
THE JAPANESE MODEL OF TRANSITION TO A CIRCULAR ECONOMY

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Abstract: The article focuses on the most important stages of enforcement and implementation of the principles of circular economy in Japan in terms of the reasons for and the consequences from the emergence and development of the circular resource-saving model in the country. It discusses the transition to an environment-friendly economic model, its importance for people's health and relevance to the needs of the modern society. The systematic role of Japan's regulatory framework is considered in terms of the implementation of a cyclical environment-friendly economic model and policies intended to strengthen public-private partnerships and promote the circular economy among a wide range of stakeholders. It also discusses the application of the ISO14001 international standard in Japan and presents several indicative circular business models successfully implemented in Japanese companies.

Keywords: Enforcement and implementation of the principles of circular economy, Japan's model of transition to a circular economy, circular economy models.

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Japan is the most developed country in Asia. It is the third largest economy in the world and a global leader in the production of technology and machinery. Japan is the 11th most populous country in the world with a population of 126.22 million people. In 2020, the size of the circular economy market in Japan was 2 100.4 billion yen; in 2021 it grew with 319 million yen, and the forecasts are that it will increase to 14 279.9 billion yen by 2030. Japan

is a member of the United Nations, the G8, the Organization for Economic Cooperation and Development (OECD) and the Asia-Pacific Economic Cooperation. As a result of rapid technological development and innovation after the Industrial Revolution, which brought wealth to people's lives in Japan, the economy of mass production and mass consumption based on waste disposal is depleting the country's land resources, which are rather limited anyway. At the same time, harmful substances generated in the process of economic activities caused a number of local ecological crises and adverse climate changes. If this negative trend continues, in the near future the current economic cycle will be at a standstill and the entire planet will be in crisis. In today's markets and societies, business uncertainty and rapid economic changes impede the growth of companies that adhere to obsolete values and conventional models. The circular economy is an innovative growth strategy that overcomes the perception of a stifling business environment and promotes the creation of new added value by becoming an efficient business model. The circular economy model is a short-term, high-speed value chain with a "consumer perspective" that collects surplus value based on re-use utility. This maximizes the potential value of existing assets and monetization to generate sustainable profits. The expectation is that by 2030, USD 4 trillion will be generated globally from USD 500 billion economic value following the circular economic model. To avoid the crisis, the United Nations and other international organizations and governments formulated Sustainable Development Goals (SDG) and established the Task Force on Climate Related Financial Disclosures (TCFD). The objectives of their workgroups are to try to stop the adverse effects on the global environment by showing the overall direction and working on solving various problems that we are currently facing. One of the problems that should be resolved is to move from the conventional linear economic model that produces large amounts of waste to a circular model that saves raw materials. In the context of global economic and environmental trends, the present paper will discuss the most important moments in Japan's progress in implementing and enforcing the principles of the circular economy tracing the historical development that led to the formation of policies for economic transition from a linear to a circular economic model.

Why did Japan have to impose stringent anti-pollution measures and establish incentives for circular economy business models?

In Japan, there were several types of severe environmental pollution due to prioritizing rapid economic growth and disregarding the health and safety standards. Consequently, this led to the introduction of strict regulations for environmental protection in the 1960s. The Soot and Smoke Regulation Law was established in 1962 and was later on transposed into the Air Pollution Control Act of 1968. The Water Quality Protection Law and the Wastewater

Control Act enforced in in 1958 were integrated into the Water Pollution Control Law in 1970. The Basic Law on Environmental Pollution Control enacted in 1967 stipulated the basic framework for pollution control policy for all government agencies and established incentives for cleaning the environment. As a result of domestic and international trends related to the transition to a circular economy, in June 2018 Japan established The 4th Fundamental Plan for Establishing a Sound Material-Cycle Society based on the Basic Act on Establishing a Sound Material-Cycle Society. The Plan sets the directions for "*integrated efforts for establishing a sustainable society*", which improve the environmental, economic and social aspects in an integrated way. The integrated measures toward a sustainable society aim to establish a "*market size of business related to a sound material-cycle society* " based on Indicators and targets reflecting the specific efforts of all material-cycle stakeholders. Moreover, in May 2020, the Ministry of Economy, Trade and Industry formulated the "Circular Economy Vision 2020" that promotes the transition to a circular economy and describes the concrete efforts expected from stakeholders. The vision states that every industry recognizes the importance of improving resource efficiency and bears the responsibility of moving to a highly cyclical business. When a company carries out its business activities, it is required to plan the recovery and disposal of waste at every stage of the supply and production chain choosing a recycling approach according to the type of business planning for the total volume of recycling with a view to its life cycle. In a global aspect, the transition to a circular economy is clearly defined in the Sustainable Development Goals (SDGs), such as „SDG 12: Ensure sustainable consumption and production patterns (production and consumption responsibilities)“, adopted by the United Nations in 2015. It also gives guidelines for achieving other goals, such as „SDG 13: Climate Change (urgent action to combat climate change and its impacts)“ and „SDG 14: Life Below Water (to conserve and sustainably use the oceans, seas and marine resources)“. An increasing number of countries, including Japan, engage at the summits of the UN, the G-20 and G-8 with political initiatives for transition to a circular economy. For example, the European Commission has established circular economy strategies and axes, such as the "Circular Economy Package" published in December 2015 and the "Circular Economy Action Plan" published in March 2020 within the 2020 Strategy and in the Roadmap for a Resource-Efficient Europe adopted in 2011. The Seventh Environment Action Programme aims to make the EU a resource-efficient, green and competitive, low-carbon economy. In fact, the first international initiative began with the Kyoto Protocol (1997), which was negotiated and signed in Japan and aims to reduce the greenhouse gas emissions of developed countries to prevent global warming. Japan set a target to reduce its greenhouse gas emissions by 2012 with

6% compared to 1990 and to promote a national awareness-raising campaign to prevent global warming called Team Minus 6%. In 2009, the Japanese government set a goal to reduce the greenhouse gas emissions by 2020 with 25% compared to the 1990 levels and started the Challenge 25 campaign. Later on, in December 2015, the Paris Agreement, which succeeds the Kyoto Protocol, was adopted at the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21), signed by 175 countries and regions, including Japan, and entered into force November 2016 through the Paris Agreement and aims to realize a "decarbonized society" with practically zero greenhouse gas emissions in the second half of this century. Consequently, the Japanese government announced that it will achieve "virtually zero (carbon neutral) emissions of greenhouse gases such as carbon dioxide (CO₂) by 2050. In line with the global trends, Japan established incentives to promote the circular economy as one of the pillars of Japan's growth strategy. According to the Circular Economy Japan, an organization that aims to promote the circular economy in Japan, "the circular economy reuses resources and products at various stages of economic activities (production, consumption, disposal, etc.)" Joint international efforts to achieve economic growth and reduce the pollution of the environment by creating added value in the cycle, while regulating the consumption of resources and energy and eliminating the generation of waste. On May 22, Japan's Ministry of Economy, Trade and Industry announced the Circular Economy Vision 2020, which shows the direction that future circular economy policies should aim for. The vision clearly defines the philosophy and purpose, as well as concrete measures to strongly promote the circular economy, ahead of Europe in some respects. It aims to maximize so-called 3R efforts by focusing on waste and recycling measures. As a result of this effort, certain results have been achieved, such as a reduction in total waste and an increase in the recycling of household appliances, cars, containers, etc. The Circular Economy Vision clearly defined the transition from the conventional linear economy to circular economy business models. Against the background of global problems such as global warming and the problem of marine plastic waste, the shift from the conventional linear economic model of mass production, mass consumption and mass disposal to a highly cyclical business is extremely important. It gives a symbolic example with the so-called the "arterial company" that cooperates with the so-called the "vein company", to reuse and recycle resources in an optimal form of symbiosis. In other words, "arterial companies" that produce and sell using resources should promote a circular economy in symbiosis with "vein companies" that recycle used products and materials and return them to the arterial companies' resource chain. It imposes a tiered model of the cycle: 1st tier - distribution and supply of products, preserving their ownership through

leasing, sharing, subscription, etc., and 2nd tier - voluntary collection of used products and creation of recycling routes in cooperation with the "vein company" industry. This necessitates an understanding of working on resource recycling throughout the life cycle. Furthermore, although advanced waste sorting with the help of artificial intelligence (AI), creation of a virtuous cycle through ESG investments and labelling (visualization) of products with circular characteristics are proposed, the institutional monitoring and analyses at all levels in the state apparatus of Japan.

In recent years, Japan has been accelerating the "three transitions" to a decarbonized, cyclical and decentralized society by redesigning its socio-economic system. In March 2021, Japan's Ministry of Environment announced the launch of the Circular Economy Partnership. The partnership aims to gather examples of Japan's advanced circular economy initiatives, to disseminate and share them both domestically and internationally, to share information and build a circular economy network of public-private partnerships. The partnership is based on urgent measures aiming to promote circulation of plastic resources, such as a sales fee imposed on plastic shopping bags. In 2021, the Japanese government published investment and business disclosure guidelines to accelerate sustainable financing, a bioplastics roadmap to promote alternatives to sustainable plastics.

Eco-Action 21 is Japan's unique Environmental Management System (EMS) introduced by the Ministry of the Environment in 2004 for organizations and businesses that voluntarily work on environmental protection to address growing environmental issues such as global warming up. The international standard "ISO14001" has a high degree of recognition as evidence of "environmental management" of Japanese companies. On the other hand, although Eco Action 21 is based on "ISO14001", it has a more liberal regime for recognition of environment-friendly procedures since its certification requirements are less strict than those of "ISO14001". Acquiring the Eco Action 21 certificate, which is the preferred certification option for small and medium-sized enterprises, is an important advantage for being chosen as a contractor or business partner if the company has an environmental management. It is also an advantage for the financial institutions as it allows them to offer loans at lower interest rates to Eco Action 21 certified businesses. Such financial institutions are Mizuho Bank ([Mizuho ESG \(Eco-guchi\) loan](#)), Sumitomo Mitsui Banking Corporation ([SMBC-ECO loan \(for selected businesses\)](#)), Bank of Tokyo-Mitsubishi UFJ ([life business loans](#)).

In recent years, an increasingly common practice for large companies is to set conditions such as "environmental efforts and environmental management systems" as criteria for selecting business partners. Therefore, for small and medium-sized enterprises, acquiring an Eco Action 21 certificate can provide

greater business opportunities for partnering with large enterprises. In addition, by acquiring the Eco Action 21 certificate, an advantage is gained when conducting tenders in public works projects and public procurement. With the acquisition of the ISO14001 certificate, the social credibility of the business activity is also improved. In addition, some local authorities provide preferential treatment by partially subsidizing the cost of acquiring a certificate.

Table 1
Number of ISO14001 certified companies as of 31 March 2022.

| Industry | В цялата страна | Saga Prefecture | Fukuoka Prefecture | Nagasaki Prefecture | Ōita Prefecture | Kumamoto Prefecture |
|------------------------|-----------------|-----------------|--------------------|---------------------|-----------------|---------------------|
| All sectors | 20.814 | 72 | 352 | 34 | 89 | 91 |
| Metal processing | 2.568 | 13 | 50 | 5 | 8 | 1616 |
| Electronics and optics | 1.546 | 8 | 24 | 6 | 5 | 1919 |
| Construction | 2.861 | 26 | 91 | 4 | 10 | 29 |

Due to its delayed efforts, in the initial phase of ISO 9001 certification Japan ranked 6th and gradually rose to the 5th position worldwide. China is the country with the highest number of ISO 14001 certificates worldwide.

Japan enforced a number of special environmental laws, such as the Packaging Recycling Law, the 3R Initiative, the Law on Specific Household Electrical Appliances, the Law on the Business Burden for Pollution Control Costs, the Law on the Development of Pollution Control Organizations in Specific Industries, the Industrial Tax waste, Law for the Promotion of Environmental Protection Motivation and Promotion of Environmental Education, Law for the Promotion of the Use of Recycled Resources, Basic Law for the Creation of a Recycling Society, Fuel Economy Standards for Heavy Vehicles, Law for the Rationalization of Use of energy. This environmental regulatory framework also creates the basic premise for determining a favourable environment for implementing the principles of the circular economy in Japan. In a separate study, I will detail the specific effects of each regulatory act or initiative in the Japanese government to support the imposition of the circular economy model, which in turn lead to:

SUCCESSFUL CIRCULAR ECONOMY MODELS IN JAPAN

The share of the green economy is still far from what is needed globally. In stock markets, just 6% of the global equity market comes from the clean energy and environmental services sector. And although this share is expected to grow by a minimum of 3% per year, only in 2019 the London Stock Exchange, which is one of the leaders in Europe, announced several initiatives to support the sustainable financing of its markets - the green economy measure (for joint-stock companies with 50% or more revenue from environmental solutions), Sustainable Bond Exchange. In a global market where only 9% of the economy is circular, the profit opportunity from converting the remaining 91% is around \$4.5 trillion. Делът на зелената икономика е все още далеч от нужното в световен план. В борсовите пазари, едва 6% от световния пазар на акции идва от сектора на чистата енергия и екологичните услуги. И макар че се очаква този дял да расте с минимум 3% годишно, едва през 2019 година Лондонската фондова борса, която е една от водещите в Европа, обяви няколко инициативи в подкрепа на устойчивото финансиране на своите пазари – мярката за зелена икономика (за акционерни дружества с 50% или повече приходи от екологични решения), борса за устойчиви облигации. На глобалния пазар, в който само 9% от икономиката е кръгова, възможността за печалба от преобразуването на останалите 91% е около 4,5 трилиона долара.

Японската асоциация за кръгова икономика при последното си пазарно проучване през 2021 г., за Япония, извършено съвместно с InfoCom Research, Inc. Според същото проучване размерът на пазара на кръгова икономика в Япония през размерът на пазара през 2020 г. е 2 100,4 милиарда йени 2021 г. , през 2021г. е 2 419,8 милиарда йени и ще се увеличи до 14 279,9 милиарда йени през 2030 г.

This actually gives us the grounds to claim that circular economy is the most popular business transformation strategy companies have undertaken since the industrial revolution. Moreover, companies willing to invest in the circular economy are real “game changers”. Here are some examples of companies that implemented innovative approaches to material circularity based on combinations of scientific and technical advancements in circular economy models:

08 March 2022: three companies and 14 certified products were added to the companies Eco Rail Mark Mitsubishi Gas Chemical, Nippon Paper Industries.

07 March 2022: NYK completes the conceptual design of an ammonia-convertible liquefied natural gas vessel.



Figure 1

22 February: Hokuriku Electric Power Co., Ltd. produces carbon-free electricity using the “energy from waste” technology in the town of Komatsu.

01 March 2022: NEDO approves the 6 JGC projects for creation of elementary “carbon recycling” technology.

25 February 2022: Tokyo Gas and Mitsubishi Heavy Industries G, demonstrated a solution for capturing and effective utilization of CO₂ in the waste incineration facility in Yokohama.



Figure 2

Another example is the Japan Partnership for Circular Economy (J4CE)¹ jointly founded in March 2021 by the Ministry of the Environment, the Ministry of the Economy, Trade and Industry, and the Japan Business Federation²

¹ Circular Economy Hub - <https://cehub.jp/>

² KEIDANREN (Japan Business Federation) is a comprehensive economic organization with a membership comprised of 1,494 representative companies of Japan, 108 nationwide industrial associations and the regional economic organizations for all 47 prefectures (as of April 1, 2022). Its mission as a comprehensive economic organization is to draw upon the vitality of corporations, individuals and local communities to support corporate

(Keidanren) for the purpose of strengthening public and private partnerships, with the aim of further fostering understanding of the circular economy among a wide range of stakeholders, including domestic companies. J4CE is widely known (both in Japan and abroad) because it promotes the circular economy through exchange of technologies and ideas and partnership relations among the Japanese companies. As of 31 August 2021, 110 companies and 13 organizations participated in J4CE and 130 cases of circular economy partnerships were submitted. J4CE has published all these cases on its website, in “Noteworthy Cases 2021” organized into the following seven **noteworthy areas** of initiatives for plastics and batteries that attract global interest, technologies and business models that are already under implementation, as well as cases that conduct research, development and cooperation for the future:

PET bottles

- Japan is the global leader in PET bottle recycling rate due to the Japan Soft Beverages Association’s Industry Voluntary Design Guidelines for

Consumer-Friendly Circular Economy

- Non-Label Beverage Products
- All-Paper Packaging: Sony Group Corporation

Recycling Technologies

- Bottle-to-Bottle Recycling: (1) Suntory Holdings Limited, Kyohei Sangyo Co., Ltd. (2) Seven & i Holdings Co., Ltd., Coca-Cola Japan Co., Ltd.
- Fiberisation: Teijin Frontier Co., Ltd., Toray Industries, Inc.

Home Appliances, Electrical/Electronic Equipment

- Improvement of material-recycle rate of end-of-life home appliances by development of recycling technologies and design of environment: Association for Electric Home Appliances

- Closed-loop recycling of plastic for home appliances: Mitsubishi Electric Corporation

- Products reuse business of multifunction copiers and printers: Ricoh Co., Ltd.

Automobiles, Batteries

- Effective use of used tires: re-tread tires and use of recovered carbon black in tire production: Bridgestone Corporation

- Launch of test run for "100% Renewable Energy" store operation utilising electric vehicle batteries high-performance solar panels, and electricity derived from "Post-FIT": Seven & i Holdings Co., Ltd., Seven-Eleven Japan Co., Ltd., Nissan Motor Co., Ltd., FORR Energy Co., Ltd.

activities which contribute to the sustainable development of the Japanese economy and improvement in the quality of life for the Japanese people.

- Recycling of lithium-ion batteries (LIB): JX Nippon Mining & Metals Co., Ltd., DOWA ECO-SYSTEM Co., Ltd.

New Technologies for Recycling

Disposable diapers

- Recycling systems for disposable diapers: (1) Letterpress Printing Co., Ltd., Total Care System Co., Ltd., Sumitomo Heavy Industries Environment Co., Ltd. (2) Unicharm Co., Ltd., Shibushi City (Kagoshima Prefecture), Osaki Town (Kagoshima Prefecture), So Recycling Co., Ltd. Center

Chemical Recycling of Waste

- Manufacturing polyolefin using waste as raw material: Sekisui Chemical Co., Ltd., Sumitomo Chemical Co., Ltd.

New Business Models – Product as Service (PaaS)

- Food refrigeration service: Panasonic Corporation
- Lighting leasing service Akari: Panasonic Corporation
- Regional food waste recycling solution: NTT Business Solutions Co., Ltd., The Merry Corp.

Insurance / Finance

- Expense insurance policy contributing to reduction of food loss: Sompo Japan Insurance Co., Ltd., Second Harvest Japan
- Investing in world's first plastic waste reduction bond: Daiichi Seimei Holdings Co., Ltd.

Cooperation on Production, Distribution and Collection

- Recycling of food trays of FP Corporation: FP Corporation
- Cooperation between similar business categories and collection at retail stores: (1) Kao Corporation, Lion Co., Ltd., Ito-Yokado Co., Ltd. (2) Aeon Retail Co., Ltd., Kose Co., Ltd., Shiseido Co., Ltd., Nippon Loreal Co., Ltd. P & G Japan GK, Terra Cycle Japan GK

Cooperation for Plastic Circulation

- Development and practical implementation of used plastic recycling technology by Earl Plus Japan Co., Ltd., a cross-industry joint venture company: Earl Plus Japan Co., Ltd.
- Development of blockchain-based digital platform for traceability of recycled plastics: Asahi Kasei Co., Ltd., IBM Japan Headquarters, Lion Co., Ltd., Mobius Packaging Co., Ltd., Toyama Environmental Improvement Co., Ltd.
- “Circular Renewables Platform” providing an effective system to match supply and demand for plastics and other recyclable resources to promote a circular economy: Sojitz Corporation, Recotech Corporation, Nissho Electronics Corporation, NTT Communications Corporation

Results and discussion

The analysis of the data leads to the following conclusions:

The examples imply that the circular economy is currently the strongest strategy for business transformation and functional advancement of companies in Japan. Moreover, the companies willing to invest in the circular economy are real game changers; there are examples of an applied innovative approach to the material cycle and they show direct results due to the close relationship between scientific and technical progress and the implemented circular economy model. Japan circular economy market size increased with ¥319 million in 2021 from ¥2,100.4 billion in 2020 and the forecast is that it will increase to ¥14,279.9 billion by 2030.

The introduction of incentives for ISO 14001 certification could support the development of a simplified and adapted to our conditions environment management system following the example of Japan's Eco-Action. Thus, this expanded approach to certification of environment-friendly industry will generate additional added value in defining the general vision for our country's transition to a circular economy.

The empirical study outlined Japan's policy for strengthening public-private partnerships to further promote the understanding of the transition to a circular economy among a wide range of stakeholders. A good example is the initiative of the Ministry of Environment of Japan, which announced the launch of the "Circular Economy Partnership". The purpose of the partnership includes examples of advanced circular economy initiatives in Japan, disseminating and sharing both domestically and among the international community through the establishment of public-private partnerships. One such example is the establishment of J4CE jointly by the Ministry of the Environment, the Ministry of Economy, Trade and Industry and the Japan Business Federation (Keidanren). Another example is the association established by the Ministry of the Environment, the purpose of which is to promote activities that contribute to the prevention of global warming, regulated in the Law for the Promotion of Measures to Counteract Global Warming.

Creating a virtuous cycle through ESG investments and labelling (visualization) of products with circulation characteristics as well as institutional monitoring and analyses at all levels in Japan's government bodies should be a good example for introducing it in our country as well.

In conclusion, we can identify Japan as a wonderful example for implementation of a comprehensive and intelligent policy regarding the efficient use of resources and proper disposal of waste. The enforcement of a number of country-specific special laws to regulate and promote material cycle not only in the economy but also in all spheres of social and household life in Japan, makes the country one of the innovators in terms of efforts to transition from linear to a circular economy. That is why Japan is the country with the highest rate of

transition from linear to circular economy. Despite what has been achieved, we note that the cyclical models that are still being introduced cannot fully meet the demand for resources of the industry. Undoubtedly, the world is still in a period of transition. We need to upgrade our regulatory framework and establish incentives to promote the circular economy. The role of investors who supply and circulate funds that drive business in the financial market and also lead to corporate innovation and corporate growth is still underestimated although it is crucial for the success of the transition. Japan's aspiration to achieve the so-called "virtuous cycle of economy and environment" is clear and gives us grounds for a thorough study of Japanese experience and practice with a view to upgrading and introducing good practices in our country and Europe.

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