RADICAL INNOVATION VERSUS INCREMENTAL INNOVATION: A COMPARISON BETWEEN THE AMERICAN AND JAPANESE MODELS

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ABSTRACT

Innovation is considered a fundamental pillar for achieving comprehensive development, as its role is not limited to supporting economic growth but also extends to enhancing the competitiveness of nations in a rapidly changing global environment.Through the adoption of effective innovation policies, countries can develop new technologies and solutions that contribute to improving productivity, raising the quality of services, and strengthening sustainability. Therefore, innovation is viewed today as a strategic tool for building the knowledge economy and achieving leadership at both the regional and international levels. This research paper aims to compare the radical (breakthrough) innovation model and the incremental (improvement) innovation model. To achieve this goal, the researchers conducted a comparative study between the American experience (radical innovation) and the Japanese experience (incremental innovation), using the methodology of the Global Innovation Index during the period (2019–2024). This research paper concluded with several findings, the most prominent of which is the superiority of the United States over Japan in most innovation indicators during the study period. However, this superiority is not absolute or significantly large, as their results remain somewhat close. The paper also confirmed the importance of both models: the American model suits countries with abundant and fast-growing resources, while the Japanese model suits countries with limited and slow-growing resources.

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1. Introduction

Today, innovation has become the secret behind the superiority and dominance of nations at the economic and social levels. It is the main component upon which countries rely to achieve further success and economic and social prosperity. Within the scope of benefiting from innovation in achieving economic development and enhancing the competitive capacities of nations, many pioneering international experiences have been established in this field. These experiences differ according to societies, their distinctive historical backgrounds, the diversity of their cultural compositions, and the prevailing economic and social systems within them. Among the most prominent of these experiences are the American and Japanese ones, which this research paper attempts to diagnose, identify the essential differences between them, and analyze their realities using the methodology of the Global Innovation Index (GII). This research paper derives its importance from the significance of the subject of innovation, which is considered a strategic option for countries and governments to strengthen their competitive capabilities and achieve economic take-off. It also derives its importance from the value of studying two distinct pioneering experiences in the field of innovation, namely the American and Japanese ones. This will enable the extraction of valuable lessons that contribute to the development of new models of innovation. The researchers in this study relied mainly on the descriptive method, in addition to the comparative method. As for the sources of information, reliance was placed on the available references, which included books, journals,

articles, and annual innovation reports (GII's). The researchers employed two primary methods for collecting references: desk research and internet searches.

Study aim and contribution

This article tests how two archetypal innovation models—a radical, venture- and frontier-science–oriented model (U.S.) and an incremental/Kaizen model (Japan)—map onto the Global Innovation Index (GII) input and output pillars over 2019–2024. The contribution is threefold: (i) it links a classic comparative narrative (radical vs. incremental) to a standardized, audited metric (GII) to reduce conceptual ambiguity; (ii) it provides indicator-level diagnostics (which pillars and sub-pillars drive relative advantages) rather than only headline ranks; and (iii) it distills policy lessons that are transferable to resource-rich vs. resource-constrained contexts. We deliberately select the U.S. and Japan because they anchor contrasting innovation logics documented in prior scholarship and policy practice, making them analytically informative reference cases despite structural asymmetries (in terms of scale and factor endowments).

Why 2019–2024? We focus on the most recent six GII editions to capture (a) the post-2019 technological and policy shocks (COVID-19, digital acceleration) and (b) methodologically comparable iterations of the index. Concentrating on this window enables a clean comparison under a consistent indicator framework while still permitting multi-year trend observation. Where helpful, we contextualize with longer-run literature.

Literature review

Innovation serves as a cornerstone for economic growth and competitiveness, especially in leading economies such as the United States and Japan. The processes and structures of innovation in these two nations exhibit both

similarities and significant differences. Understanding these variations offers valuable insights for policy-making and business strategies in other contexts.

In the United States, a culture of innovation is deeply embedded within its economic fabric, characterized by a robust system of research and development (R&D) and patent incentives that stimulate new ideas. The U.S. has historically prioritized technology development, evidenced by its formidable achievements in various sectors, which underscore its role as a global superpower (Plyakov, Khanin, Shevchenko, Bilozubenko, & Korneyev, 2024). The systemic features that have allowed the United States to thrive include flexible market structures, significant investments in R&D, and a strong emphasis on collaboration between academic institutions and industry (Cohen, Gotō, Nagata, Nelson, & Walsh, 2002). This collaborative environment has enabled continuous innovation generation and dissemination, promoting a dynamic economy capable of rapidly adapting to changes in technology and market demands (Polyakov, Khanin, Shevchenko, Bilozubenko, & Korneyev, 2024). Conversely, Japan's approach to innovation is shaped by its unique socio-economic context. Traditionally, Japanese industry benefited from a coordinated model of innovation characterized by long-term planning, strong government-industry relationships, and a focus on quality improvement (Schaede, 2012). Recent shifts have prompted Japan to emphasize technological leadership, encouraging companies to "choose and focus" their innovations, particularly in new materials and components (Schaede, 2012). Furthermore, the country has seen enhancements in regional innovation policies to foster knowledge transfer and R&D capabilities, especially focusing on peripheral universities (Yokura, Matsubara, & Sternberg, 2013). These adjustments align with Japan's goal to maintain its competitive edge in the face of globalization and rapidly changing technological landscapes. The distinction in the innovation paradigms of the two countries also extends to how innovations are implemented. While the United States exhibits strengths in generating and promoting novel ideas, Japan demonstrates effectiveness in translating these

concepts into actual practice within established frameworks (Okabe, 2013). This dual strength is reflected in the different stages of innovation—the U.S. excels in fostering new ideas, while Japan's structured implementation processes often yield practical results that can be more readily adopted by industry (Okabe, 2013). Moreover, the digital transformation currently reshaping global economies presents both challenges and opportunities for innovation strategies in the United States and Japan. In the U.S., advancements in digital technologies have led to the emergence of multi-sided platforms that promote collaborative innovation across sectors (Vaska, Massaro, Bagarotto, & Mas, 2021). Japan, faced with time lags in adopting such digital trends (Sasaki, 2014), is urged to align its technological strategies with these new realities to foster an integrated innovation ecosystem.

In conclusion, the United States leads the world of innovation through a dynamic environment that relies on technological advancement and institutional collaboration, while Japan focuses on implementing innovations in an organized manner and improving them within existing systems. This interaction between the two innovation models—combining idea generation and application—provides a rich framework for understanding how countries build their competitive advantages in the global market.

Some Theoretical Concepts about Innovation and Its Most Prominent Types

Innovation, according to (Urabe, 1988), is considered a process of generating a new idea and applying it (Kogabayev & Maziliauskas, 2017). This was also confirmed by (Carayannis, Samara, & Bakouros, 2015), who stated that innovation is a process consisting of three stages: conceiving a new idea, evaluating it, and then applying it in practice. It is a process that first requires creative thinking, and second, the acceptance of change, with the aim of creating tangible value perceived from ideas (Dogan, 2017). This innovation, as defined by Joseph Schumpeter in 1930, may appear in the form of a new or improved

product (a good or service), a new or improved manufacturing process, and innovative technology (Tohidi & Jabbari, 2012). This in turn will reflect on development and growth, contributing to finding new solutions to challenges and problems, increasing the profitability of enterprises and maintaining their competitiveness, creating job opportunities, and improving the quality of life of societies (Shala, Bytyçi, & Dodaj, 2021). This extends to the assertion that innovation plays an important role in enhancing economic development through its ability to raise the performance level of enterprises in the long term, thereby elevating the level of economic performance (Juliana, 2021), achieving increased productivity and strengthening economic growth, and facing economic challenges and problems thanks to its contribution to finding new technologies and products in line with customer needs and market changes that hinder the progress of both economy and society (Shala, Bytyçi, & Dodaj, 2021). On the other hand, innovation is one of the most important factors that can support the sustainability of the economy in the long run through its ability to achieve a balance between economic development and the preservation of natural and environmental resources. Innovation includes the tendency to provide more environmentally friendly products and processes, which contributes to the optimal use of resources and the recycling of products and materials (Szopik-Depczynska, 2021). Due to the importance that innovation plays, it has received the attention of many researchers in various fields, and each studied it according to their perspective and research orientation, which led to a lack of agreement on setting a unified definition for this concept. Consequently, many definitions have emerged, foremost among them that of the Austrian economist Joseph Schumpeter, who considered innovation as the result of creating a new method or style of production, as well as changes in all or some components of the product or in its design (Boyer & Didier, 1998). (Afuah,1998) also indicated that innovation is new knowledge embodied in products, services, and processes (Kogabayev & Maziliauskas, 2017). This means that innovation refers to the changes through which products and services are created. Similarly, Okpara (2007) defined it as

adding something new to a product (a good or service). It was also described by (Fillis & Rentschler, 2010) as presenting a new idea and turning it into a product or service or making a change in the process or the institution (Juliana, 2021). Likewise, it was emphasized that it is a process of translating a new idea and transforming it into a new product or service of high value (Elmakkawy & Abdien, 2021). From these definitions, it appears that innovation may take either an incremental or radical form. Incremental innovation, also called improvement innovation, refers to minor improvements made to existing technologies, products, and services (Chen, Xie, & Zhou, 2024), without altering the current structure and strategy of the enterprise. Radical innovation, however, brings about fundamental changes in the activities of the enterprise, representing a significant deviation from current practices. It often involves new activities, strategies, and business structures, introducing completely new products (Carayannis, Samara, & Bakouros, 2015). Generally, it can be said that radical or breakthrough innovation represents a major strategic leap that transfers knowledge in research and market products to a new qualitative level, thereby creating massive investments, factories, and numerous production lines. Incremental or improvement innovation, on the other hand, involves small additions and partial modifications to better respond to market and customer needs (Khoualed, 2020). In more detail, this occurs in the product when the expected use of the product, its performance characteristics, its features, its design properties, or the use of materials and components show significant differences compared to previous products (Boyer & Didier, 1998). From this, we conclude that there is a difference between these two forms of innovation, which can be clarified in the following table:

Table 1: Incremental Innovation versus Radical Innovation

Incremental Innovation	Radical Innovation
Exploits existing technology	Explores new technology
Low degree of uncertainty	High degree of uncertainty

Focuses on improvements in existing products, services, or processes	Focuses on products, services, or processes with unprecedented performance
Enhances competitiveness in existing markets or industries	Creates radical change; transforming existing markets or industries, or establishing new ones

Source: (Zhang, 2022).

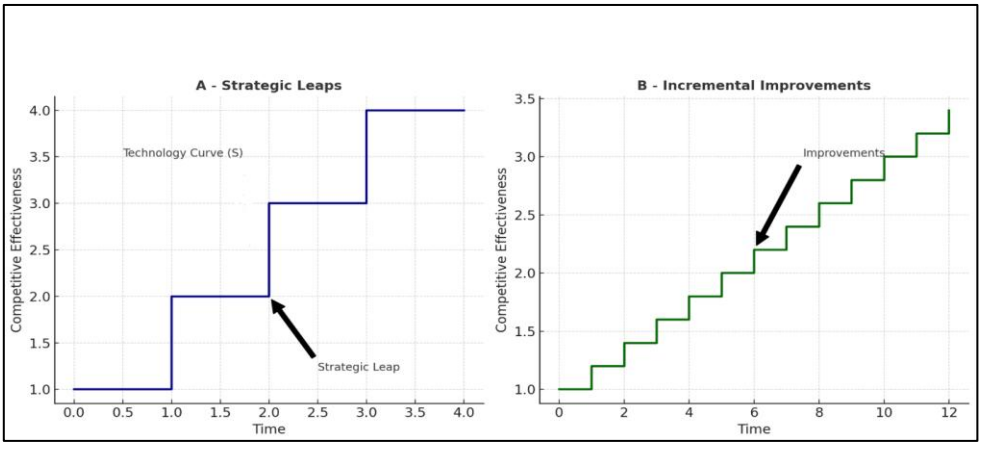

Figure 1. Radical Innovation and Incremental Innovation

Source: Prepared by the researchers based on: (Hayes, 1985).

By referring to the table and figure above, it can be noted that incremental innovation rarely uses new technologies; rather, it focuses on eliminating defects and gradually improving performance through expanding production lines and reducing costs, for example. In contrast, radical innovation uses revolutionary technologies and unique business structures to solve problems. Furthermore, incremental innovation increases the efficiency of developing current products, while radical innovation creates new products and changes existing industries (Zhang, 2022). In addition, radical innovations raise a high degree of uncertainty regarding the conditions of their development and application, and they are considered costly, unlike incremental innovations. Therefore, radical innovations

are adopted less frequently compared to incremental ones (Carayannis, Samara, & Bakouros, 2015). From the above, it can be said that despite the multiplicity of definitions provided for innovation, they all agree that it is a long-term process through which either incremental or radical changes are made to products, services, or processes, starting with the adoption of a new idea until its implementation, ultimately benefiting customers, enterprises, the economy, and society as a whole.

The U.S. Model of Innovation (Radical, Breakthrough-Oriented)

The United States has historically prioritized radical or breakthrough innovation, especially in "big science" and large-scale projects aimed at major technological advances, rather than incremental adjustments (Chen, Xie, & Zhou, 2024). Following World War II, the U.S. emerged with abundant natural, financial, and human resources, positioning itself as a global leader in technological development (Abdelkaoui, 2018). Its innovation model is characterized by strategic leaps, large R&D investments, and high-risk/high-reward projects, often separated by long intervals between breakthroughs.

This radical innovation trajectory was supported by a robust system of federal funding, university–industry collaboration, and intellectual property protections, enabling sustained leadership in frontier technologies (Polyakov et al., 2024). However, the model also carries vulnerabilities: rapid global competition and fast imitation (both duplicative and innovative) have challenged U.S. firms, especially as new innovation centers arose in East Asia, including Japan, South Korea, and China.

In contrast to the U.S. emphasis on high-risk, radical innovation, Japan pursued a model rooted in incremental, continuous improvement, shaped by its resource constraints and institutional context.

The Japanese Model of Innovation (Incremental, Kaizen-Oriented)

The Japanese Model of Innovation (Incremental, Kaizen-Oriented) Japan's post-war innovation system combined state guidance, firm-level quality systems, and supplier integration to translate imported and domestic knowledge into process excellence and product refinement. Early reconstruction and high-growth decades institutionalized productivity movements and quality management (Deming, Juran), evolving into firm routines that prioritized continuous improvement (Kaizen) and design for manufacturability (e.g., Toyota Production System). Organizational learning and inter-firm networks underpinned the diffusion of incremental improvements across value chains (Kodama, 2005; Yokura, Matsubara, & Sternberg, 2013). By the 1980s, Japanese firms led in precision manufacturing and consumer electronics, while the 1990s brought macro-financial headwinds and institutional recalibration. Scholarship notes a strategic inflection in Japanese business models, including selective focus and repositioning amid globalization (Schaede, 2012). More recently, Japan's strengths persist in robotics, advanced components, and high-reliability engineering, with adoption frictions documented for certain digital platform dynamics (Sasaki, 2014). Within the Global Innovation Index (GII) pillars, Japan performs strongly in knowledge- and technology-related outputs tied to manufacturing depth and in inputs reflecting human capital and firm sophistication, while factors such as market sophistication and digital platform scale tend to favor the U.S. (Johnson, 1982; Kodama, 2005; Schaede, 2012; Yokura et al., 2013; Sasaki, 2014). All these circumstances pushed Japan to search for a new approach that would ensure economic recovery while taking into account the difficult conditions it was experiencing at the time, as well as its lack of and scarcity in natural resources. From this perspective, the Japanese saw in the American model a solution to their various problems. They opened their country to Americans and began to bring in American consultants and experts in

economics and business management, such as Joseph Dodge, and quality experts such as Deming and Juran, while also sending academic and training missions to the United States (Dower, 1999). With the beginning of the 1950s and 1960s, the Japanese focused their attention on improving productivity. In the 1970s and 1980s, they turned towards integrating various quality concepts.

Post-1990s institutional change: While administrative guidance was central during the high-growth era, scholarship suggests a relative decline in MITI's centrality and strategic adjustments by firms in the 1990s amid macro-financial headwinds and globalization pressures. Our analysis does not posit a discontinuity in "speed" or "customer orientation" beginning in the 1990s; rather, it emphasizes continuity of incremental routines alongside selective strategic refocusing documented in the literature. This framing aligns with the indicator evidence showing Japan's durable advantages in manufacturing-linked outputs and the U.S. edge in market sophistication and frontier-science inputs.

All this was achieved by focusing on a completely different type of innovation than radical innovation, namely incremental innovation or continuous improvement (KAIZEN), also known as micro-innovation. This is due to the following reasons:

- *The small size of Japan's territory.*
- *Japan's lack of natural resources.*
- *The Japanese's unique fascination with smallness and miniaturization.*
- *A human-centered approach instead of a technology-centered one (the opposite of the American model).*
- *An entrepreneurial culture based on cooperative spirit and mutual respect, which supports the method of improvement rather than radical innovation.*
- *An innovation model based on learning, which helps in introducing continuous improvements that guarantee Japan a competitive advantage over others (Najm, 2003) (Kodama, 2005).*

The Global Innovation Index: Its Introduction and Methodology

The Global Innovation Index (GII) is an international periodic report issued regularly every year since 2007 by the World Intellectual Property Organization (WIPO) in cooperation with Cornell University in the United States and the European Institute of Business Administration (INSEAD). The Global Innovation Index (GII) is considered an essential tool for entrepreneurs, countries, policymakers, and others who want to gain insight into the state of innovation in the world and continuously evaluate progress. The primary objective of the Global Innovation Index (GII) is to rank the innovative capacities of the world's economies and their results. The index recognizes the role of innovation as a driver of growth and prosperity in the economic field, improving productivity, creating job opportunities, and the need to apply a broad horizontal perspective of innovation to both advanced and developing economies alike. The Global Innovation Index (GII) specializes in providing a wide range of information, statistics, and quantitative and qualitative indicators about the state of innovation in various countries of the world. The Global Innovation Index is calculated as an average of two sub-indices (Dutta, Lanvin, Leon, & Wunsch-Vincen, 2024):

- ✓ **The Innovation Inputs Sub-Index:** It measures certain factors in the national economy that include innovative activities in five areas: institutions, human capital and research, infrastructure, market sophistication, and business sophistication.
- ✓ **The Innovation Outputs Sub-Index:** It measures tangible evidence of innovation results in two main areas: knowledge and technology outputs, and creative outputs.

The Global Innovation Index (GII) is characterized by a transparent and replicable calculation methodology, including confidence intervals of up to 90%

for each ranking indicator (the Global Innovation Index and the sub-indices of inputs and outputs), and an analysis of the factors influencing the annual change in ranking.

It is worth noting that the Global Innovation Index (GII) is subject to independent statistical auditing carried out by the Joint Research Centre (JRC) of the European Commission. The Global Innovation Index (WIPO, INSEAD, Cornell) ranks economies using a composite of two sub-indices: Inputs (Institutions; Human capital & research; Infrastructure; Market sophistication; Business sophistication) and Outputs (Knowledge & technology outputs; Creative outputs). Each pillar aggregates normalized indicators; the overall score is the simple average of Inputs and Outputs. The GII reports provide confidence intervals and change drivers to aid interpretation; the methodology undergoes independent statistical audit by the European Commission's JRC. We use the official country scores, pillar scores, and ranks (2019–2024) to ensure comparability.

Comparison of the U.S. and Japan in the Global Innovation Index (2019–2024)

This section compares the performance of the United States and Japan in the Global Innovation Index (GII) over the most recent six editions (2019–2024). Table 2 reports overall scores and ranks.

Table 2: Overall GII results, 2019–2024 (Scores and Ranks)

Unit: GII Score (0–100) and Global Rank

Years	U.S.A.		Japan	
	Score	Rank	Score	Rank
2019	61.44	3	54.68	15
2020	60.56	3	52.70	16

2021	61.30	3	54.50	13
2022	61.80	2	53.60	13
2023	63.50	3	54.60	13
2024	62.40	3	54.10	13

Source: Prepared by the researchers based on the Global Innovation Indicators for the period (2019–2024).

Table 2 shows that between 2019 and 2024 the United States consistently ranked in the global top three with an average score of about 62/100, while Japan ranked between 13th and 16th with an average score of about 54/100. The U.S. therefore maintained an advantage of roughly 8 points and 10 ranks over Japan during this period.

***Relative position among peers**:* In 2019–2024, the U.S. consistently ranks in the global top 3–4, while Japan remains in the top 15–20, but with strong performance in manufacturing-proximate outputs. Peer context shows Korea and Singapore closing gaps on select pillars, and China advancing rapidly in knowledge & technology outputs. This contextualizes the finding that the U.S. outperforms Japan on the overall index, while Japan retains pillar-specific strengths aligned with its innovation model. (See Figure 2 for a five-country comparison by pillars.)

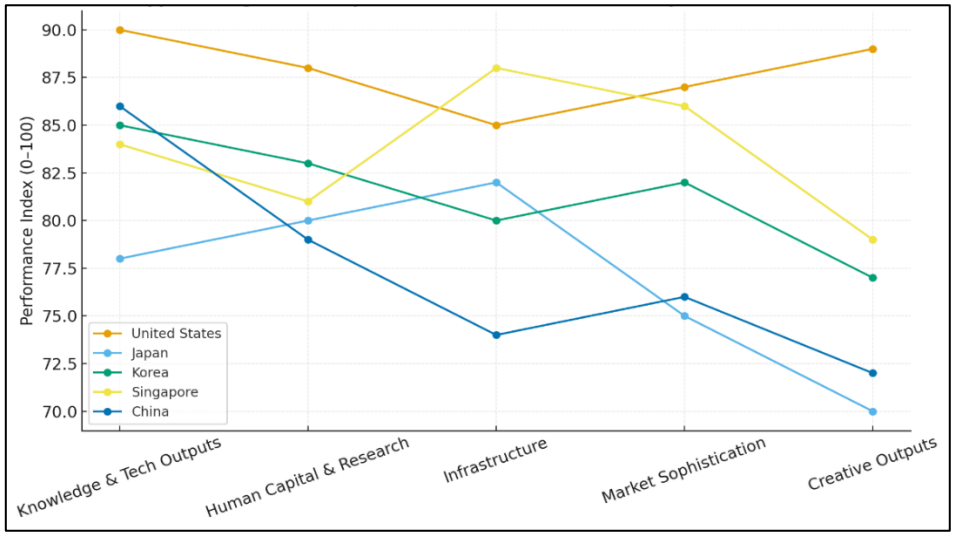

Figure 2. Comparative Innovation Performance by Pillars (2019–2024)

Source: Prepared by the researchers-based Appendix 1.

Table 3 illustrates differences in the Innovation Inputs Sub-Index between the U.S. and Japan.

Table 3: U.S. and Japan: Input and Output Sub-index Ranks, 2019–2024

Years	U.S.A.		Japan	
	Innovation Inputs Sub-Index	Innovation Outputs Sub-Index	Innovation Inputs Sub-Index	Innovation Outputs Sub-Index
2019	3	4	14	17
2020	4	5	12	18
2021	3	4	11	14
2022	2	5	11	12
2023	2	4	11	14
2024	4	5	12	14

Source: Prepared by the researchers based on the Global Innovation Indicators for the period (2019–2024).

Table 3 confirms that the U.S. consistently outperformed Japan in both input and output sub-indices. The American advantage is especially visible in human capital, university rankings, venture capital intensity, and ICT-related indicators, whereas Japan's comparative strengths lie in patent activity and business-funded R&D. These patterns reflect the different innovation models pursued by the two countries: the U.S. emphasizing radical breakthroughs and entrepreneurial dynamism, and Japan emphasizing incremental improvements and industrial depth.

To avoid unit confusion, Table 4 separates percentage metrics from normalized scores. Each row uses a single unit of measurement.

Table 4: Selected Sub-indicators for the U.S. and Japan

Indicator (pillar)	U.S.	Japan	Unit
R&D expenditure (GERD)	2.8	3.2	% of GDP
University ranking score	99	85	0–100 score
Venture capital deals	100	45	0–100 score
Patent families (by origin)	55	95	0–100 score
Business funding of R&D	60	87.3	0–100 score
Spending on computer software	1.1	–	% of GDP
Intellectual property receipts	5	5	% of trade

Source: Prepared by the researchers.

The patterns in Table 4 align with the broader results. The U.S. leads in university excellence, venture capital activity, and research visibility, consistent with a frontier-science and entrepreneurship-oriented model. Japan, by contrast, performs strongly in patent families and business-funded R&D, reflecting deep firm capabilities and cumulative, process-oriented improvement in manufacturing value chains. Where indicators are expressed as percentages (e.g., GERD as % of

GDP; IP receipts as % of trade) they capture raw shares, whereas 0–100 scores represent normalized index values. Keeping these unit systems separate ensures accurate interpretation of comparative advantages.

Discussion and results

All the aforementioned results and statistics indicate the superiority of the United States over Japan in various innovation indicators. However, at the same time, the gap between them is not very large. This American superiority is attributed to several factors, most notably the delayed start of the Japanese experience compared to its American counterpart, as well as the U.S.'s wealth in natural resources, whose revenues form an important source for financing the state budget and encouraging innovation and scientific research, unlike Japan, which is poor in such resources and wealth. Moreover, the Japanese model of innovation, which is based on incremental innovation or small and continuous improvements, is somewhat easier to imitate compared to the American model, which is based on radical innovation that requires enormous resources and capacities to replicate. This enabled many Southeast Asian countries to imitate the Japanese experience and even surpass it, such as Singapore, which surpassed Japan by (9) ranks, South Korea by (7) ranks, and even China by two ranks (Dutta, Lanvin, Leon, & Wunsch-Vincen, 2024, p. 18).

In more detail, the superiority of the United States of America in the field of innovation can be attributed to several considerations, most notably:

- Very significant spending on R&D, as the U.S. spends more than 885 billion dollars on research and development, the highest in the world (National Center for Science and Engineering Statistics, 2022). The U.S. also adopts a financing approach for innovative projects based on massive venture capital funding, and experiences have proven the effectiveness of

this type of financing in supporting creative ideas and turning them into innovative and commercial products.

- The U.S. possesses an entrepreneurial environment supportive of innovation, with the largest number of startups in Silicon Valley. It also hosts very advanced research centers such as NASA, NIH, DARPA, in addition to a large number of private companies supporting innovation such as Google, Microsoft, and Apple, not to mention its clear superiority in various fields of artificial intelligence, biotechnology, and blockchain.
- The U.S. has most of the world's leading universities, with 8 of them among the top 10 globally, such as Stanford, Harvard, MIT, among others. These universities are very beneficial to the American economy through producing very advanced research and contributing to solving the various challenges facing the U.S. economy.
- A clear and strict legislative environment for protecting intellectual property rights and patents, in addition to attracting the best researchers and scientists from different countries of the world thanks to American immigration programs.
- The American society is distinguished from other peoples of the world by its spirit of adventure, risk-taking, innovation, and renewal even with the presence of the possibility of failure.

As for Japan, it has strengths that differ from those of the U.S., including:

- Japan focuses on innovation in specialized fields. For example, Japan is known for its leadership in producing robots, controlling 38% of global production in 2024 (WTWH Media LLC, 2025).
- Japan relies on an educational model that is very encouraging of innovation through strictness and emphasis on mathematics and technology from the early stages of education. We also notice strong partnerships between universities and their socio-economic environment, especially industry.

- The presence of an environment very supportive of innovation based on government support (especially support from MITI), strict adherence to quality standards, and the development of artificial intelligence and digital infrastructure, alongside highly advanced companies that support innovation such as Fujitsu, Hitachi, Panasonic, Sony, Toshiba.
- The culture of Japanese society, which is based on teamwork, a sense of responsibility, and a love of learning and innovation.

Nevertheless, despite the strength of the Japanese experience, its performance in innovation is considered less comprehensive due to several factors, most notably: problems in financing, infrastructure, and natural resources, weak international communication, and excessive reliance on industrial innovations.

Although both the United States and Japan are considered global leaders in innovation, the difference between the two experiences is fundamental. The United States is characterized by a flexible and open environment that supports entrepreneurship, fueled by massive capital and global talent, allowing for rapid growth and innovation in modern fields such as software and artificial intelligence. In contrast, the Japanese experience is based on a culture of discipline, quality, and continuous improvement, which made it strong in precision industries and advanced technology, especially in manufacturing and robotics. While the American model shows greater dynamism, the Japanese model is distinguished by stability and depth in certain sectors. Nevertheless, both models face challenges that require continuous updating and adaptation to the rapid global technological changes.

Comparative strengths of the U.S. and Japan

The U.S. innovation advantage is underpinned by massive R&D spending (over USD 885 billion in 2022, NCSES), deep venture capital markets, world-class research centers (NASA, NIH, DARPA), leading universities, and a strong IP regime that attracts global talent. These factors sustain its capacity for radical, high-risk innovation. Japan's strengths lie in specialized fields such as robotics (38% of global production in 2024), early STEM-focused education, strong university–industry linkages, government support through MITI, and corporate adherence to quality and continuous improvement systems. These structural features consolidate Japan's incremental innovation model, ensuring resilience in precision industries and advanced manufacturing.

Despite the U.S. consistently outperforming Japan in overall GII rankings, the gap is not absolute. Japan remains a top-20 innovator with global leadership in robotics and advanced manufacturing. The U.S. model shows greater dynamism and frontier expansion, while the Japanese model provides stability and depth in specialized sectors. Both models face the challenge of adapting to rapid technological change, and both continue to offer valuable lessons for innovation policy worldwide.

- United States. The U.S. innovation advantage is underpinned by large-scale R&D investment (e.g., more than USD 885 billion in 2022), deep venture capital markets, world-class research centers (such as NASA, NIH, and DARPA), leading universities, and a mature IP regime that supports commercialization and attracts global talent. These institutional features sustain the country's capacity for radical, high-risk innovation and rapid diffusion in software, AI, and other frontier domains.

- Japan. Japan's strengths lie in advanced manufacturing, robotics, and supplier-network integration, supported by business-funded R&D, quality management systems, and university–industry linkages. An early and steady emphasis on STEM education and the organizational routines of continuous improvement (Kaizen) reinforce an incremental innovation model that delivers reliability and precision at scale.

Bridging assessment. Taken together, the results from Tables 3 show that while the United States maintains a clear overall lead in innovation performance during 2019–2024, Japan achieves notable strengths in specific pillars—particularly patents, robotics-related capabilities, and business-funded R&D—consistent with an incremental, Kaizen-oriented model. These complementary patterns underscore that different innovation strategies can yield international competitiveness under different institutional and resource conditions, and they set up the policy discussion developed in the conclusion.

Taken together, the results from Tables 2, 3, and 4 show that while the United States consistently maintains a global lead in overall innovation performance, driven by radical and resource-intensive dynamics, Japan achieves notable strengths in specific pillars—particularly patents, robotics, and business-funded R&D—reflecting its incremental, Kaizen-oriented model. These complementary patterns confirm that different innovation strategies can produce international competitiveness under varying institutional and resource conditions.

Conclusion

This study examined radical and incremental innovation models through a comparative analysis of the United States and Japan using the Global Innovation Index (2019–2024). The findings confirm that the United States consistently outperforms Japan in overall GII scores, reflecting its strong position in frontier-

science inputs, market sophistication, and venture capital depth. Japan, while ranking lower overall, demonstrates durable strengths in manufacturing-related outputs, patents, and business-funded R&D, consistent with its incremental, Kaizen-oriented model.

The comparison highlights two complementary pathways to competitiveness. The U.S. experience demonstrates how resource-rich economies can harness large-scale R&D investments, entrepreneurial ecosystems, and global talent to drive sustained radical innovation. Japan shows how resource-constrained economies can build long-term advantages through continuous improvement, supplier–producer networks, and high-quality standards. These lessons are particularly relevant for policymakers in developing and middle-income economies seeking to design context-appropriate innovation strategies.

This study is limited by its two-country scope and six-year time frame. Future research should expand the sample to include peer economies such as South Korea, Singapore, China, and Germany, and investigate how specific GII pillars respond to institutional reforms and technological transitions.

Overall, the evidence suggests that radical and incremental innovation are not mutually exclusive but complementary. Their coexistence in the global economy underscores the importance of tailoring innovation policy to national capabilities while remaining adaptive to rapid technological change.

Policy Recommendations: Lessons from the U.S. and Japan (2019–2024)

Drawing on the comparative analysis of radical and incremental innovation models, several practical lessons emerge for policymakers:

Scale matters, but ecosystems matter more

- ✓ The U.S. demonstrates that radical innovation requires not only high R&D spending but also risk-tolerant financing, entrepreneurial ecosystems, and robust IP protection.
- ✓ Policymakers should strengthen venture capital markets and university–industry partnerships to support commercialization of research.

Incremental innovation is a viable alternative

- ✓ Japan illustrates that continuous improvement (Kaizen), supplier–producer integration, and strict quality standards can yield global competitiveness even under resource constraints.
- ✓ Governments in resource-scarce contexts can replicate these mechanisms to achieve steady productivity gains.

Human capital as the foundation

- ✓ Both countries highlight the critical role of STEM education, advanced universities, and international talent flows.
- ✓ Investment in human capital and lifelong learning is central to sustaining innovation.

Diversify innovation approaches

- ✓ Radical and incremental innovation are not mutually exclusive; hybrid strategies combining breakthrough research with incremental upgrades can build resilience.
- ✓ Policymakers should adapt the mix according to national capabilities and sectoral priorities.

Regional benchmarking adds value

- ✓ East Asia's rising innovators (South Korea, Singapore, China) demonstrate that peer learning accelerates reform.
- ✓ Comparative monitoring within regional blocs can help countries identify transferable practices.

Countries should avoid adopting any single innovation model uncritically. Instead, they should tailor strategies to their institutional capacity, resources, and culture—leveraging radical leaps where feasible while ensuring continuous incremental improvement for long-term resilience.

Appendix 1. Comparative Innovation Performance by Pillars (2019–2024)

Pillar	United States	Japan	South Korea	Singapore	China
Knowledge & Tech Outputs	90	78	85	84	86
Human Capital & Research	88	80	83	81	79
Infrastructure	85	82	80	88	74
Market Sophistication	87	75	82	86	76
Creative Outputs	89	70	77	79	72

Source: Prepared by the researchers based on Global Innovation Index (GII) data, 2019–2024.

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References and Appendices:

Abdelkaoui, F. (2018). Overview of the Japanese Innovation Systems vs. the American Innovation System. Journal of Global Economics, 6(4), 1–6. https://doi.org/10.4172/2375-4389.1000312

Afuah, A. (1998). Innovation management: Strategies, implementation, and profits. New York, NY: Oxford University Press.

Boyer, R., & Didier, M. (1998). Innovation et croissance. Paris: Documentation Française.

Carayannis, E. G., Samara, E., & Bakouros, Y. (2015). Innovation and entrepreneurship: Theory, policy and practice. Cham, Switzerland: Springer International Publishing. https://doi.org/10.1007/978-3-319-11218-3

Chen, X., Xie, H., & Zhou, H. (2024). Incremental versus radical innovation and sustainable competitive advantage: A moderated mediation model. Sustainability, 16(11), 1–18. https://doi.org/10.3390/su16114545

Cohen, W. M., Gotō, A., Nagata, A., Nelson, R. R., & Walsh, J. (2002). R&D spillovers, patents, and the incentives to innovate in Japan and the United States. Research Policy, 31(8–9), 1349–1367. https://doi.org/10.1016/S0048-7333(02)00068-9

Dogan, E. (2017). A strategic approach to innovation. Journal of Management, Marketing and Logistics, 4(3), 290–300. https://doi.org/10.17261/Pressacademia.2017.491

Dower, J. W. (1999). Embracing defeat: Japan in the wake of World War II. New York, NY: W. W. Norton & Company.

Dutta, S., Lanvin, B., Leon, L., & Wunsch-Vincent, S. (2024). The Global Innovation Index 2024: Unlocking the promise of social entrepreneurship. Geneva, Switzerland: WIPO, INSEAD, and Cornell University.

Elmakkawy, M. H., & Abdien, M. K. (2021). Impact of strategic management on innovation in five-star hotels in Egypt. Journal of Tourism, Hotels and Heritage, 4(1), 42–54.

Fillis, I., & Rentschler, R. (2010). The role of creativity in entrepreneurship. Cheltenham, UK: Edward Elgar Publishing. https://doi.org/10.4337/9781849805293

Hayes, R. H. (1985). Strategic planning—Forward in reverse. Harvard Business Review, 63(6), 111–119.

Johnson, C. (1982). MITI and the Japanese miracle: The growth of industrial policy, 1925–1975. Stanford, CA: Stanford University Press.

Juliana, N. O. (2021). The impact of creativity and innovation on entrepreneurship development: Evidence from Nigeria. Open Journal of Business and Management, 9(4), 1743–1770. https://doi.org/10.4236/ojbm.2021.94095

Khoualed, A. (2020). Reality of innovation indicators in Algeria during the period (2011–2015): An analytical study using the Global Competitiveness Reports (GCRs). International Journal of Inspiration & Resilience Economy, 4(1), 16–24. https://doi.org/10.5923/j.ijire.20200401.03

Kodama, F. (2005). Innovation management in Japan. Berlin, Germany: Springer. https://doi.org/10.1007/3-540-28361-1

Kogabayev, T., & Maziliauskas, A. (2017). The definition and classification of innovation. Holistica – Journal of Business and Public Administration, 8(1), 59–72. https://doi.org/10.1515/hjbpa-2017-0005

Najm, A. N. (2003). Innovation management: Concepts, characteristics, and modern experiences. Amman, Jordan: Dar Wael for Publishing.

Okabe, R. (2013). Policy innovation paradigm in the United States and Japan. Police Practice and Research, 15(3), 192–206. https://doi.org/10.1080/15614263.2012.754125

Pishkar .K. (2025). Tracing the Necessity and Emergence of "Posts" in Literature the Ever-Growing Relevance of 'Post' Theories in Modern Life and Literature. International Journal of Humanities and Social Development Research. 9(1).42-69 https://doi.org/10.30546/2523-4331.2025.9.1.42

Polyakov, M., Khanin, I., Shevchenko, G., Bilozubenko, V., & Korneyev, M. (2024). Systemic features of innovation development in the USA. Financial and Credit Activity: Problems of Theory and Practice, 1(54), 348–363. https://doi.org/10.55643/fcaptp.1.54.2024.4247

Sasaki, H. (2014). Time lags related to past and current IT innovations in Japan. International Journal of Business Analytics, 1(1), 29–42. https://doi.org/10.4018/ijban.2014010103

Schaede, U. (2012). From developmental state to the 'new Japan': The strategic inflection point in Japanese business. Asia Pacific Business Review, 18(2), 167–185. https://doi.org/10.1080/13602381.2011.561653

Shala, V., Bytyçi, S., & Dodaj, P. (2021). The role of innovation in the growth of the company: A case of the emerging country. Journal of Governance and Regulation, 10(4), 175–182. https://doi.org/10.22495/jgrv10i4art16

Szopik-Depczynska, K. (2021). New forms of innovations related to the environment: A systematic review. Procedia Computer Science, 192, 5039–5049. https://doi.org/10.1016/j.procs.2021.09.279

Tohidi, H., & Jabbari, M. M. (2012). The importance of innovation and its crucial role in growth, survival, and success of organizations. Procedia Technology, 1, 535–538. https://doi.org/10.1016/j.protcy.2012.02.116

Urabe, K. (1988). Innovation and the Japanese management system. In K. Urabe, J. Child, & T. Kagono (Eds.), Innovation and management: International comparisons (pp. 3–25). Berlin, Heidelberg: Walter de Gruyter.

Vaska, S., Massaro, M., Bagarotto, E., & Mas, F. (2021). The digital transformation of business model innovation: A structured literature review. Frontiers in Psychology, 11, 539363. https://doi.org/10.3389/fpsyg.2020.539363

Yokura, Y., Matsubara, H., & Sternberg, R. (2013). R&D networks and regional innovation: A social network analysis of joint research projects in Japan. Area, 45(4), 493–503. https://doi.org/10.1111/area.12055

Zhang, X. (2022). Incremental innovation: Long-term impetus for design business creativity. Sustainability, 14(22), 14697. https://doi.org/10.3390/su142214697

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