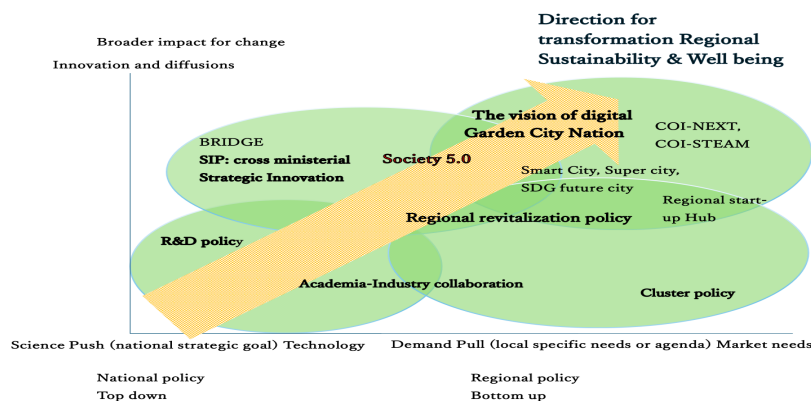
Figure 2: Regional and National STI related policies in Japan

The increasing attention to regions in the STI policy can be confirmed in figure 3 below that showing the increasing use of the term 'region' in the Basic Plans. It highlights a peak in the 3rd Plan with a focus on cluster policy, a decline during the DPJ-led 4th Plan, and a resurgence starting with the 5th Plan's regional revitalization policy, which continued into the 6th Plan.
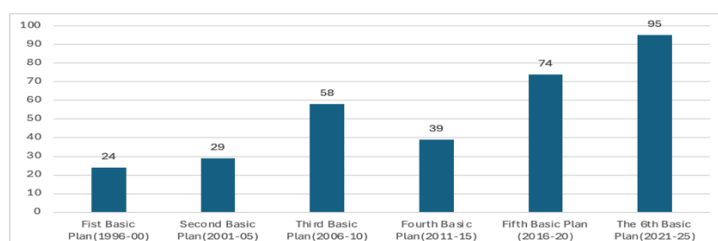
Figure 3: Increased reference to" region" in the Basic Plans

Source: based on the data from https://documents-search.nistep.go.jp/

Note: Analysis was made in Japanese, *Chiiki* in the text of the Basic Plans.

The observations above indicate that the strengthening of the control tower function of the Council for Science, Technology and Innovation (CSTI) and the Cabinet Secretariat has guided policy direction and made programs accessible to regions and municipalities for their initiatives. This reinforces the top-down approach in regional STI policy, although local bottom up approach remains present. However, it remains unclear—partly due to limited access to primary data—how this cascading approach of programs from central to regional levels contributes to balanced regional capability development.

While secondary sources highlight numerous successful cases among municipalities and regions, these entities often possess greater capabilities due to historical connections with regional universities or strong local companies. Consequently, the causal relationships regarding regional development are not well-defined, and the fundamental solutions for regional revitalization—particularly those addressing the most

pressing needs—may be overlooked. The transformation of regional STI policies is underway, and further

exploration into the underlying mechanisms of regional transformation is essential in Japan.

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