DIGITAL GOVERNANCE AND SMALL BUSINESS RESILIENCE: COMPARING SMART CITY POLICY FRAMEWORKS IN TAIWAN AND JAPAN

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Abstract

Since the term "digital transformation" was introduced by Swedish professor Erik Stolterman in 2004, many countries have embraced this trend. Governments worldwide have implemented policy tools to drive industrial digitalization, while enterprises anticipate new business opportunities through digital transformation. According to the 2024 AI maturity survey by the International Data Group (IDC) for the Asia-Pacific region, Japan ranks at the third stage—AI Innovators, while Taiwan is at the second stage—AI Practitioners. Furthermore, the 2023 AI Readiness Index for the Asia-Pacific region from Salesforce ranked Japan second, just behind Singapore.

This study provides a comparative analysis of the digital transformation policies of Taiwan and Japan, focusing on two questions: (1) how do the administrative bodies of both countries construct policy frameworks to drive industrial digitalization, and (2) how do government subsidies facilitate industrial digital transformation. Given that small and medium enterprises (SMEs) account for over 98% of enterprises in both Taiwan and Japan, this study concentrates on policies and subsidy resources targeting SMEs, comparing policy differences and implementation effectiveness between the two countries.

The study finds that Taiwan and Japan allocate approximately NT$23 billion and NT$37 billion, respectively, to annually support industrial digital transformation. The Japanese government follows a "central-local cooperation model," whereas Taiwan adopts a "centralized governance model." There are also differences in subsidy programs: Japan offers various subsidy schemes based on a company's stage of digitalization, while Taiwan categorizes subsidies by application

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themes and industry categories. Additionally, in response to the increasing importance of cybersecurity, Japan has partially shifted its digital transformation subsidies to cybersecurity since 2024. In contrast, Taiwan mandates enterprises to include cybersecurity assessment items and budget allocations within their subsidy applications.

Taiwan and Japan each have distinct advantages in promoting digital transformation of SMEs; therefore, Taiwan can learn from Japan's experience by fostering central-local government collaboration to develop region-specific industries. Furthermore, Taiwan could refine its subsidy strategies by tailoring them to enterprises at different digital transformation stages. Finally, international security frameworks to align industrial development with global security standards are crucial to help both Taiwan and Japan achieve digital transformation of SMEs, which would benefit the ecosystem of smart cities in the future.

Keywords: *Digital Transformation, SMEs, Policy Comparison, Government Subsidies, Smart City*

I. Introduction

In the process of industrial innovation, the government often plays a pivotal role. Governments can foster (or hinder) industry and technological innovation through the formulation of policies or regulations, or they may mitigate innovation risks faced by enterprises through subsidized research and development programs.[1] [2]An OECD report underscores the need for policies to facilitate corporate digital transformation by enhancing enterprise vitality and efficient resource allocation, strengthening the dissemination of technology and knowledge, promoting investments in tangible and intangible capital, and assisting small and medium-sized enterprises (SMEs) to participate in digital transformation.[3]

[1]*See* Phanish Phanakul & Jeffrey K. Pinto, *Examining the Roles of Government Policy on Innovation*, 25 J. High Tech. Mgmt. Res. 97, 97 (2014).
[2] *See also* Anil B. Boghani & Ronald S. Jonash, *The Role of Government in Fostering Innovation*, Arthur D. Little (1993), https://www.adlittle.com/sites/default/files/prism/1993_q1_23-27.pdf (last visited Mar. 28, 2024).
[3] Org. for Econ. Co-operation & Dev. [OECD], Going Digital in a Multilateral World, at 6 (May 11, 2018), https://one.oecd.org/document/C/MIN(2018)6/en/pdf.

Recognizing the significance of national policies for digital development, the OECD conducted a survey of its 38 member countries in 2023, revealing that over 90% had already formulated or were in the process of developing national digital strategies. Increasingly, these national digital strategies are coordinated at the highest governmental levels. The proportion of countries with digital policy officials at ministerial levels or higher increased from 12% in 2016 to over 42% in 2023. Furthermore, in 2023, nearly half (47%) of the countries utilized dedicated digital departments for planning national digital strategies, a significant increase from less than a quarter (24%) in 2016.[4]

Regarding digital readiness, Cisco's 2021 Digital Readiness Index, which assessed 147 countries based on seven indicators, listed Singapore, South Korea, New Zealand, Australia, and Japan among the top 20 Asian countries. Focusing specifically on East Asian nations, only Singapore, South Korea, and Japan ranked first, seventh, and eighteenth, respectively. In terms of business and government investment indicators, Singapore demonstrated the strongest performance, followed by South Korea and Japan.[5]

Given that Taiwan and Japan both belong to the East Asian economies and that SMEs constitute more than 98% of enterprises in both countries, this study aims to explore the processes by which Taiwan and Japan have developed their national digital strategies. To address this aim, this research specifically investigates how administrative agencies in Taiwan and Japan construct policy frameworks to promote industrial digitalization, how they leverage policy subsidies to drive industries toward digital transformation, and compares the differences between the two countries' policies.

II. Policy Framework for Promoting Science and Technology in Taiwan and Japan

A. Japan

The legal basis for Japan's promotion of science and technology policies is the Basic Act on Science and Technology, enacted in 1995; this was renamed the Basic Act on Science,

[4] OECD, Digital Economy Outlook 2024, vol. 2, at 14–15 (Nov. 19, 2024), https://doi.org/10.1787/3adf705b-en.
[5] Cisco, *Digital Readiness Index*, https://www.cisco.com/c/m/en_us/about/corporate-social-responsibility/research-resources/digital-readiness-index.html (last visited Mar. 28, 2024).

Technology, and Innovation in April 2021.[6] Article 9 of the Act explicitly stipulates that a "Basic Plan for Science and Technology" must be formulated to advance national development of science and technology.[7] Under this Plan, beginning in 2013, Japan also annually issued the Comprehensive Strategy on Science, Technology and Innovation (科学技術イノベーション綜合戦略) to outline specific implementation approaches for key policy initiatives.[8] Currently, the Sixth STI Basic Plan (2021–2025) is in effect. The present policy directions, including 5G, artificial intelligence (AI), and digital transformation, are largely continuations of the Fifth STI Basic Plan (2016–2020).[9]

The Fifth Basic Plan explicitly set forth Japan's ambition to build a world-leading "Super Smart Society," also referred to as "Society 5.0." To ensure that Society 5.0's overall scientific and technological development goals are implemented effectively, the Cabinet reviewed the implementation of past Comprehensive Strategies on Science, Technology and Innovation. In 2018, the Cabinet launched the Integrated Innovation Strategy (統合イノベーション戦略), which is approved by the Prime Minister.[10] The Strategy is revised on a rolling basis, and to date, 22 editions have been approved.[11]

To promote implementation of the Strategy, the Cabinet established the Integrated Innovation Strategy Promotion Committee (統合イノベーション戦略推進会議), which integrates different administrative bodies and strengthens decision-making mechanisms highly related to "innovation," enabling cross-sectoral, interdisciplinary coordination.[12] The Promotion Committee is led by the Chief Cabinet Secretary, who also serves as the chairperson. Among the bodies involved, the Council for Science, Technology and Innovation (CSTI) serves as the core

[6] Hsiu-Ying Wang, Japan's Sixth Science, Technology, and Innovation Basic Plan, Sci. & Tech. Pol'y Res. & Info. Ctr. (June 8, 2021), https://outlook.stpi.narl.org.tw/index/focus-news/4b114100791e38590179e943f6370ad1.
[7] Basic Act on Science, Technology, and Innovation, Law No. 130 of 1995 (as amended 2021), art. 9 (Japan).
[8] Cabinet Office, Gov't of Japan, *Integrated Innovation Strategy*, https://www8.cao.go.jp/cstp/tougosenryaku/index.html (last visited Mar. 28, 2024).
[9] Chia-Yin Liu, *What Is Society 5.0?*, Inst. for Info. Indus. Sci. & Tech. L. Inst. (Jan. 2019), https://stli.iii.org.tw/article-detail.aspx?no=64&tp=1&d=8174.
[10] Cabinet Office, Gov't of Japan, *Integrated Innovation Strategy*, supra note 8.
[11] Id.
[12] Cabinet Office, Gov't of Japan, *Integrated Innovation Strategy Promotion Council*, https://www8.cao.go.jp/cstp/tougosenryaku/kaigi.html (last visited Mar. 28, 2024).

body. Under the CSTI, an Expert Committee for Strengthening Innovation Policy Promotion has been established to investigate specialized topics such as AI.[13]

Although the concept of Society 5.0 was introduced as early as 2016, the global outbreak of the COVID-19 pandemic in 2019 inadvertently revealed Japan's slow progress in realizing a super-smart society and its lagging digital transformation. The World Digital Competitiveness Ranking published by the International Institute for Management Development (IMD) in 2019 pointed out Japan's shortcomings in international experience, big data utilization, and corporate adaptability to changes. Recognizing these issues, the Integrated Innovation Strategy 2020 placed significantly more emphasis on measures to address the country's digitization gaps. These measures included initiatives related to infrastructure, environmental readiness, talent development, cross-disciplinary integration, and investment in digital-related research and development (R&D). In terms of supporting SMEs' adoption of AI and digital technologies, the government aims to encourage equipment investments needed for developing innovative services, R&D aimed at enhancing technological capabilities, and increasing products' and services' added value through data and information sharing.[14]

B. Taiwan

The legal basis for Taiwan's science and technology policy is the Fundamental Science and Technology Act. In accordance with Articles 9 and 10 of the Act, the government is required to issue a "White Paper on Science and Technology" every two years, prepared by the National Science and Technology Council (NSTC), to outline the vision, strategy, and current status of scientific and technological development. In addition, the "National Science and Technology Development Plan" must be formulated every four years through the National Science and Technology Conference convened by the Executive Yuan.[15]

At the highest level of national governance, Taiwan has established the Executive Yuan's Science and Technology Advisory Board (STAB), chaired by the Premier of the Executive Yuan,

[13] Cabinet Office, Gov't of Japan, Establishment of the Integrated Innovation Strategy Promotion Council (Apr. 2021); Cabinet Office, Gov't of Japan, Minutes of the 1st Integrated Innovation Strategy Promotion Council, at 1 (July 2018), https://www8.cao.go.jp/cstp/tougosenryaku/kaigi.html.
[14] Cabinet Office, Gov't of Japan, *Integrated Innovation Strategy 2020*, at 121 (July 17, 2020).
[15] Fundamental Science and Technology Act, arts. 9–10 (Taiwan), Ministry of Justice Database, https://law.moj.gov.tw.

with the President of Academia Sinica serving as the Chief Advisor.[16] At present, Taiwan is concurrently implementing the National Science and Technology Development Plan for 2021–2024 and the White Paper on Science and Technology for 2023–2026.

To understand the overall policy framework for science, technology, and innovation development in Taiwan, the National Science and Technology Council (NSTC) and the Executive Yuan's Board of Science and Technology can be regarded as the core mechanisms for integrating science, technology, and innovation policies across different ministries and agencies. This framework forms a policy planning and implementation structure comparable to Japan's Integrated Innovation Strategy Promotion Council.

Accordingly, in Taiwan's 2023–2026 "White Paper on Science and Technology," the government established the 2035 Vision for Science and Technology Development.[17] With respect to SMEs, the focus is on accelerating the twin transformations of digitization and net-zero (General Goal 5), leveraging digital technologies to upgrade the manufacturing sector (General Goal 8), and fostering open innovation and talent cultivation (General Goal 10). To achieve these goals, the Executive Yuan coordinates the promotion of initiatives such as the Smart Taiwan Program (2021–2025) and the Asia Silicon Valley Development Plan 2.0.[18]

III. Measures and Subsidy Mechanisms for SME Digital Transformation in Taiwan and Japan

A. Japan

To implement the Integrated Innovation Strategy, Japan's Small and Medium Enterprise Agency launched a new action plan in May 2019 titled the SME Productivity Revolution

[16] Executive Yuan, Gov't of Taiwan, Establishment Guidelines for the Executive Yuan Science and Technology Advisory Meeting, https://stp.nstc.gov.tw/stab/CF7FDFDCD1D1EC91 (last visited Mar. 28, 2024).
[17] Nat'l Sci. & Tech. Council, Gov't of Taiwan, Science and Technology White Paper, https://www.nstc.gov.tw (last visited Mar. 28, 2024).
[18] Executive Yuan, Gov't of Taiwan, Asia Silicon Valley Development Plan, https://www.ndc.gov.tw/Content_List.aspx?n=4C7EEC31A722B7B4 (last visited Mar. 28, 2024).

Promotion Project.[19] Under this Project, different subsidy measures are offered based on the level of digitization required by different enterprises.[20]

Taking the Manufacturing Subsidy as an example, from the supplementary budget in 2019 (Reiwa 1) to the supplementary budget in 2021 (Reiwa 3), a total of five rounds were implemented, with an overall budget of approximately ¥960 billion. To support SMEs and micro-businesses affected by the COVID-19 pandemic, special subsidy categories were introduced. These included increasing subsidy ratios and maximum amounts, as well as simultaneously promoting enterprise digitization. For example, to encourage SMEs to adopt digital tools, the first supplementary budget for 2020 (Reiwa 2) raised the subsidy ratio for SMEs introducing IT tools. In December 2021 (Reiwa 3), in addition to the standard framework, three new application categories were introduced: Digitization; green; and recovery (with wage increases and employment expansion).[21] The maximum subsidy amount was adjusted based on company size. For the digitization category, the cap was raised to ¥12.5 million; for the green category, to ¥20 million.[22]

Using the Manufacturing Subsidy as an example of the implementation mechanism, the National Federation of Small Business Associations (NFSBA) serves as the implementing unit and works together with regional branches to promote the subsidy program. SMEs interested in applying submit a business proposal, which is reviewed by a committee through written or oral evaluations to identify enterprises that preliminarily meet the eligibility criteria. Approved enterprises must undergo a mid-term review and a final inspection before applying for the subsidy payment from the implementing agency. For the five years following the subsidy award, SMEs are required to submit annual reports to the NFSBA regarding the commercialization status of the project and any developments related to intellectual property.[23]

[19] Small & Medium Enter. Agency, Ministry of Econ., Trade & Indus., Gov't of Japan, Operational Mechanisms and Subsidy Methods for SME Productivity Revolution Promotion Project (May 2019).
[20] Org. for Small & Medium Enters. & Reg'l Innovation, Gov't of Japan, Subsidy Utilization Navigator, https://www.smrj.go.jp/sme/funding/manufacturing/index.html (last visited Mar. 28, 2024).
[21] Small & Medium Enter. Agency, 2022 White Paper on Small and Medium Enterprises, ch. 1, § 6 (2022), https://www.chusho.meti.go.jp.
[22] Small & Medium Enter. Agency, FY2021 Supplementary Budget Overview for IT Implementation Support (IT Subsidies), https://www.pref.nagasaki.jp/shared/uploads/2022/04/1650874003.pdf (last visited Mar. 28, 2024).
[23] Org. for Small & Medium Enters. & Reg'l Innovation, Procedures After Selection as Subsidy Recipient, https://www.smrj.go.jp/sme/funding/manufacturing/index.html (last visited Mar. 28, 2024); Nat'l Fed'n of Small Bus. Ass'ns, Japan, Recruitment Guidelines for Manufacturing, Commerce, and Service Productivity Enhancement Project (18th Call), at 2 (Mar. 2024).

B. Taiwan

In terms of the Taiwanese government, according to the Ministry of Economic Affairs' 2024 budget, approximately NT$23 billion has been allocated for promoting science and technology policies.[24] In addition, to support digital transformation for SMEs, the Industrial Development Administration, the Small and Medium Enterprise Startup Administration, and the Ministry of Digital Affairs have each introduced subsidy programs tailored to different industries. In 2023, as the COVID-19 pandemic situation stabilized and international trends began shifting toward the implementation of carbon taxes, the Executive Yuan utilized surplus tax revenue from 2022 to launch a "Post-Pandemic Special Budget." This included subsidies for low-carbon and smart transformation in small and medium-sized manufacturers, encouraging SMEs to conduct carbon inventories, adopt smart technologies in high-emission processes, and move toward smart manufacturing.

Each year, government ministries and departments allocate budgets for subsidy programs, which are implemented by organizations such as the Taiwan Small & Medium Enterprise Counseling Foundation and the Information Service Industry Association of ROC (CISA). Enterprises must submit their proposals before the application deadline. Through written or oral evaluations, selected businesses are chosen by a review committee to receive subsidies. During the implementation period, enterprises are required to submit interim and final reports. Notably, the Ministry of Economic Affairs' Bureau of Industrial Parks (BIP) oversees 67 industrial parks and 13 technology industrial parks across Taiwan, covering approximately 13,000 enterprises, and commissions support institutions to assist SMEs in applying for government programs each year.

IV. Conclusion: A Comparative Analysis of Digital Transformation Implementation in Taiwan and Japan

This study synthesizes and compares the organizational structures and policy frameworks of Taiwan and Japan regarding government initiatives for digital transformation. It argues that

[24] Ministry of Econ. Affairs, Gov't of Taiwan, Central Government General Budget for Fiscal Year 2024, at 11, https://www.moea.gov.tw/Mns/populace/information/Information.aspx?kind=04&menu_id=1429&info_id=1410 (last visited Mar. 28, 2024).

similarities exist between the two nations in their organizational structures aimed at facilitating intelligent transformation among SMEs, providing valuable opportunities for mutual learning.

Both governments place significant emphasis on inter-ministerial coordination and integration within their digital transformation strategies. Japan demonstrates this through the "Integrated Innovation Strategy Promotion Committee" under its Cabinet Office, whereas Taiwan utilizes the collaborative structure between the "Board of Science and Technology Advisors of the Executive Yuan" and the National Science and Technology Council. Both countries display highly integrated policymaking mechanisms across various fields, effectively enhancing coordination and resource integration among administrative departments.

This paper suggests that Taiwan could enhance the organizational positioning and perceived importance of its annual advisory meetings by adopting Japan's approach. Utilizing the quadrennial "National Science and Technology Development Plan" as a foundation, Taiwan could leverage the annual advisory meetings to dynamically adjust strategies according to current industry developments, thereby increasing policy efficiency.

The comparison of subsidy mechanisms between Taiwan and Japan reveals the following key differences:

1. Recruitment Mechanism for Subsidy Measures

In Japan, when the central government announces subsidy measures, local governments actively recruit local enterprises to apply. Annual performance tracking reports analyze data such as the number of enterprises, employees, and industry categories receiving subsidies within each prefecture. Local governments also publish regional case studies online for broader reference. Conversely, Taiwan rarely employs joint central-local recruitment strategies or regional case dissemination mechanisms.

2. Mechanism for Proposal Evaluation

The Ministry of Economy, Trade and Industry (METI) in Japan distributes subsidy funds through administrative corporations to implementing agencies, which are responsible for evaluating and disbursing subsidies to enterprises. In contrast, Taiwan's central government directly allocates subsidy funds to implementing agencies—typically foundations, industry

associations, or academic institutions—which subsequently review and distribute funds to enterprises. Regarding the review process, Japanese implementing agencies adopt a two-stage collaborative evaluation model involving both headquarters and regional institutions, whereas in Taiwan, the implementing agencies receiving funding hold sole authority over the evaluation process.

3. Classification Criteria for Subsidy Applications

The Japanese government designs subsidy applications based on enterprises' IT maturity levels. Taiwanese enterprises, however, apply for subsidies categorized according to their industry sectors, such as manufacturing through the Industrial Development Administration, service industries through the Department of Commerce, and information industries via the Ministry of Digital Affairs.

4. Subsidy Limits and Allocation Ratios

In Japan, subsidies and allocation ratios vary according to enterprise size, with higher subsidy ratios for smaller enterprises (manufacturing firms with fewer than 20 employees, and commercial businesses with fewer than 5 employees). In Taiwan, subsidy ratios are uniformly determined by review committees based on the appropriateness of application content and budgetary justifications, irrespective of employee numbers.

5. SME Definition Standards

In Taiwan, enterprises with fewer than 200 employees or capital under NT$100 million are classified as SMEs. In Japan, criteria differ by industry; for instance, manufacturing SMEs are defined as having fewer than 300 employees or capital under 300 million yen, while hotel SMEs have limits set at fewer than 200 employees or capital under 50 million yen.

6. Post-Subsidy Follow-up Mechanisms

Enterprises receiving subsidies in Japan must submit annual reports over five years to allow governmental tracking of subsidy effectiveness. In Taiwan, subsidized enterprises are subjected to random inspections by government agencies within a three-year period.