Conservation of the Global Environment by Developing Digital Platforms – As a Preliminary Perspective

BY MASAO TSUJIMOTO

Abstract

This paper explores environment conservation with development of digital platforms, employing financial performance and environmental impact data from six digital platform providers in the US and Japan.[1]

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1. Introduction

This paper explores conserving the global environment while promoting the sustainable development of digital platforms. It uses financial performance and environmental impact data of six digital platform providers in the US and Japan.

First, amid the COVID-19 pandemic, the challenge of achieving conservation while developing digital platforms has become increasingly urgent for platform providers such as Google, Amazon, Facebook (newly named Meta Platforms), and Apple (GAFA), Rakuten, and Yahoo Japan.

Despite its importance, the author's thorough review of academic journals reveals that minimal research has been conducted from this paper's trans-Pacific perspective and accounting approach. The lack of prior research is assumed to be due to a lack of data related to insufficient disclosure of ESG information and inconsistency in company and rating agency standards.

Therefore, this paper clarifies the results of the regression analysis and discusses the fact that the efforts to develop digital platforms while preserving the global environment have reached the beginning of the germination stage of decoupling growth and environmental impact.

2. Legislation and Trends for Environmental and Digital Goals in Japan

This section outlines the progress of legislation on global environmental conservation and digital platform development in Japan and summarizes business expansion and potential power shortages for digital platforms. This highlights two Japanese platforms, in addition to GAFA, because it will offer useful information for overseas researchers to focus on the legislative progress of global warming prevention and digital platforms in Japan; the U.S. legal system was omitted due to word limit.

First, in October 2020, the Japanese government committed to attaining a carbon-neutral society by 2050 to comply with the Paris Agreement and raised its target for reducing greenhouse gas emission from 26% to 46% against 2013 levels by the target year 2030 in April 2021.

Moreover, Act (No. 117 of 1998) on Promotion of Global Warming Countermeasures was revised in May 2021. The term *control* of greenhouse gas emissions in the previous Act was strengthened using the word *reduce.* Article 5, for example, highlights the need for companies' cooperation with national and local governments as follows, "Business entities shall endeavor to take measures to *reduce* greenhouse gas emissions and shall cooperate with measures implemented by the national and local governments to *reduce* emissions."

Furthermore, two complementary Acts specifically related to digital platforms were ratified in Japan: Act (No. 38 of 2020) on Improving Transparency and Fairness of Digital Platforms (official abbreviation: TFDPA) in May 2020 and Act (No. 32 of 2021) for the Protection of Users of Digital Platforms in April 2021.

In the TFDPA, Article 2, Paragraph 1, and Paragraph 5 define *digital platforms* and *digital platform providers* as follows:

Digital platforms refer to services provided to many persons through the internet or other advanced information and telecommunications networks. Information regarding goods, services, or rights of persons who intend to present offers is usually displayed.

Digital platform providers refer to entities that provide online platforms alone or in collaboration.

Cabinet Order No. 17 of 2021 establishes the scale of specified digital platform providers subject to the TFDPA.

- *B to C comprehensive online mall providers:* Total domestic circulation in the previous fiscal year of 300 billion yen ($264 million) or more.
- *B to C application store providers:* Total domestic circulation in the previous fiscal year of 200 billion yen ($176 million) or more.

In accordance with Cabinet Order No. 17 of 2021, the six entities in Table 1 have been designated as *specified digital platform providers.* This includes Japanese subsidiaries of (1) Amazon, (4, 5) Apple, and (6) Google from the US as well as the domestic platforms (2) Rakuten and (3) Yahoo

Table 1 Specified digital platform providers

Comprehensive online shopping malls	
Company names	Names of malls
(1) Amazon Japan G.K.	Amazon.co.jp
(2) Rakuten Group, Inc.	Rakuten Ichiba
(3) Yahoo Japan Corporation * Subsidiary of Z Holdings	Yahoo! Shopping
Application stores	
Company names	Names of stores
(4) Apple Inc. (5) iTunes KK	App Store
(6) Google LLC	Google Play Store

Source: Ministry of Economy, Trade and Industry of Japan

Japan. A Japanese subsidiary of Meta-Facebook is not designated because it does not meet the specified scale in Japan.

Moreover, the Digital Agency, headed by the Minister, was newly established in September 2021 to promote the formation of a digital society by collectively managing the operations divided among various Ministries.

Therefore, the legal framework for global environmental conservation and digital platform development is in progress.

However, there is room for further reforms in protecting personal information, preventing "fake news" and abusing monopolistic market power, and improving corporate governance structure.

On the other hands, the growing scale and influence of digital platform providers have made the issue of balancing platform development and conserving the global environment more urgent.

Consolidated sales performance has been on the rise for the six digital platform providers in this study, GAFA, Rakuten, and Z Holdings (100% shareholder of the designated Yahoo Japan). According to each company's financial statements, GAFA's total sales reached $773.2 billion in 2019 and $923 billion in 2020, up 19.4% year on year, and all six platforms combined reached $794.5 billion in 2019 and $941 billion in 2020, up 18.5% (see "References"). The sales of GAFA and all six digital platforms in 2020 were nearly equivalent to Netherlands' nominal GDP of $909 billion. (IMF 2021). GAFA's market capitalization ($7.43 trillion) at NASDAQ in the middle of January 2022 exceeded to that of all 3,823 companies listed on the Tokyo Stock Exchange ($6.95 trillion).

Regarding Monthly Active Users (MAU) in 2021, Facebook reached 2.91 billion globally as of September 30, 2021, an increase of 6% year-over-year (Facebook 2021c). In July 2021 in Japan, Yahoo was first with 85.92 million; Google in second, with 82.18 million; LINE (another subsidiary of Z Holdings) third, with 71.00 million; YouTube fourth, with 69.71 million; Rakuten fifth.[2]

Notably, GAFA combined emitted 93.13 million tons in 2019 and 95.30 million tons of CO_2 (market basis) in 2020, up 2.3%. And the six providers, including Rakuten and Z Holdings, emitted 97.63 million tons in 2019 and 101.11 million tons in 2020, up 3.6%, which is nearly equivalent to Qatar's 99.49 million tons in the same year (EDGAR website).

Japanese government reports have sounded the alarm regarding the insufficient power supply and network infrastructure capacity during the COVID-19 outbreak and subsequent restrictions on the development of digital platforms. For example, the Ministry of Internal Affairs and Communications (MIC, 2021) reported that the traffic of fixed-line broadband service subscribers in Japan was on the rise in May 2021, with downloads increasing 25.6% to 23.9 Terabits per second (Tbps) and uploads increasing 19.8% to 2.8 Tbps year on year. Japan Science and Technology Agency (JST 2021) reports propose concerted energy conservation at data centers, as power consumption in Japan will be 90 TWh in 2030 and 12,000 TWh by 2050, compared to 14 TWh in 2018, with the spread of cloud services, medical image diagnosis, and face recognition.

The Tokyo Metropolitan government has adopted a data center evaluation system, revealing that Power Usage Effectiveness (PUE) averaged 1.91 at the 78 locations measured. (The closer the value is to 1.0, the more efficient it is.) However, considerable improvement is needed. Google, considered one of the best data centers, had an average annual PUE of 1.10 in 2020 (2021a, p. 4). Hence, the issue has become urgent to environmental conservation in promoting the development of digital platforms.

3. Method, Results and Discussion

This section verifies the relationship between the six digital platform providers' financial and environmental impact data, employing linear, quadratic, and cubic regressions. This approach differs from previous studies in using data from platform providers in both the US and Japan. The method is outlined below.

• The six target platform providers:

GAFA (Google, Amazon, Meta-Facebook, and Apple), Rakuten, and Z Holdings. This paper includes Facebook, which is not *designated* by TFDPA in Japan, in the analysis given GAFA's overall name recognition and influence. The six providers analyzed in this paper differ from the six presented in the TFDPA in Table 1. And consolidated data are examined because non-consolidated environmental data are not disclosed in detail.

• Dependent and Explanatory variables:

The number of basic regression formulas includes 20 combinations of 4 x 5. The number of advanced formulas is 35 by 7 x 5 because each item decomposed in Scopes 1, 2, and 3 is tested in addition to total CO_2 emissions in Table 2. [3]

• Target year of data:

Cross-section data is for the year 2020.

Available environmental impact data before 2019 is insufficient or inconsistent, rendering time series analysis impossible in prior studies.

For example, Google (2020) says, "to align with industry best practices for Scope 3 reporting. We extended our reporting boundaries." Thus, Google's Scope 3 CO_2 emissions in 2019 were 4.29 times higher than that reported in 2017 (p.79). The extension of the range suggests that the measurement method used before 2017 was insufficient.

Table 2 Dependent and Explanatory variables (abbreviation)

Dependent variables: Basic - 4, Advanced - 7	Explanatory variables: 5
(1) CO_2 emissions (CO_2, million MT) • Total = Scope 1 + 2 + 3 emissions • Scope 1 (SCP1, million MT) • Scope 2 (SCP2, million MT) • Scope 3 (SCP3, million MT)	(1) Net sales (SAL) (2) Net income (INC) (3) Earnings per share (EPS) (4) Total assets (TAS) (5) Property, plant, and equipment (PEQ)
(2) Electricity consumption (ELC, MWh)	
(3) Water consumption (AQU, m^3)	
(4) Waste generation (WST, tons)	

Though the data is limited to 2020, it illustrates the circumstances of each company amid the COVID-19 pandemic, which discloses certain implications, prospects, and germination in the relationship between conservation and development for digital platforms.

By employing the Environmental Kuznets Curve (EKC) hypothesis, the author has already calculated and derived the following preliminary results and findings.

The EKC hypothesis is an economic theory that illustrates the relation between growth and environment impacts. This is an application of the theory of economic growth and income inequality postulated by Dr. Simon Kuznets, a Nobel laureate in economics. In the hypothesis, environment impacts increase up to a certain level of economic growth, and then start to decrease, showing an inverted U-shaped curve at the turning point.

(1) Results: The regression analyses illustrate a monotonic increase in the seven cases out of thirty-five tested, while the EKC hypothesis is confirmed in the two combinations of Electricity consumption (ELC)–Earnings per share (EPS) (Figure 1), and an Inverted N-shaped curve, a variant model of the EKC hypothesis, is demonstrated in the cubic regression of Scope 2 CO_2 emissions–Earnings per share (Figure 2).

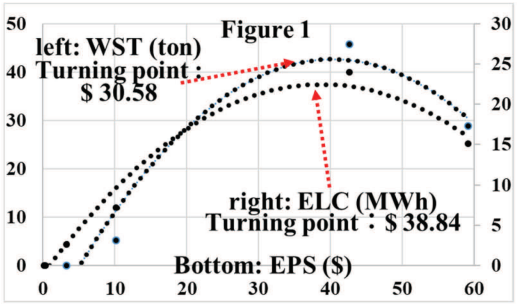

FIGURE 1
Electricity consumption (ELC) / Waste generation (WST) – Earnings per share (EPS)

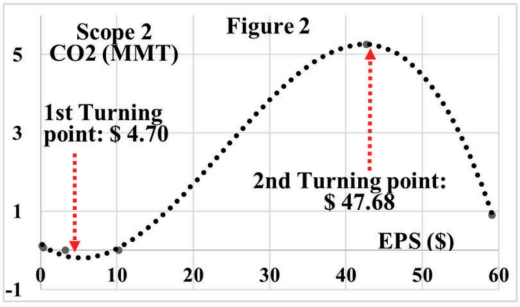

FIGURE 2
Scope 2 CO_2 emissions–Earnings per share

(2) findings: regarding the significant cases confirmed in the EKC hypothesis and the inverted N-shaped curve, the growing trend of Environment, Society, and Governance (ESG)-oriented investment has acted as competitive pressure on the platform providers for fundraising, especially in spurring them to disclose information.

Investors' emphasis on ESG has been functioning as the compelling or driving force to advance digital platform providers' implementation of ESG-related environmental conservation activities, particularly in terms of information disclosure, through financing requirements, such as loans and underwriting of securities and bonds.

On other hands, without appropriate disclosure of ESG information, digital platforms face challenges in raising funds through the issuance of bonds and securities. In addition, disclosure requires the formulation and execution of corporate strategies that are worthy of disclosure, and the promotion of ESG activities, such as participation and signature on various ESG initiatives. Furthermore, data is disclosed on sponsoring organizations' websites regarding whether the providers signify and the attending ratings. As a result, the platform providers are driven to compete with rivals for information disclosure, as if the dominoes are beginning to fall.

4. Concluding remarks

Digital platform providers that have become so powerful today can offer spaces for sharing and interaction through their platforms and meaningfully contribute to the realization of a sustainable society, represented by *No. 13: Climate Action* of the 17 United Nations Sustainable Development Goals. Digital platform providers must strengthen internal efforts to collaborate with Scope 2 and 3 business partners through knowledge sharing to advance a sustainable society.

Therefore, establishing the EKC hypothesis and the Inverted N-shaped curve in this research indicate the beginning of the *germination* stage of decoupling growth and environmental impact. All economic actors must advocate that digital platform development presents a driving force for global environmental conservation, taking advantage of the current state of economic and social transformation.

Footnotes

[1] This is a preliminary summary to be presented in a forthcoming paper at the International Association for Energy Economics (IAEE) 2022 Conference in Tokyo.

[2] The other rankings in Japan are: seventh, Twitter, with 51.99 million; eighth, Instagram, with 47.71 million. Apple and Facebook were in the top 10 until 2020, but in this data, they are below the top 10.

[3] Basic formula are:

$Y(CO_2) = \alpha + \beta_1 (SAL) + \varepsilon,$

$Y(CO_2) = \alpha + \beta_{11} (SAL) + \beta_{12} (SAL)^2 + \varepsilon,$

$Y(CO_2) = \alpha + \beta_{11} (SAL) + \beta_{12} (SAL)^2 + \beta_{13} (SAL)^3 + \varepsilon.$

The significance level of the p-value is set at 5% ($p < 0.05$). α and ε indicate constant and error terms, respectively.

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