

Accounting for Natural Capital in Japanese Companies: From Biodiversity Conservation to Value Creation of Natural Capital

Shoji OKA*, Qi WU** and Michiyasu NAKAJIMA***

Abstract

This study analyses natural capital management in Japanese companies from an accounting perspective. We used data from Nikkei and Toyo Keizai to clarify the current status of natural capital accounting and biodiversity conservation activities in Japanese companies. Furthermore, we conducted case studies of Sanden, Kirin, Toshiba, Sekisui Chemical and Eisai, which have been implementing advanced practices in natural capital management and accounting. First, the importance of intangible assets in corporate management and accounting is increasing, especially in a sustainable society, and the measurement and disclosure of natural capital is necessary. We found that the number of environmental accounting and environmental reports by Japanese companies has been decreasing, while the number of integrated reports that include natural capital has been increasing. Finally, we discuss the significance of natural capital accounting, from environmental accounting to sustainability accounting and from biodiversity conservation to value creation.

Keywords: Natural Capital, Biodiversity Conservation, Value Creation, Sustainability

* Professor, Faculty of Business and Commerce, Kansai University, Osaka, JAPAN
E-mail: shojioka@kansai-u.ac.jp

** Junior Associate Professor, Faculty of Economics and Business Administration,
Kyoto University of Advanced Science, Kyoto, JAPAN

*** Professor, Faculty of Business and Commerce, Kansai University, Osaka, JAPAN

1. INTRODUCTION

In 1999, Japan's Ministry of the Environment (MOE) issued the first version of its Environmental Accounting Guidelines and issued the final version by 2005, while it published the first version of the Environmental Reporting Guideline in 2000 and finalised it in 2018 after several revisions. The Natural Capital Coalition (NCC) issued the Natural Capital Protocol in July 2016 (NCC, 2016). It is a decision-making framework that enables organisations to identify, measure and value their direct and indirect impacts and dependencies on natural capital. Moreover, the International Integrated Reporting Council (IIRC) published the Integrated Reporting Framework in December 2013 (IIRC, 2013). It focuses on value creation, and six capitals (financial, manufactured, intellectual, human, social and relationship, and natural) embedded within mainstream business to create value over the short, medium and long terms.

What is natural capital? The MOE (2014) focuses on 'natural capital' and considers the natural environment as an important type of capital that supports people's livelihoods and is a foundation for companies. It defines natural capital as the capital (stock) formed by nature, such as forests, soil, water, air and biological resources. We can consider the flows of natural capital as ecosystem services. The flow of natural capital can be regarded as an ecosystem service. The capital formed by nature is connected and builds biodiversity and ecosystems, and the appropriate valuation and management of the value of natural capital enhances the sustainability of corporate management. However, current corporate accounting does not cover such important natural capital, but recent works argue the importance of intangible assets in corporate management. For example, Haskel and Westlake (2018) argue that investment in intangible assets (computerised information, innovation property and economic capabilities) will lead to higher firm-level productivity in the future. From an accounting perspective, Lev and Gu's (2016) argument is from the perspective of the accounting information. They propose the Strategic Resources & Consequences Report. These two studies discuss the importance of intangibles, but do not mention natural capital in depth. On the other hand, the UNU-IHDP and UNEP (2012), Managi (2017), Dasgupta et al. (2019) and others discuss the importance of natural capital, including biodiversity. For example, Professor Managi and his research group proposed the Inclusive Wealth Index (produced capital, human capital and natural capital) as an alternative to GDP, but it is limited to the macro level of countries and regions. Therefore, while the importance of natural capital at the macro level

and intangible assets in corporate management and accounting is increasing, what about natural capital at the micro level, such as companies?

This paper aims to observe the research direction of natural capital accounting, the first step is to clarify the current state of environmental accounting, establish the concept of biodiversity and natural capital and determine how to evaluate natural capital and disclose information. To investigate the state of natural capital management and natural capital accounting in Japanese companies, we conducted interview. We then discuss sustainability management tools as a new evaluation method and the significance of natural capital accounting.

2. ENVIRONMENTAL ACCOUNTING FOR BIODIVERSITY AND NATURAL CAPITAL IN JAPAN

First, environmental accounting research has progressed in Japan in earnest since the 1990s. The MOE drafted and revised its environmental accounting guidelines, and more companies have introduced environmental accounting. In 1999, the MOE issued the first version of the Environmental Accounting Guidelines and provided the final version in 2005, while it published the first version of the Environmental Reporting Guideline in 2000 and provided the final version in 2018 after some revisions. The final version works from the premise that the business environment is in the process of shifting towards a sustainable society. It accounts for the information needs of investors who will use environmental reporting within the ESG reporting framework, the guidelines require companies to report both conventional environmental management information and forward-looking non-financial data including the soundness of the organisation structure (governance, risk management etc.) and the direction of management strategy (long-term vision, strategy business model). The guidelines changed, and require not only comprehensive reporting on the 'material balance' as a whole, but also require the entity itself to assess the major direct and indirect impact of its activities on the environmental and report on the material environmental issues that the entity must address. The guidelines also now require entities to report the financial impact of the major environmental issues it identifies and to incorporate a monetary approach for quantitatively recognizing, measuring and communicating the costs (benefits) of its environmental activities, as in the environmental accounting framework of the Environmental Accounting Guideline 2005 (MOE, 2018, 5). For example, entities must report the impact of business activities on biodiversity, the status and extent of the dependency of the entity's business

activities on biodiversity, business activities that contribute to biodiversity conservation, and the status of cooperation with external stakeholders. Regarding the status and extent of the entity's dependency on biodiversity for its business activities, the entity should explain the natural capital and ecosystem services that the business activities depend upon (e.g., the entity procures biological raw materials for its business), with further discussion of the extent of that dependency from the perspective of the sustainability of those business activities (MOE, 2018, 28).

However, while academic research on environmental accounting is progressing, the number of companies that actually adopted environmental accounting has not increased, as the '*Survey on Environmentally Friendly Corporate Behavior*', published annually by the MOE, reveals. FIGURE 1 shows the implementation rate of environmental accounting in Japanese companies. In recent years, the number of companies that introduced environmental accounting has been declining. The implementation rate of environmental accounting was 19.6% in 2018 and decreased 9.8% points in 13 years (MOE, 2020). FIGURE 2 shows the publication rate of environmental reports in Japanese companies. As with environmental accounting, the number of companies that issue environmental reports has been declining in recent years. The publication rate of environmental reports was 31.3% in 2016, and decreased 3.4% points in 11 years.

Alternatively, the number of Japanese companies issuing self-asserted integrated reports is on the rise, as FIGURE 3 shows. In 2020, 579 companies issued integrated reports. Therefore, Japanese companies have not introduced or issued

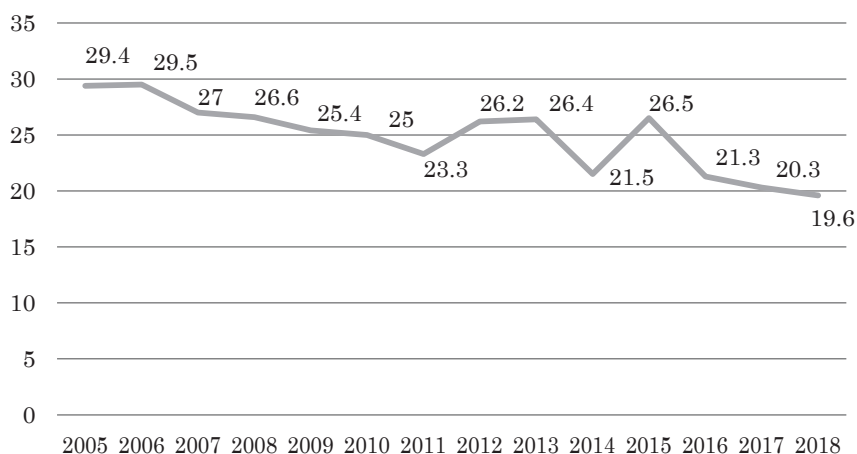


FIGURE 1: Implementation rate of environmental accounting in Japanese companies (MOE, 2020).

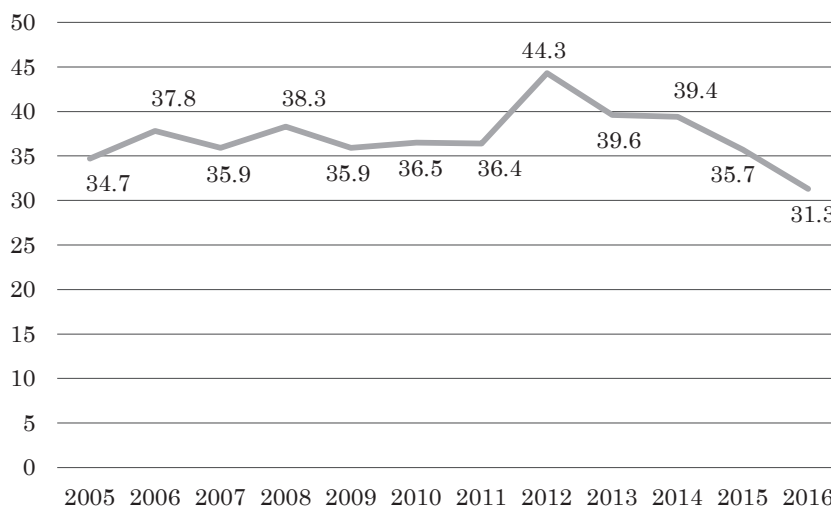


FIGURE 2: Publication rate of environmental reports in Japanese companies (MOE, 2020).

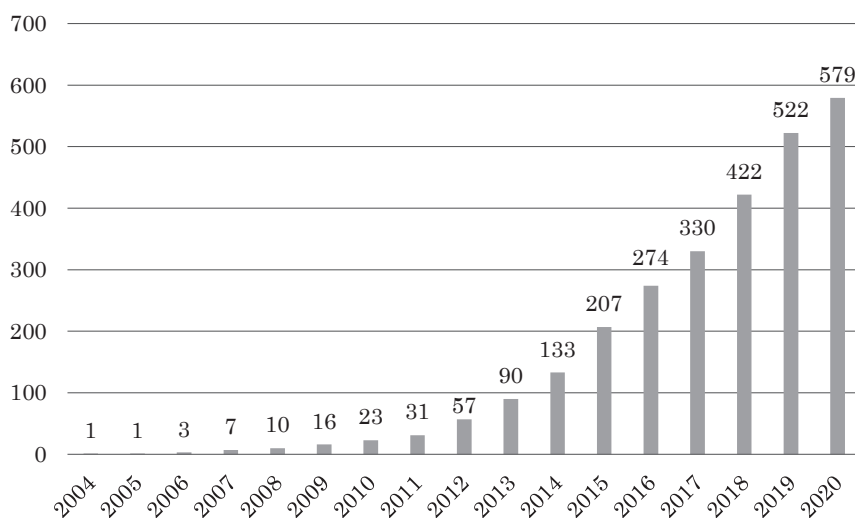


FIGURE 3: Number of issued integrated reports in Japanese companies (Corporate Value Reporting Lab., 2021).

environmental accounting and environmental reports so far, but have integrated non-financial information and financial information related to the value creation from six capitals, including natural capital. We can see the shift towards issuing integrated reports.

KPMG JAPAN (2019) analyses KPI trends in integrated reports in terms of the six capitals (financial, manufactured, intellectual, human, social and relationship,

and natural), finding that the percentage of non-financial KPIs has been steadily rising since 2014, when KPMG JAPAN began conducting this survey, reaching 38% in FY2018 (compared to 26% in FY2014). In addition, KPMG JAPAN (2019) finds that human- and nature-related KPIs increased, accounting for 16% (10% in FY2014) and 12% (7% in FY2014), respectively. ‘CO₂ and greenhouse gas emissions (GHG)’ has been the most common nature-related KPI in the past five years, indicating that concern over climate change remains high in the corporate sector. The next nature-related KPIs are ‘Energy consumption and input’ and ‘Waste emissions’, though biodiversity is not in the ranking (KPMG JAPAN, 2019, 18), natural capital is one of the most important types of capital in corporate value creation.

The MOE conducted a survey and issued a report on natural capital accounting in 2016 in cooperation with KPMG AZUSA (KPMG AZUSA, 2016). The key findings are as follows. Business risks and opportunities regarding natural capital can be a material issue in sustainable business operations and value creation in the long-term, and hence the information demand in these areas is on the rise. Furthermore, there are a range of efforts undertaken towards creating tools and methodologies of valuing natural capital by diverse organisations at various levels, from industry to international governmental bodies. For natural capital accounting, the key recommendation is to clarify the meaning and purpose of the engagement, as it is essential, especially the identification of value chain risk status for many global companies. Natural capital valuations in Japanese industry should be harmonised with international efforts to develop a standard for natural capital valuation based upon coordination between related initiatives within the MOE and other domestic ministries and agencies.

A Japanese newspaper’s questionnaire research, entitled ‘*Nikkei Environmental Management Survey in 2017*’, contains the question ‘Are you introducing and calculating Natural Capital Accounting that converts the impact on natural capital such as water and air throughout the supply chain in your company and group?’, and collected answers from 396 firms. Of the respondents, 24 firms (6.1%) chose ‘we already calculate the value of natural capital in the company or the whole business unit’, 17 firms (4.3%) chose ‘we calculate it as part of business unit’, and 205 firms (51.8%) chose ‘will consider the implement and calculation from now’ (TABLE 1). By industry, the number and percentage of companies that Electric Appliances has introduced and calculated the most is high. Toshiba will be introduced later as a case study. In addition, we will introduce Sekisui Chemical, a chemical company that actively implements natural capital management and evaluates natural capital.

TABLE 1: Rate of natural capital accounting in Japanese companies (Nikkei, 2017)

	Numbers	Calculated (all)	Calculated (part)	in review	No plan	N/A
Total	396	24	17	205	141	10
		6.1	4.3	51.8	35.6	2.5
Foods	44	1	2	22	19	0
		2.3	4.5	50.0	43.2	0.0
Textiles and Apparels	10	0	0	5	4	1
		0.0	0.0	50.0	40.0	10.0
Pulp and Paper	7	1	0	6	0	0
		14.3	0.0	85.7	0.0	0.0
Chemicals and Oil	71	1	1	45	22	2
		1.4	1.4	63.4	31.0	2.8
Pharmaceutical	22	2	0	10	10	0
		9.1	0.0	45.5	45.5	0.0
Rubber Products	10	0	1	3	5	1
		0.0	10.0	30.0	50.0	10.0
Ceramics	10	0	0	7	3	0
		0.0	0.0	70.0	30.0	0.0
Iron and Steel	7	0	0	5	1	1
		0.0	0.0	71.4	14.3	14.3
Nonferrous Metals and Metal Products	23	2	1	13	8	0
		8.7	4.3	56.5	34.8	0.0
Machinery	44	0	4	21	18	1
		0.0	9.1	47.7	40.9	2.3
Electric Appliances	80	10	1	40	27	2
		12.5	1.3	50.0	33.8	2.5
Shipbuilding	3	0	0	0	3	0
		0.0	0.0	0.0	100.0	0.0
Transportation Equipment	31	3	5	12	11	0
		9.7	16.1	38.7	35.5	0.0
Precision Instruments	13	2	1	5	5	0
		15.4	7.7	38.5	38.5	0.0
Printing	10	2	0	4	2	2
		20.0	0.0	40.0	20.0	20.0
Light Industry	8	0	0	6	2	0
		0.0	0.0	75.0	25.0	0.0
Other Manufacturing	3	0	1	1	1	0
		0.0	33.3	33.3	33.3	0.0
< Top 50 >	51	16	6	26	3	0
		31.4	11.8	51.0	5.9	0.0
< Others >	345	8	11	179	138	10
		2.3	3.2	51.9	40.0	2.9

3. BIODIVERSITY CONSERVATION ACTIVITY IN JAPANESE COMPANIES

To clarify the current state of biodiversity conservation activities in Japanese companies, we use data from the database ‘*CSR Corporate Handbook*’ by Toyo Keizai and the ‘*Nikkei Environmental Management Survey*’ by Nikkei.

First, according to each edition of the *CSR Corporate Handbook*, Japanese companies increasingly examine the impact of business activities on biodiversity from 2017 to 2021. The number of such companies increased annually (5.3% points increase in 5 years). Otherwise, the companies that do not care about the impact of biodiversity are decreasing (3.2% points decrease in 5 years) (TABLE 2). It seems that companies are beginning to recognise the importance of the impact of business activities on biodiversity.

TABLE 2: Impact of business activities on biodiversity (Toyo Keizai, 2017–2021a, b)

	2017 edition		2018 edition		2019 edition		2020 edition		2021 edition	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Assessing	301	31.0%	324	32.9%	361	35.2%	375	35.5%	399	36.3%
Not assessing	415	42.7%	417	42.3%	424	41.3%	431	40.8%	434	39.5%
Others	127	13.1%	127	12.9%	126	12.3%	137	13.0%	143	13.0%
Unknown	129	13.3%	117	11.9%	115	11.2%	114	10.8%	123	11.2%
Total	972	100%	985	100%	1,026	100%	1,057	100%	1,099	100%

Second, we investigate the next five questions in the *Nikkei Environmental Management Survey*: (1) Whether activities for biodiversity conservation and sustainable use are promoted, (2) The basis of the biodiversity conservation efforts, (3) Biodiversity conservation activities; Publication of policy and guidelines, (4) Formulation of biodiversity conservation activity targets, and (5) Establishment of an organisation that oversees and promotes biodiversity conservation activities. The results show that the number of companies that carry out activities to conserve biodiversity and promote sustainable use is increasing annually. Moreover, companies are making efforts based on the ‘Guidelines for Private Participation in Biodiversity’ by the MOE, and more than 75% of companies have disclosed their policies and guidelines. Specifically, more than 75% of companies have created biodiversity conservation activity targets, and more than 85% have established an organization to supervise and promote biodiversity conservation (TABLES 3–7).

TABLE 3: Does your company implement biodiversity conservation and sustainable use promotion? (Nikkei, 2015–2019)

	... already implemented	...will implementation year	...have plans to implement in future	...totally not	N/A
18th	77.8	1.0	6.7	14.3	0.2
19th	81.4	0.7	5.6	12.1	0.2
20th	84.3	0.5	4.0	10.9	0.3
21st	84.8	0.5	5.3	9.1	0.3
22rd	89.4	0.3	3.3	6.9	0.0

TABLE 4: What kind of guideline does your company use for biodiversity conservation efforts? (Nikkei, 2015–2019)

	MOE	NGO / NPO	Companies	Suppliers	N/A
18th	49.7	26.1	22.7	0.9	0.6
19th	49.0	26.5	22.7	1.5	0.3
20th	49.7	25.3	23.8	1.2	0.0
21st	47.8	27.3	24.0	0.9	0.0
22rd	47.7	24.8	27.2	0.3	0.0

TABLE 5: Does your company already disclose biodiversity conservation policy and guidelines? (Nikkei, 2015–2019)

	Yes	...have plans to disclose	No	N/A
18th	72.1	17.0	10.6	0.3
19th	71.4	17.1	11.2	0.3
20th	74.7	14.6	10.4	0.3
21st	76.9	12.2	11.0	0.0
22rd	78.3	9.6	11.5	0.6

TABLE 6: Does your company set goals for biodiversity conservation activities? (Nikkei, 2015–2019)

	...embedded since last year	...will embed this year	...will embed next year	...no plan	N/A (business characteristic)	N/A
18th	69.7	9.7	16.1	3.3	0.9	0.3
19th	70.8	8.3	14.5	5.3	1.2	0.0
20th	73.8	6.8	13.4	4.5	1.2	0.3
21st	76.3	4.5	12.8	5.9	0.6	0.0
22rd	77.4	4.3	11.1	5.6	1.2	0.3

TABLE 7: Does your company have a department that controls and promotes biodiversity conservation activities? (Nikkei, 2015–2019)

	Yes	...will set up this year	...will set up next year	No	N/A (business characteristics)	N/A
18th	87.3	2.1	5.2	4.2	0.9	0.3
19th	85.5	2.4	5.0	5.9	0.9	0.3
20th	87.8	1.2	5.4	4.8	0.6	0.3
21st	87.2	0.6	5.6	5.9	0.6	0.0
22rd	87.9	1.2	3.7	5.6	1.2	0.3

We examined the status of biodiversity conservation activities by Japanese companies using externally disclosed data for the past five years. We can see that companies understand the importance of biodiversity conservation activities in corporate management. Therefore, to further promote biodiversity conservation activities among companies, it is vital to express the impact of biodiversity numerically. In general, unquantifiable items are difficult to manage. In the next section, we introduce natural capital, a concept that extends the scope of biodiversity, in connection with accounting (Oka and Nakajima, 2017).

4. CASE STUDIES

Natural capital is an important management resource for corporate sustainability and a source of value creation. In other words, it is essential to evaluate, manage and disclose natural capital in future corporate management in a society that implements the Sustainable Development Goals (SDGs). Some Japanese companies already actually implement natural capital management and accounting. For example, (1) Sanden and Kirin, which measure and assess natural capital using an input-output analysis model called ESCHER (Efficient Supply Chain Economics & Environmental Reporting); (2) Toshiba, which uses natural capital accounting as a way to visualise external diseconomies using LIME to convert the environmental impacts of its entire life cycle, including its supply chain, into monetary values and apply the reduction rate as a KPI; (3) Sekisui Chemical, which uses a single index (SEKISUI Environmental Sustainability Index) to express the impact of corporate activities on the environment (use of natural capital) and the degree of contribution to the environment (return on natural capital); and (4) Eisai, which uses a Balanced Scorecard (BSC) and strategy map to visualise the value creation process in its integrated report. We discuss these four case studies below.

4.1 Sanden Holdings and Kirin Group

ESCHER is a proprietary input-output analysis model developed by PwC Germany. It provides services for calculating water use and depletion potential, GHGs and land use area due to global business activities, as well as for assessing environmental risks and opportunities using the results of the calculations. ESCHER uses a company's financial information as a key resource to determine the impact of its entire supply chain (GHG emissions, land use, water use, value added etc.) (Scope 3). Sanden Holdings (Sanden) is one of the companies that actually uses ESCHER to measure and evaluate natural capital. Sanden uses ESCHER to calculate the burden on natural capital to obtain a 'natural capital assessment-type environmental rating loan' from Sumitomo Mitsui Trust Bank, Ltd., which incorporates the company's efforts in terms of natural capital into its assessments. Developed in collaboration with the PwC Arata, the natural capital assessment-based environmental rating for loans uses a proprietary model (an econometric model using input-output tables and trade statistics) to provide a comprehensive estimate of upstream natural capital impacts in the supply chain from purchasing data. It can be used to estimate the load on natural capital in the upstream part of the supply chain from purchasing data. In addition to the environmental rating based on various items such as climate change measures, resource circulation and environmental real estate, the evaluation results are fed back to Sanden to calculate the extent to which Sanden is impacting soil, air and water, which are fundamental components of natural capital in the upstream supply chain. This feedback includes upstream water use, GHGs and land use by country/region and by commodity, which is traditionally difficult for companies to calculate. On the results of the ESCHER calculation of the impact on natural capital, Sanden stated, 'The results of the calculation show that there is an expected risk to "water" capital in some areas, and we have decided to take this into account in our future business development. The calculated upstream Scope 3 (GHGs in the supply chain) was accepted as a CDP response and was used in our reporting to CDP.' in its CSR report (Sanden, 2014, 23).

Kirin Group (Kirin) also conducted a study using ESCHER to understand the natural capital used in the upstream value chain, namely water consumption, GHG emissions and land use area, mainly in the Japanese integrated beverages business. We can see Kirin's approach as an example of natural capital accounting. For example, Kirin measures and evaluates the natural capital burden in its supply chain. Its natural capital accounting information shows that the value chain burden is four times higher in terms of GHG emissions and seven times

higher in terms of water consumption than the company's own burden. Additionally, water-stressed Oceania and the United States accounted for 62% of the water use in the value chain, and the results were shared with the procurement department to understand the risks (Kirin, 2015).

4.2 Toshiba Group

We can take Toshiba Group (Toshiba) as an example of using environmental accounting in an attempt to measure the costs and benefits of various environmental activities to minimise such diseconomies. However, the environmental impacts associated with business activities cannot be reduced to zero. Natural capital accounting is an attempt to 'visualise external diseconomies' by converting environmental impacts into monetary values. Toshiba continues to raise its level of environmental management using two tools: environmental accounting and natural capital accounting (FIGURE 4).

Toshiba evaluated its business activities in terms of their impact on natural capital by dividing it into environmental impacts on natural capital, reuse of natural capital and positive effects on natural capital (Toshiba, 2016). The impact on natural capital in FY2015 measured in monetary value decreased by 17% from the previous year to 261.2 billion yen. Data by life cycle stage show that the environmental impact is most significant during the use of products sold, followed by the procurement of resources and raw materials. To reduce the environmental impact during product use, it is important to create products with the highest level of environmental performance, including energy efficiency. Meanwhile, the monetary value of business activities that did not consume natural capital was 241.4 billion yen in FY2015. These activities include new power generation using delivered renewable energy systems as well as water reuse and recycling, addition to rainwater utilisation at business and production sites. Moreover, the costs

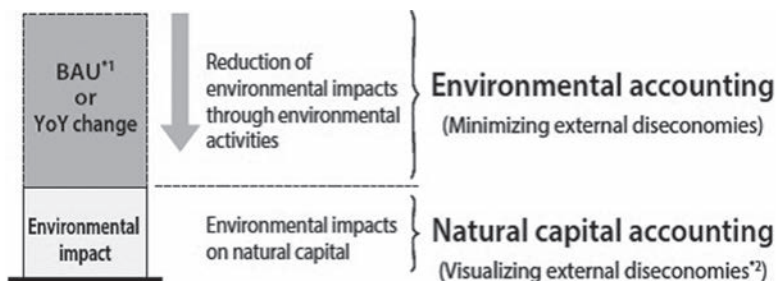


FIGURE 4: Environmental accounting and natural capital accounting in Toshiba (Toshiba, 2016, 64).

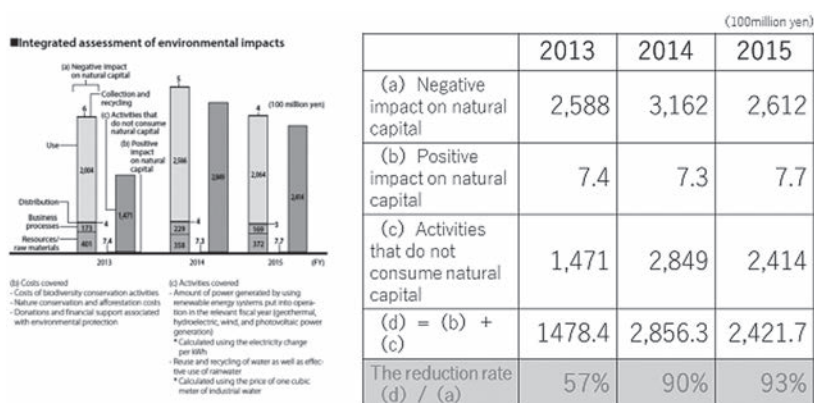


FIGURE 5: Comparison of the impact of Toshiba group's emissions on natural capital, reuse of natural capital, positive effects on natural capital, and the reduction rate (Toshiba, 2016, 65).

incurred for biodiversity conservation, factory afforestation and other initiatives that positively affect natural capital totalled 770 million yen. This includes, for example, cases in which new ecosystems are created through environmentally friendly greenery management on the premises of Toshiba factories built on reclaimed land which originally had no ecosystem. These numbers include the monetary values of environmental impacts and the amounts that were actually paid. However, Toshiba is considering a system that compares these results expeditiously to offset or reduce its environmental impacts on natural capital. The reduction rate changed from 57% to 90% to 93% over the three-year period from 2013 to 2015 (FIGURE 5) (Toshiba, 2016, 65).

4.3 Sekisui Chemical Group

Sekisui Chemical Group (Sekisui) recognised that business activities depend on resources (natural capital). All executives and employees are working to improve their skills in promoting environmental activities and aim to promote environmental management based on contributions in three areas: expand and create markets for Environmental-Contributing Products, reduce environmental impact and conserve the natural environment to 'give back more to the Earth than is taken' in 2030. Sekisui established and are implementing a three-year Environmental Medium-term Plan for FY2017 through FY2019 based on back-casting from the Long-term Environmental Vision. This Environmental Medium-term Plan, 'Sekisui Environmental Sustainability Plan: Accelerate' aims to accelerate various initiatives that contribute toward achieving the 2030 in Long-term

Environmental Vision (Sekisui Chemical, 2019b, 68).

Sekisui is generating prominent value toward the realisation of ‘the Earth with maintained biodiversity’ by contributing to the return of natural capital. Since 2014, Sekisui calculates the impact of its corporate activities on the environment (i.e. use of natural capital) and the contribution to the environment (i.e. return to nature) as part of the ‘Sekisui Environmental Sustainability Index’. The Sekisui Environmental Sustainability Index is the overall volume of returns to natural capital by the Group divided by its overall volume of natural capital use. They calculate the usage and return to natural capital with LIME2, a damage calculation-based impact assessment method developed for use in Japan by Professor Itubo of Tokyo City University. This single indicator covers all the criteria for conservation defined by LIME2, including the impacts on ‘human health (including the effects of global warming)’, ‘societal assets (including the effects of global warming)’, ‘the effects on plants (reducing interference on growth)’ and ‘the effects on life (restricting the extinction of living species)’. Sekisui calculates the amount of return to natural capital as the reduction in the risk of harm to natural capital from the whole Group’s various initiatives that contribute to the environment, relative to the case without these initiatives. More specifically, the calculation of the amount of natural capital used includes direct usage of land, GHGs, amounts PRTR substance and other pollutant air emissions; the COD volume of discharge into bodies of water; and indirect usage such as purchased raw materials, energy use, amount of water used, amount of waste material emitted and amount of GHGs emitted indirectly in the supply chain (Scope 3). The calculation for the returns to natural capital is the amount of contribution to reducing the use of natural capital through Environmental-contributing Products, environmental conservation activities, environment-related donations, and mega-solar power generation output (Sekisui Chemical, 2019a, 47).

FIGURE 6 provides the Sekisui Environmental Sustainability Index using the results from FY2018. Setting the use of natural capital (impact on the environment) at 100%, the return to natural capital (contribution to the environment) was 92.8%. The Sekisui Environmental Sustainability Index is (1) quantify environmental impact and outcomes of activities by category, (2) calculate the load for each item by multiplying the coefficient for the load and the contribution to various environmental aspects for each item, and (3) add environmental impacts and contributions (integration). Starting in FY2017, the “rate of natural capital,” as reflected in this index, is being used as a KPI to manage the overall progress of Sekisui’s environmental management (FIGURE 7). Sekisui has incorporated the

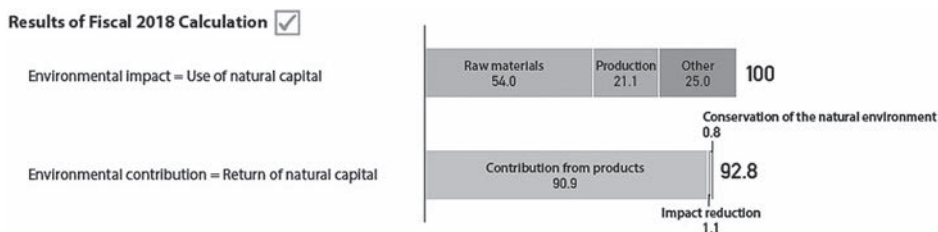


FIGURE 6: Sekisui Environmental Sustainability Index (Sekisui Chemical, 2019a, 46)

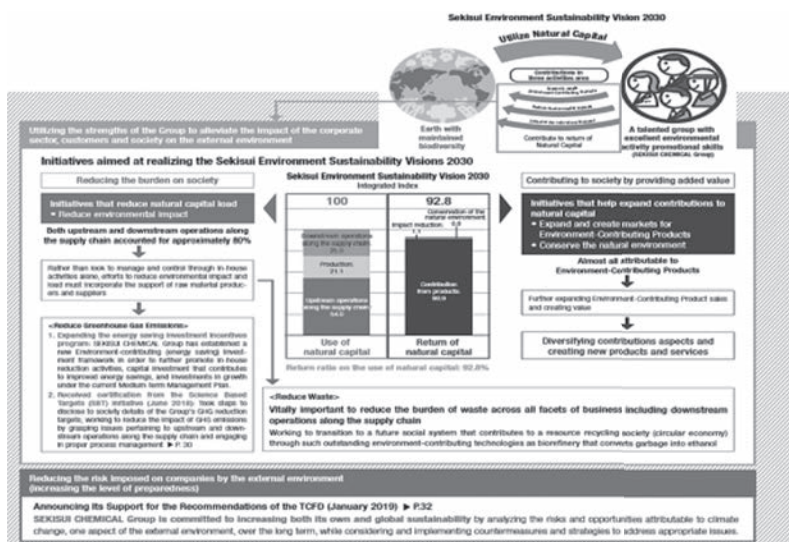


FIGURE 7: Overview of Environmental Initiatives (Sekisui Chemical, 2019b, 26)

Sekisui Environmental Sustainability Index into the Sekisui Environmental Sustainable Vision 2030, in other words, natural capital indicators are included in the long-term management plan. Sekisui's natural capital management implements plan-do-check-act management cycle (BMU, 2012, 26).

4.4 Eisai

Eisai's corporate philosophy is to recognise that the leading roles in healthcare are played by patients, their families, and consumers, and to carry out business by improving their benefits. Eisai's aim (hhc = human health care) differs from CSR, which focuses on social contribution activities, including charitable activities that do not necessarily contribute to business activities. Eisai's aim is similar to the CSV concept that aims to achieve social value and economic value simultaneously (Eisai, 2017, 4–5). Eisai has been publishing the integrated report since 2014, and uses the concept of the BSC for its value creation process and flow

instead of the IIRC’s framework. First, in the IIRC’s framework, an integrated report is a brief communication of how a company’s strategy, governance, performance and outlook can lead to short-, medium- and long-term value creation in the company’s external environment.

Eisai also considers the process of investing in capital to conduct business activities, creating added value and increasing capital beyond input, in accordance with the IIRC’s framework, as the ‘value creation process’. It views ‘value creation flow’, such as how it creates value through business activities, from the four BSC perspectives, with a focus on the financial perspective. This is based on Eisai’s corporate philosophy that the sole purpose of business activities is to create social value by increasing patient satisfaction, and consequently to create economic value, such as sales and profits, in this order. FIGURE 8 shows Eisai’s sustainable value creation based on a new model that incorporates the IIRC’s framework and a BSC as a model of the value creation process and flow (Eisai, 2017, 10).

The company replaced the flow of value creation with its BSC strategy map, which is more specific. To achieve the ultimate goal of ‘financing the long-term shareholder value’ (the financial perspectives), its strategy map includes the base of learning and growth perspectives, internal business processes perspectives, and the connection between customer perspectives. From the learning and growth perspectives, the hhc philosophy has been incorporated into the BSC, with is a concept of CSV similar to Eisai’s corporate philosophy. We could see this as a Sustainability Balanced Scorecard (SBSC).

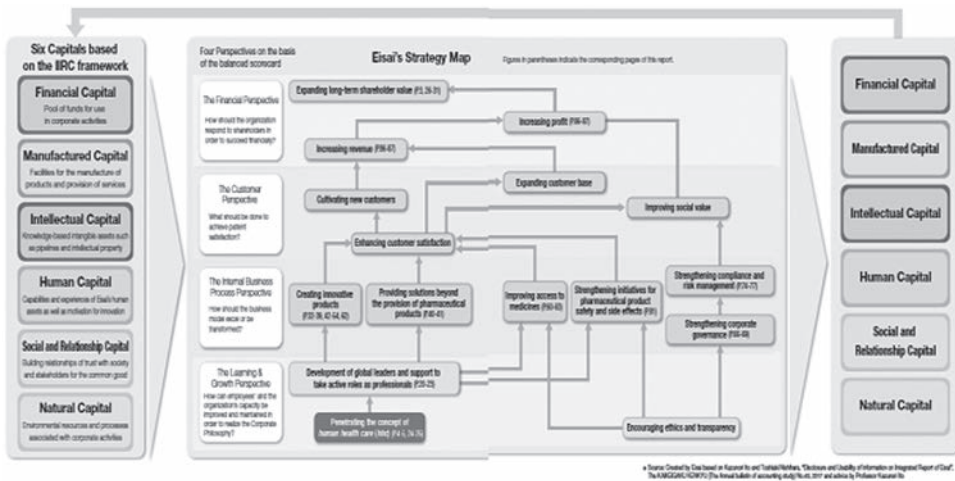


FIGURE 8: Eisai’s value creation process and strategy map (Eisai, 2017, 10–11)

5. DISCUSSION AND CONCLUSION

The Economics of Ecosystems and Biodiversity (TEEB) study started in 2007, with a focus on the fact that society does not recognise the value of biodiversity, which led to the loss of biodiversity. It concentrates on assessing the value of biodiversity and publishes its research results (TEEB, 2010, 2012). Moreover, economists developed a full toolkit for the economic valuation of natural resources, the environment and its services. The valuation methods include revealed-preferences (RP) techniques, where valuations are inferred from actual observations of choice behaviour and stated-preferences (SP) techniques, where valuations are obtained directly from hypothetical statements of choice. The RP methods include travel cost methods that account for the costs to individuals to experience spatially distributed natural systems, hedonic pricing methods that account for the premiums individuals pay to have environmental amenities and averting cost methods that calculate the costs to avoid environmental damage.

The SP techniques include contingent valuation method (CVM), in which people are presented with a hypothetical contingency scenario and answer questions explicitly, and conjoint analysis (CJ), in which people are presented with a set of hypothetical scenarios involving various levels of two or more attributes and are asked to rate, rank or choose among them, and researchers infer the structure of their preference for these attributes from their choices (Farber and Griner, 2000). The CVM is applied through surveys asking people directly how much they would be willing to pay for a change in a specific environmental service. The CVM received a lot of attention in the field of environmental economics since the 1990s (Kuriyama, 2018) because it has a wide range of evaluation targets and is the most widely used method for estimating non-use values such as global warming and biodiversity. The CJ method, like CVM, evaluates the economic effects of environmental measures using questionnaires. By showing multiple environmental measures to respondents, researchers can decompose the economic value and evaluate each component of the environmental measures. The corporate environmental measures include global warming countermeasures, waste countermeasures, water pollution countermeasures and air pollution countermeasures. By using CJ, the economic effects of environmental countermeasures can be decomposed into individual countermeasures. Thus, this method is effective in environmental accounting as well. At present, several practical and efficient toolkits for environmental evaluation have been developed. However, there are few practical cases in which firms have adopted these methods to evaluate their biodiversity

conservation activities in environmental accounting.

We find from externally published data that Japanese companies place importance on biodiversity conservation activities. To improve the implementation of biodiversity conservation activities, it is necessary to build an accounting system that uses valuation techniques in environmental economics to quantify, measure and communicate biodiversity and natural capital. Natural capital accounting covers not only biodiversity conservation but also value creation, and is shifting from negative CSR to positive CSR (CSV). As for the remaining issues, it is necessary to examine the relationship between conservation science and accounting research, as in Feger et al. (2018) and the relationship with KPMG's True Value Methodology (KPMG, 2014) (Taibi et al., 2020).

Natural capital accounting recently attracted attention, though some existing tools, such as full cost accounting (Bebbington et al., 2001) and externality accounting (Unerman et al., 2018) may be useful. No matter how much a company considers the environment, it is inevitable that some environmental impact will occur as long as it is conducting economic activities. Such an environmental burden creates social costs as external diseconomies. The essence of environmental conservation activities in companies is to minimise social costs. Environmental management accounting that includes this social cost is life cycle costing in the broadest sense, though it is called full cost accounting in the sense of 'complete cost accounting'. A system that integrates all potential and actual costs and benefits in current accounting and economic factors, including environmental (and social) externalities, will yield the true costs (Bebbington et al., 2001). Unerman et al. (2018) show the process by which externalities are internalised in response to social transformation. Until now, externalities were viewed as costs, but natural capital accounting views natural capital as value creation and can be internalised.

REFERENCES

- Bebbington, B., Gray, R., Hibbitt, C. and Kirk, E. (2001). *Full Cost Accounting: An Agenda for Action*, Certified Accountants Educational Trust.
- BMU. (2012). *Corporate Biodiversity Management Handbook: A Guide for Practical Implementation*, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).
- Corporate Value Reporting Lab. (2021). *Trends in Integrated Reporting Supporting Japanese Sustainable Growth*, Corporate Value Reporting Lab. (in Japanese).
- Dasgupta, P., Raven, P. and McIvor, A. (2019). *Biological Extinction: New Perspectives*,

- Cambridge University Press.
- Eisai. (2017). *EISAI Integrated Report 2017*, Eisai.
- Farber, S. and Griner, B. (2000). Using Conjoint Analysis to Value Ecosystem Change, *Environmental Science and Technology*, Vol. 34, No. 8, 1407–1412.
- Feger, C., Mermet, L., Vira, B., Addison, P. F. E., Barker, R., Birkin, F., ... Sutherland, W. J. (2018). Four Priorities for New Links Between Conservation Science and Accounting Research, *Conservation Biology*, Vol. 33, No. 4, 972–975.
- Haskel, J. and Westlake, S. (2018). *Capitalism Without Capital: The Rise of Intangible Economy*, Princeton University Press.
- IIRC. (2013). *The International <IR> Framework*, International Integrated Reporting Council.
- Kirin. (2015). Natural Capital Upstream of the Kirin Group's Value Chain and Identifying Water Risks at Major Global Business Sites. (http://www.kirinholdings.co.jp/news/2015/0227_01.html (01/12/2021)).
- KPMG. (2014). *A New Vision of Value: Connecting Corporate and Societal Value Creation*, KPMG.
- KPMG AZUSA. (2016). *Results Report for 2015 Survey and Study on Issues Related to Environmental Accounting and Natural Capital Accounting*, MOE. (in Japanese).
- KPMG JAPAN. (2019). *Survey of Integrated Reports in Japan 2018*, KPMG JAPAN.
- Kuriyama, K. (ed.) (2018). *Corporate Management and Environmental Valuation*, Chuokeizai-Sha. (in Japanese).
- Lev, B. and Gu, F. (2016). *The End of Accounting and the Path Forward for Investors and Managers*, John Wiley & Sons.
- Managi, S. (ed.) (2017). *Valuing Inclusive Wealth*, Chuokeizai-Sha. (in Japanese).
- MOE (Ministry of the Environment). (2005). *Environmental Accounting Guidelines 2005*, MOE. (in Japanese).
- MOE (Ministry of the Environment). (2014). *White Paper on the Environment, Circular Society and Biodiversity*, MOE. (in Japanese).
- MOE (Ministry of the Environment). (2018). *Environmental Reporting Guidelines 2018*, MOE. (in Japanese).
- MOE (Ministry of the Environment). (2020). *Environmental Corporate Behavior Survey*, MOE. (in Japanese).
- NCC. (2016). *Natural Capital Protocol*, Natural Capital Coalition.
- Nikkei (2015–2019). *Nikkei Environmental Management Survey*, Nikkei. (in Japanese).
- Oka, S. and Nakajima, M. (2017). New Development on Natural Capital Accounting into Environmental Accounting Information: Towards a New Corporate Value Evaluation, *The Journal of Cost Accounting Research (Japan Cost Accounting Association)*, Vol. 41, No. 2, 134–145. (in Japanese).
- Sanden. (2014). *CSR Report 2014*, Sanden Holdings.
- Sekisui Chemical. (2019a). *CSR Report 2019*, Sekisui Chemical Group.
- Sekisui Chemical. (2019b). *Integrated Report 2019*, Sekisui Chemical Group.

- Taibi, S., Antheaume, N. and Gibassier, D. (2020). Accounting for Sustainable Developing: An Intervention-Research Approach, *Sustainability Accounting, Management and Policy Journal*, Vol. 11, No. 7, 1213–1243.
- TEEB. (2010). *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*, Routledge.
- TEEB. (2012). *The Economics of Ecosystems and Biodiversity in Business and Enterprise*, Routledge.
- Toshiba. (2016). *Toshiba Environmental Report*, Toshiba Group.
- Toyo Keizai. (2017–2021a). *CSR Corporate White Paper*, Toyo Keizai. (in Japanese).
- Toyo Keizai. (2017–2021b). *CSR Corporate Handbook*, Toyo Keizai. (in Japanese).
- Unerman, J., Bebbington, J. and O'Dwyer, B. (2018). Corporate Reporting and Accounting for Externalities, *Accounting and Business Research*, Vol. 48, No. 5, 497–522.
- UNU-IHDP and UNEP. (2012). *Inclusive Wealth Report. Measuring Progress Toward Sustainability*, Cambridge University Press.

This is a product of research which was financially supported by the Kansai University Fund for Supporting Outlay Research Centers, 2021, “Development of the Sustainability Accounting System to support SDGs society” and JSPS KAKENHI Grant Number 21K13407 and 21K01800.