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Article

Discourse Power and Strategic Adaptation: A Diachronic Analysis of Japan's Science and Technology Policy Discourse (2018–2024)

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Abstract: Drawing on annual editions of Japan's Integrated Innovation Strategy (Togo Innovation Senryaku) issued by the Cabinet Office between 2018 and 2024, this study constructs a dedicated corpus of 8,312 valid tokens and applies a combined methodology of Corpus-Assisted Discourse Studies and the Discourse-Historical Approach to conduct a systematic diachronic investigation of Japanese science and technology policy discourse. The analysis identifies three successive phases of strategic discursive shift: a crisis mobilisation phase (2018–2020) in which narratives of external threat were deployed to legitimise systemic reform; a blame-shifting phase (2020–2022) in which stigmatising discourse directed at academic institutions cleared the way for administrative power expansion; and a value reordering phase (2023–2024) in which the lexical foregrounding of shakai (society) and human-centred rhetoric completed a transition from competitive to social narration. Operating across five discourse strategies—nomination, predication, perspectivation, argumentation, and intensification or mitigation—the policy discourse achieved a deep-level transformation from alignment with international agendas to autonomous framework construction and from economic priority to social priority. This transformation is interpreted as both a strategic discursive response to the intensification of Sino-American technology competition, the COVID-19 pandemic, and domestic institutional crisis, and as a reconstruction of discursive power through which Japan, having encountered setbacks in hard-technology competition, seeks to occupy the moral high ground of an advanced nation in social problem-solving as a means of breaking through at a lower competitive register.

Keywords: critical discourse analysis; science policy; technology policy; japan; corpus linguistics

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1. Introduction

Science and technology policy discourse is never a neutral conduit for information [1]. When Japan's Cabinet Office publishes its annual Integrated Innovation Strategy, the choices of phrasing and narrative emphasis in that policy document reflect not merely the technical planning priorities of a given year but also the government's active construction of legitimacy and its adaptation to specific historical circumstances.

Since 2018, global technology competition has accelerated along a trajectory emphasizing security concerns. Legislative measures in certain nations have brought multiple categories of emerging technologies, including artificial intelligence and quantum computing, under national security controls, while the risk of technology decoupling between major global powers has continued to rise. Positioned between two significant economic and technological powers, Japan faces dual pressures: aligning with international technology alliances while maintaining its economic relationship with its largest trading partner. Additional concerns arise from technological marginalization, as Japan's share of global patent applications in artificial intelligence has significantly declined over time, alongside a reduction in its academic competitiveness. In emerging fields such as artificial intelligence and the platform economy, dominant corporations

from other nations have established a duopoly, leaving Japanese firms largely absent from the competitive frontier.

In response to these internal and external pressures, the Japanese government began publishing its annual Integrated Innovation Strategy in 2018, consolidating top-level authority over science and technology innovation from a previously dispersed, ministry-specific model into the Cabinet Office's Council for Science, Technology and Innovation. The sixth Science, Technology and Innovation Basic Plan, launched in 2021, placed a human-centered society at its core, emphasizing a shift from solely pursuing technological competitiveness to balancing social values and sustainable development [2]. These changes represent not only adjustments to policy objectives but also significant transformations in the underlying policy discourse.

This study is organized around the following core questions: (1) What is the thematic structure of Japan's science and technology policy discourse during 2018–2024, and what characteristics does its evolution display over time? (2) What strategies does the policy discourse employ, and how are these strategies adjusted across different periods? (3) How do adjustments in discourse strategy contribute to constructing national identity and policy legitimacy? (4) What socio-historical factors drive the evolution of the discourse? Discourse analysis reveals how governance and legitimacy are achieved by constructing social reality, shaping identities, and delineating boundaries of action [3, 4]. Furthermore, analysis of policy discourse can uncover the power relations and ideologies embedded within texts. Despite its importance, existing research has paid insufficient attention to Japanese science and technology policy discourse, particularly in terms of diachronic analysis of the Integrated Innovation Strategy. This study seeks to address that gap.

2. Literature Review

Critical Discourse Analysis (CDA) emerged in the 1990s, with its central claim being that discourse not only reflects social reality but constructs it [1, 5]. The social-semiotic framework, the socio-cognitive approach, and the Discourse-Historical Approach constitute the three theoretical pillars of CDA, all of which share the position that discourse should be understood as a form of social practice and that textual analysis can reveal the mechanisms of power and the operation of ideology.

The Discourse-Historical Approach (DHA) integrates linguistic analysis with historical and sociological methods, conducting analysis along three dimensions: discourse topics, discourse strategies, and socio-historical context. It identifies five basic discourse strategies: Nomination, Predication, Perspectivation, Argumentation, and Intensification/Mitigation. DHA has been widely applied to political discourse, national defence and security discourse, and identity construction research, consistently demonstrating formidable explanatory power with respect to diachronic evolution and strategic operations [4].

Corpus-Assisted Discourse Studies (CADS) employs computational processing of corpora to systematically identify discourse patterns through word frequency statistics, keyword extraction, and collocation analysis, thereby providing a quantitative foundation for qualitative interpretation. The combination of CADS and DHA is capable both of verifying the researcher's intuitive judgments and of revealing discourse patterns that traditional qualitative analysis is ill-equipped to capture, effectively circumventing the methodological flaw of confirmation bias in conventional CDA research [6, 7].

Within the field of science and technology policy discourse, research has illuminated the deep connection between science and technology discourse and national political culture, examined the historical journey by which the concept of innovation evolved from an economic term into a political rhetoric, and systematically charted the paradigm shift in Japan's innovation policy from a catch-up to a frontier orientation. Within Japanese science and technology policy studies, scholars have largely focused on policy content and technological trends, while comparative institutional analysis has been favored internationally. Both approaches share a lack of systematic scrutiny of discourse strategies and their diachronic evolution. Research combining CADS and DHA to investigate

systematically the discursive evolution of Japan's Integrated Innovation Strategy remains absent from the literature [4].

3. Research Design

3.1. Data Sources and Corpus Construction

The research corpus is derived from the annual Togo Innovation Senryaku (Integrated Innovation Strategy) issued by Japan's Cabinet Office, covering the period 2018 to 2024 and consisting of seven policy documents. Three key considerations guided the selection of this timeframe: first, 2018 marks the midpoint of the fifth Science and Technology Basic Plan (2016–2020), during which policy discourse entered a phase of intensive development; second, the period encompasses both the fifth and sixth policy cycles, enabling the observation of phased discursive transitions; third, this timeframe aligns with significant external events, including the global pandemic and intensifying international technology competition, offering a valuable context for analyzing the interaction between discourse and societal factors [1].

Original texts were sourced in PDF format from the official website of Japan's Cabinet Office, converted to plain text, and refined to include only narrative core paragraphs focused on policy elaboration, objective-setting, and measure descriptions. Non-narrative elements such as charts, data tables, and meeting rosters were excluded. After manual refinement, KH Coder software was employed to utilize the MeCab morphological analyzer for word segmentation. Nouns, verbal nouns (sa-hen meishi), and proper nouns were retained, while formal nouns (e.g., koto, mono), temporal terms, and non-directional policy vocabulary (e.g., promote, implement) were excluded. The final corpus contained 8,312 valid tokens with 1,258 unique types. The distribution of tokens by year is presented in Table 1. The highest token count occurred in 2020 (2,565 tokens), attributed to the significant increase in content addressing the global pandemic that year, while 2023 had the lowest count (569 tokens) due to a more concise narrative style focusing on priority issues. To account for the substantial variation in token counts across years, all analyses apply PTW (per thousand words) normalization throughout [8].

Table 1. Distribution of Corpus Tokens by Year.

Year	2018	2019	2020	2021	2022	2023	2024	Total
Tokens	438	985	2,565	1,309	1,184	569	1,262	8,312

Given the significant variation in token counts across years, PTW (per thousand words) normalization is consistently applied throughout the analysis to mitigate the impact of differences in text length on frequency comparisons.

3.2. Analytical Framework and Research Procedure

This study adopts a tripartite, mutually corroborating path of 'quantitative identification --- qualitative interpretation --- contextual association'. In the first step, KH Coder is used to extract thematic keywords, and their evolutionary trends are identified through PTW normalization and diachronic comparison. In the second step, drawing on five strategic dimensions (Nomination, Predication, Perspectivation, Argumentation, and Intensification/Mitigation) and complemented by KWIC (Keyword in Context) analysis, the diachronic evolution of discourse strategies is systematically examined [9]. In the third step, strategic adjustments are interpreted within concrete socio-historical contexts to reveal the power logic underlying discursive transformation. The core methodological advantage of this path is that quantitative statistics precede theoretical analysis, rendering qualitative interpretation reproducible and effectively addressing the methodological challenge of bias in conventional research approaches.

4. Findings

4.1. Distribution of Corpus Thematic Keywords

After screening and consolidation, 104 thematic keywords were identified and grouped into five functional categories: Category A, 'Innovation Discourse and Capability Construction' (18 items; core examples: Inobēshon [innovation], AI); Category B, 'National Identity and International Positioning' (7 items; core examples: Wagakuni [our country], Sekai [world], Kokusai [international]); Category C, 'Social Value Reorientation' (26 items; core examples: Shakai [society], SDGs, Jizoku [sustainability]); Category D, 'Human Capital and Diversity' (11 items; core examples: Jinzai [human resources], Daigaku [university], Josei [women]); and Category E, 'Policy Planning and Implementation' (42 items; core examples: Senryaku [strategy], Keikaku [plan], Renkei [cooperation]). The fifteen highest-frequency thematic keywords are presented in Table 2.

Table 2. Top 15 High-Frequency Thematic Keywords (Integrated Corpus, 2018--2024).

Rank	Keyword (translation)	Frequency	Category
1	innovation	91	A
2	our country	64	B
3	world	53	B
4	strategy	40	E
5	society	36	C
6	research	36	D
7	policy	32	E
8	international	31	B
9	economy	28	C
10	university	25	D
11	system	25	E
12	basic/fundamental	24	E
13	field/domain	24	E
14	plan	22	E
15	challenge/task	21	C

Frequency counts reflect raw occurrences in the integrated corpus without PTW normalization.

The frequency distribution exhibits a typical long-tail pattern: Inobēshon (91 occurrences) far exceeds all other items and is 4.3 times as frequent as the fifteenth-ranked Kadai (21 occurrences), reflecting a structural characteristic of policy discourse whereby a small number of core concepts dominate the textual space. The predominance of nouns among high-frequency words corroborates the tendency of policy discourse to favor nominalization, a device through which dynamic processes are reified as objective entities, thereby producing an effect of neutrality and authority. In terms of discursive emphasis, Inobēshon occupies an unrivaled central position, complemented by an international orientation expressed through Wagakuni and Sekai, and supported at the implementation level by planning vocabulary such as Senryaku and Keikaku. The appearance of Shakai and Kadai within the top fifteen already signals an early shift in value orientation from economic competition toward social concern.

4.2. Three Patterns of Diachronic Evolution in Thematic Keywords

Following PTW normalization, the diachronic trajectories of ten representative thematic keywords fall into three distinct evolutionary patterns.

Pattern 1: Gradual stabilization [10, 11]. Both thematic keywords reach extreme peaks in 2018 before declining sharply and stabilizing. This 'intensive construction --- discursive consolidation' trajectory reveals the typical mechanism by which policy discourse establishes core concepts: high-frequency repetition at a specific moment in time secures the concept's central status, after which no continuous reinforcement is required --- the concept transforms into the 'infrastructure' of discursive operation. Contextual analysis

shows that the discursive function of one keyword underwent a qualitative shift from 'crisis construction' in 2018 (frequent co-occurrence with terms indicating disruption in the left context and relative decline in the right) to 'value internalization' in 2024 (the right context shifting toward international development and broader sustainable development goals), corroborating a functional transformation concealed beneath a stable word frequency.

Pattern 2: Sustained increase. One thematic keyword rises continuously from a PTW of 61.6 in 2018, surging to 309.3 in 2023 (approximately five times the 2018 figure). Contextual analysis reveals that this keyword underwent a leap in discursive status: from a subordinate component within compound terms (in which another term consistently preceded it, 2018--2020) to an independent value subject (with phrases indicating social transformation and problem-solving appearing in abundance in 2023). Particularly noteworthy is the fact that the PTW of the loanword marker declined continuously from 27.4 in 2018 to approximately 10 after 2020 --- a conspicuous inverse trend relative to the rise of the native term [5]. This reveals that the concept has completed a journey of internalization from a 'new concept requiring a loanword marker' to a 'mature discourse adequately expressed in native vocabulary.'

Pattern 3: Sharp decline or disappearance. One thematic keyword fell from a PTW of 75.3 in 2018 to zero after 2022; another declined from seven occurrences in 2018 to zero after 2021. The disappearance of these items is not an abandonment of the underlying ideas but a strategic transformation of discourse strategy: the sustainable development values represented by one concept have been internalized into native vocabulary such as terms indicating society, challenges, and sustainability; the radical threat narrative associated with another concept has yielded to more constructive expressions such as transformation and problem-solving [12]. The countervailing trajectories of these keywords, alongside the disappearance of one and the rise of another, together reveal a fundamental discursive shift from 'following international agendas' to 'constructing an autonomous framework.'

4.3. DHA Discourse Strategy Analysis

Drawing on the five strategic dimensions of DHA, this study systematically analyzes the construction mechanisms and diachronic transformation of Japan's science and technology policy discourse.

1. Nomination: the construction of subject positions and conceptual frameworks. Across seven years of white papers, the term 'Wagakuni' appears 64 times, while the neutral third-person designation 'Nihon' (Japan) appears only 3 times. The first-person collective nomination blurs the boundary between government and public, activating collective identification by constructing an 'imagined community' and converting macro-level policy into a matter of individual emotional belonging. The contrastive logic of nomination is particularly striking: 'In the United States and China there have emerged... whereas in our country... do not exist' — employing a 'presence vs. absence' structure to complete the 'disadvantage nomination' of the domestic subject, thereby establishing an emotional basis for policy intervention. Loanword nominations serve a dual indexical function: 'Inobēshon' replaces the native word 'Kakushin' ('reform/innovation'), and 'Society 5.0' enters the discourse in the form of an English word combined with a numeral, both endowing policy concepts with connotations of novelty and internationalism. As the discourse matured, however, loanword markers progressively receded, and the native word 'Shakai' took over the central position in the policy narrative — representing a transfer of nominative discursive power from 'leveraging international agendas' to 'constructing an autonomous framework'.
2. Predication: the attribution of subject properties and value transformation. The predicative attributes assigned to 'Wagakuni' differ markedly across periods. In earlier years, the term appeared predominantly in contexts of capability discourse, constructing a capable subject with solid foundations and considerable potential. In

later years, it co-occurred more frequently with problem discourse, shifting toward the construction of a problem subject in crisis and urgently requiring transformation. This predicative shift does not objectively reflect a change in real conditions; it is a strategic discursive adjustment through which problem predication — by foregrounding difficulties and crises — constructs the urgency and necessity of change with greater mobilizing force. The predication of 'Shakai,' for its part, underwent a qualitative transformation from descriptive (economic and social system) to normative (human-centered society, a society that leaves no one behind), elevating policy objectives from objective description to value advocacy and completing a discursive functional shift from 'what is' to 'what ought to be'.

3. Perspectivation: the selective construction of comparative frameworks. The selection of objects for international comparison is highly strategic: statistics show that references to the United States and China together account for a significant majority of international comparisons, while neighboring countries such as South Korea and ASEAN are barely mentioned. This selection positions Japan as a participant in 'great-power competition' and amplifies the impetus for reform by emphasizing the gap with first-tier rivals. The comparative framework features two characteristic structures — 'presence vs. absence' (Japan lacks large platform companies) and 'fast vs. slow' (other countries are accelerating while Japan's responses lag) — which construct respectively a sense of deficit and a sense of urgency. The temporal perspective similarly evolved, shifting from 'past vs. present' ('Japan once led the world in... but now...') to 'present vs. future' ('By 2030, we will realize...'), corresponding to an overall transformation in discursive tone from a 'decline-and-revival narrative' to a 'goal-and-vision narrative'.
4. Argumentation: laying the logical groundwork for legitimacy. The core argumentative structure of the policy discourse is a causal chain: external disruptive change → relative decline in national capability → reform is imperative → specific measures are implemented. Through causal connectives, the discourse constructs policy intervention as the 'inevitable response' to objective circumstances, concealing the subjective selectivity involved. The teleological argumentation constructs a four-tier value chain — 'technological innovation → economic development → social values → human well-being' — in which 'humanity' is established as the ultimate purpose, with predicative formulations such as 'leaving no one behind' providing moral legitimacy for the entire policy system. The combined power effect of both forms of argumentation is to present particular policy choices as the only rational path, effectively foreclosing alternative possibilities.
5. Intensification/Mitigation: phased regulation of discursive intensity. The first phase made extensive use of intensification devices: degree adverbs were stacked in dense configurations; absolute negative expressions constructed a total absence amounting to zero; temporal adverbs generated a sense of standing at a historic juncture; and cumulative enumeration of multiple pressures reinforced a cognitive frame of internal and external crisis. Entering the second phase, a marked mitigation tendency emerged: confrontational terms yielded to more neutral ones, absolute negatives decreased, and affirmative, goal-oriented formulations such as 'aiming for...' and 'working toward the realization of...' increased significantly. This shift from a confrontational to a conciliatory discursive tone is entirely consistent with the post-pandemic rise of the values of 'resilience' and 'inclusivity' in the international discursive environment, and with the reorientation of Japan's policy focus from external competition to internal social construction.

5. Discussion

5.1. Socio-Historical Drivers of the Three-Phase Discursive Evolution

The adjustments in discourse strategy are not merely rhetorical techniques but represent strategic responses by which the government adapts to internal and external pressures within specific historical contexts.

Phase 1 (2018–2020): Crisis mobilisation and framework construction. The intensification of technological competition, coupled with entrenched bureaucratic practices and resistance within fragmented research funding structures, prompted the government to construct an extreme cognitive frame of 'crisis on all fronts, a historic turning point.' This was achieved through the use of high-intensity vocabulary, repeated comparisons with global developments, and temporal intensifiers. The political function of this crisis narrative was twofold: to provide top-down reforms with discursive legitimacy as 'extraordinary measures for extraordinary times' and to support the large-scale resource concentration envisioned by the 'Public-Private Research and Development Investment Expansion Plan' launched in 2018. This plan aimed to increase R&D investment to exceed 4% of GDP by 2025. The crisis discourse served as a tool of 'deterrence,' enabling administrative leadership to overcome resistance from vested interests and enforce the centralisation of resources.

Phase 2 (2020–2022): Blame-shifting and discursive redirection. The COVID-19 pandemic in 2020 exposed significant weaknesses in digital administration, symbolised by outdated practices and technical failures in public health applications [13]. These shortcomings undermined the national self-image as a leader in science and technology. Concurrently, a decline in doctoral enrolment and a broader deterioration in academic competitiveness became evident. In response, the government employed frequent negative characterisations of university institutions, attributing the decline in academic output to internal institutional deficiencies rather than to insufficient government investment or policy shortcomings. This narrative not only allowed the government to deflect political responsibility but also legitimised the establishment of a substantial university endowment fund in 2021. While presented as an increase in investment, this fund effectively strengthened governmental control over universities through financial mechanisms.

Phase 3 (2023–2024): Value reordering and 'dimensional-reduction breakthrough.' Amid growing social challenges, including income inequality, declining birth rates, and regional depopulation, the government shifted its evaluative standards for science and technology. The focus moved from traditional metrics such as GDP contribution and patent counts to broader measures of social contribution, including well-being and problem-solving. Long-standing domestic challenges, such as an ageing population, regional decline, and natural disasters, were reframed as strategic advantages, positioning the nation as a leader in addressing social challenges. This redefinition opened a path for international competition in moral and social dimensions, reducing reliance on hard-power metrics.

5.2. The Operational Logic of Discursive Power

A comprehensive survey of the three phases reveals three underlying operational logics of discursive power in Japan's science and technology policy discourse [14]. First, selective responsiveness: policy discourse strategically emphasizes certain changes while concealing others. The first phase heavily focused on international technology competition while rarely addressing the self-induced decline of Japan's consumer electronics and semiconductor industries; the third phase frequently emphasized social challenges while downplaying the fiscal crisis associated with a government-debt-to-GDP ratio of 264%. Second, pre-framed problem attribution: attributing the decline in academic output to the rigidity of the university system, rather than to insufficient government resource allocation, logically directs attention toward strengthening administrative control rather than expanding academic autonomy. This approach effectively pre-selects policy options through the construction of discursive premises. Third, agenda

substitution: when disadvantaged within existing dimensions of competition, new dimensions are created through discursive construction, establishing a position of advantage in these new areas. From the concept of "a nation built on science and technology" to "a human-centered society," and from "catching up with technology powers" to "leading sustainable development," discourse provides a continuous mechanism for reproducing policy legitimacy through agenda substitution. This process delineates the horizon of possibilities and defines the boundaries of action, illustrating the operational logic of discursive power.

6. Conclusion

Applying a combined methodology of CADS and DHA to the Integrated Innovation Strategies published over a defined period, this study has conducted a systematic diachronic examination of Japanese science and technology (S&T) policy discourse. The following core conclusions emerge.

At the level of discursive evolutionary patterns, Japan's S&T policy discourse underwent a three-phase strategic transition of 'crisis mobilisation --- blame-shifting --- value reordering,' with an overall trajectory constituting a deep-level transformation from 'international agenda alignment' to 'autonomous framework construction' and from 'competitive narration' to 'social narration.' At the lexical level, this transformation is expressed as the retreat of core competitive vocabulary and the rise of native social vocabulary. At the strategic level, it is expressed as: nomination shifting from loanword markers to native vocabulary; predication shifting from capability discourse to problem discourse; perspective shifting from 'past vs. present' to 'present vs. future'; argumentation shifting from causal chains to teleological chains; and discursive intensity shifting from confrontational to conciliatory.

At the level of theoretical contribution, this study integrates CADS's quantitative identification with DHA's qualitative interpretation, constructing a tripartite mutually corroborating analytical model of 'quantitative tracing --- qualitative deconstruction --- historical attribution,' offering a methodological reference for diachronic policy discourse research and extending the domain of CDA's application in the S&T policy field. The research demonstrates that S&T policy white papers are not neutral technical-planning documents; they are core discursive instruments through which governments conduct resource redistribution, crisis management, and legitimacy production.

At the level of practical implications, a clear-sighted reading of the 'discursive rhetoric' in Japan's S&T policy discourse helps analysts penetrate the surface narratives of 'social co-creation' and 'human-centred values' to accurately identify the deeper strategic intentions of strengthening administrative control, reconstructing academic power relations, and seeking discursive authority in specific international arenas — insights of reference value for the formulation of S&T policies and for fostering international science and technology diplomacy.

This study has two limitations. First, the corpus is restricted to top-level Cabinet Office documents and does not incorporate derivative texts such as deliberation records or ministry budget documents, leaving the study's examination of discursive intertextuality incomplete. Second, the research focus is on the strategic intentions of the government as text producer and does not adequately examine the counter-deconstructive practices directed at official discourse by the academic community, the media, and the public. Future research could expand in the following directions: introducing cross-national comparison by constructing a parallel corpus of Japanese S&T policy discourse alongside relevant texts from other nations; introducing multimodal Critical Discourse Analysis to examine the collaborative construction by charts and visual elements alongside verbal text; and extending downward to the social circulation of discourse, tracking the evolution and resistance of official S&T discourse in public opinion arenas, so as to present the complete picture of the power operation through which national S&T policy travels from 'discourse production' to 'social reconstruction.'

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