

The evolution of sustainability accounting and reporting in the United States: applications of the ecological anthropology and industrial ecology frameworks

Seleshi Sisaye

Palumbo-Donahue School of Business Administration, Duquesne University, Pittsburgh, Pennsylvania, USA, and

Jacob G. Birnberg

Katz Graduate School of Business, University of Pittsburgh, Pittsburgh, Pennsylvania, USA

Abstract

Purpose – The primary objective of this research is to chronicle how the Environmental Protection Agency (EPA) and other United States Federal Government Agencies (USFGA) agencies have played a role in shaping the trajectory of financial reporting for sustainability, with a particular emphasis on triple bottom line (TBL). This exploration extends to other indexes reporting sustainability data encompassed within financial, social and environmental reporting.

Design/methodology/approach – This study adopts an illustrative methodology, utilizing data sourced from governmental, business and international organizational documents.

Findings – Sustainability accounting predominantly finds its place within the framework of TBL. However, it is crucial to note that sustainability reporting remains voluntary rather than mandatory. Nevertheless, accounting firms and professional accounting societies have embraced it as a supplementary facet of financial accounting reporting.

Originality/value – The research highlights the historical evolution of sustainability within the USFGA and corporate entities. Corporations' interest in accounting for sustainability performances has significantly contributed to the emergence of voluntary sustainability accounting rules, as embodied by the TBL.

Keywords TBL, Sustainability accounting reporting, EPA, DJSI, Ecological anthropology, Industrial ecology, Environmental management, Socio-economic development

Paper type Research paper

1. Introduction

1.1 Background

Ecological anthropology and industrial ecology are the primary disciplines that have studied sustainable development. They have both addressed the impact of external environmental

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factors on organizational population birth, growth, decline and death. Ecological anthropology addresses sustainable development, balancing environmental concerns with socio-economic growth. Industrial ecology broadens sustainability to focus on the relationship between society, economy and the environment. The methodology of the paper is archival of online publications and reports from government, industrial organizations and international development organizations. The main objective of the paper is to document that the Environmental Protection Agency (EPA) approaches to sustainability have followed the ecological anthropology and industrial ecology concerns over limiting growth since the 1970s. This research discusses the development of sustainability reporting within the United States Federal Government Agencies (USFGA) and business organizations. The primary findings are that the EPA's work on the environment has influenced accounting reporting guidelines including the triple bottom line (TBL). However, TBL is voluntary and not mandatory, and the Financial Accounting Standards Board (FASB) has issued guidelines but not mandated TBL. Nevertheless, TBL has become an external reporting guideline to report on an organization's economic, environmental and social performances.

Sustainability accounting and reporting, as well as corporate governance, have not been extensively studied from the perspectives of ecological anthropology, industrial ecology and sociology. There is a need to study sustainability accounting from these two fields of social sciences. While sustainability has attracted research in business, the history of sustainability has its roots in ecological anthropology and agricultural sciences. These fields viewed sustainability as a natural resources approach to conservation of the environment. In the United States of America, sustainable development came as a reaction to limits to growth and the environmental movement which followed advocated for governmental regulations to control environmental degradation. Conservation and sustainability called for regulation and planned development. Sustainability in the 1970s and 1980s became the guiding framework to balance the impact of economic growth with the environment.

This research focused on the environmental movement in the United States of America because it brought the importance of sustainability development as a government policy to mitigate the impacts of economic growth and industrial development. The environmental movement in the United States of America not only addressed environmental concerns, but also brought other reform movements in sustainability and ecological systems management – water, natural resources management and conservation and pollution control, among others. The movement has contributed to the legitimization and institutionalization of environmental resources conservation concerns within the USA federal government agencies. The creation of the Environmental Protection Agency (EPA) consolidated regulatory power over business development practices to regulate pollution, hazardous waste and other environmental resources. Sustainability emerged as an ecological framework to guide governmental and business organizations to be involved in community development for sustained economic growth. Ecological anthropology and industrial ecology shaped government policies.

The contribution of this research is to study sustainability as an integrated framework for managing environmental and natural resources. Ecology is the primary social science discipline that brought the importance of sustainability management. However, behavioral accounting research has not applied to ecological framework. This is the first research to study sustainability from an ecological framework. Social science, particularly anthropology and sociology are the key disciplines that established the foundation of sustainability for balanced economic growth. In accounting, sustainability is a topic that has attracted contemporary research.

Hopwood (2009) suggests that the most effective approach to studying sustainability is when it becomes an integral part of the business enterprise. This involves integrating the management of ecological and environmental issues with the accounting reporting system. Building on Hopwood's (2009) insights, Bebbington and Larrinaga (2014, 2020) discuss the constraints in accounting research theory and methods in advancing the United Nations (UN)

Sustainable Development Goals (SDGs), as put forth in the [Brundtland Report \(1987\)](#), “*Our Common Future*”. They note that accounting research has not fully embraced and invested in ecological sustainability. While progress has been made in examining specific reports and sustainability issues, a comprehensive treatment of the sustainability paradigm in connection with SDGs has yet to emerge. This research addresses their concern by extending the ecological anthropology and industrial ecology frameworks to foster the development of sustainability accounting. The triple bottom line (TBL) has evolved as an integrated sustainability reporting approach for businesses, encompassing financial, social and environmental performance. This aligns with the ideals advocated by SDGs for the common good of societies and communities.

1.2 Contributions of the research/study

The study contributes to the accounting literature in three key areas. First, it is one of the few studies that utilizes ecological anthropology and industrial ecology approaches to study the environmental movement in the United States of America. The ecological movement in the United States of America has consolidated environmental conservation and legislation programs under the EPA. The EPA over the years has evolved to become the main agency for the promulgations of environmental legislation. Business sustainability has aligned with the policies of the United States Federal Government Agencies (USFGA) and the environmental legislations of the EPA in preparing sustainability reports.

Second, the study contribution is on documenting that most USFGA including the Department of Commerce, the Department of State and the United States Forest Service (USFS) participate in environmental sustainability. Their programs support that of the EPA to protect natural resources. Ecological anthropology and industrial ecology have thus influenced sustainability programs within the USFGA. Their focus on human ecology and adaptation is integral to the environmental programs and legislations of the USFGA.

Third, the research is the first to extend the sociology of population ecology framework for the institutionalization of rulemaking within organizations. While sustainability is now the focus for many public and business organizations, a policy that will mandate sustainability reporting has not been formulated. Sustainability reporting is voluntary and an attempt to establish standard financial accounting reporting rules has not materialized. In There is a proliferation of sustainability accounting guidelines. TBL, Corporate Social Reporting (CSR), Global Reporting Initiative (GRI) and Integrated Reporting (IR) are sustainability reports. However, there are no uniform guidelines on how these reports are prepared to document an organization’s financial/economic, environmental and social performances. There is an absence of commonly accepted reporting practices by business organizations. Sustainability has not become a universally accepted business strategy. This has contributed to the lack of sufficient support for the establishment of bureaucratic rules for sustainability accounting and reporting by accounting standard-setting bodies.

1.3 Research methodology: data sources

The research uses an illustrative methodology, utilizing data sourced from governmental, business and international organizational documents. These sources are available online databases. The research focused on those United States of America and international development organizations that have policies of sustainability development. Moreover, there are accounting firms that have policy guidelines on TBL and sustainable development. The literature sources are varied and exhaustive. We selected only those relevant documents that substantiate sustainability and TBL. We developed an index of archival data to reference these documents for citation in the study. A list of the acronyms of those organizations that were selected for the documents cited are provided in [Table 1](#).

AICPA	American Institute of Certified Public Accountants
CSR	Corporate Social Reporting
DJSI	Dow Jones Sustainability Index
EPA	Environmental Protection Agency
ESG	Environmental, Social and Governmental Index
FASB	Financial Accounting Standards Board
GRI	Global Reporting Initiative
IR	Integrated Reporting
IBRD	International Bank for Reconstruction and Development, commonly known as World Bank
LDC	Least Developed Countries
MSCI	Morgan Stanley Capital Investment Index
NOAA	National oceanic and Atmospheric Administration
NEPA	National Environmental Policy Act
SIA	Social Impact Analysis
SSA	Social Soundness Analysis
TBL	Triple bottom line reporting
UNDP	United Nations Development Programme
UNSDG	United nations Sustainability Development Group
USAID	United States Agency for international Development
USFGA	United States Federal Government Agencies
USFS	United States Forest Service

Source(s): Table by authors

Table 1.
Listing of acronyms in
alphabetical order

1.4 Paper's organization

The paper proceeds as follows. The second part discusses the historical context of sustainable development from ecological anthropology and industrial ecology. The third part describes the evolution of sustainable programs within the USFGA, notably within the EPA. Part four reports the external reporting guidelines that formed the basis for sustainability reporting. The fifth part discusses sustainability accounting and reporting systems, focusing on the application of ecological anthropology and industrial ecology. It outlines the constraints associated with the TBL due to the lack of standardized sustainability accounting rules and its acceptance by accounting standard-setting bodies such as Financial Accounting Standards Board (FASB). This part also provides insights into our limited understanding of user behavior. The sixth and final part summarizes the paper.

2. Literature review

2.1 Historical context of sustainable development

Historically the evolutionary ecological theory of organizations has its roots in Malthusian population theory. Darwin later adapted natural selection to describe the proliferation of population growth. Darwin's approach was subsequently expanded by sociologists into population ecology, aimed at explaining organizational growth, development, decline and eventual dissolution. Natural selection describes the process of birth, growth, survival of organizations (the fittest) and the natural demise of declining organizations. Sustainability is an integral part of the natural selection and adaptation of organizations through survival, growth and environmental transformations. In the realm of accounting, sustainability pertains to organizations as living entities with the capacity to coexist and adapt to environmental uncertainties indefinitely.

Valentinov (2021) argues that both classical institutional economics and general social systems theory suggest that sustainability is an ongoing concern embedded within organizations and society. This is because organizations engage in coordinated activities to share societal resources in a manner that sustains them over the long term. According to

institutional economics theory, sustainability involves both production and consumption. In general systems theory, organizations possess well-embedded functional systems that coordinate sustainable production and consumption for the present and the future. Conservation and planned sustainable production and consumption form the foundation of ongoing organizational survival.

Ecology and sustainable development are organizational domains with present and future transaction costs that have attracted the attention of economists. In the 1970s, in the United States of America, a group of economists (Meadows *et al.*, 2004) from Massachusetts Institute of Technology (MIT) argued that rapid population growth would constrain economic development by limiting industrial growth. Their report highlighted the necessity for sustained economic growth. The concept of sustainable development emerged as a response to the limits of growth.

Economics, anthropology and sociology have all contributed to the study of sustainable development. In economics, the evolutionary economics approach focuses on selection mechanisms to describe the behavioral decisions of organizations in response to environmental changes. Organizations employ selective strategies, such as expansion when profitable and contraction when not. Resource availability, influenced by geographical location and spatial distribution, shapes these strategies (Nelson and Winter, 2002). The evolutionary economics approach underpins the framework for external financial accounting reporting.

In sociology, evolutionary theory emphasizes organizational development and processes. Newer organizations replace older forms, constituting the underlying process of organizational change (Barnett and Carroll, 1995, p. 218). Sociological research applies population and organizational ecology approaches to describe the effects of organizational transactions, power dependence and boundary spanning on the organizational adaptation process. This shift in organizational studies incorporates the environment as an interactive factor in the cultural practices of organizational systems, moving beyond purely cultural explanations.

The ecological approach prompts researchers to examine the impact of social and spatial groups, location, geology, technology levels and land use patterns on the development of organizational density and population. Additionally, it investigates how internal and external environmental constraints affect organizational adaptation and change.

Economics, sociology and general systems theories have all been concerned with conservation policies and environmental management. Nevertheless, the fields of ecological anthropology and industrial ecology are the two primary areas that have shaped EPA and USFCA policies and legislation.

Ecological anthropology's and industrial ecology's influence on sustainable development and natural resource conservation policies are explored in the following subsections.

2.2 Ecological anthropology framework for sustainability

The ecological anthropology approach to sustainability development comprises two significant dimensions: political and economic. Political anthropology studies the application of power including ethnography, class and political systems, in shaping conservation and environmental policies (Carpenter, 2020). The ecological/economic anthropology framework focuses on sustainability rooted in institutional economics, emphasizing sustainable production and consumption (Valentinov, 2021).

The Social Soundness Analysis (SSA), adopted by the United States Agency for International Development (USAID) in the 1970s, incorporates ecological/economic anthropology within programs for low-income developing countries (Robbins, 1987; Stone, 2003). The SSA approach aims to align economic growth with culturally suitable sustainable development (Kottack, 1999), fostering constructive collaboration between government officials and development aid agencies (Latour *et al.*, 2018; Stone, 2003). A modified approach to SSA, the Social Impact Analysis (SIA), was initiated by the International Bank for Reconstruction and Development

(IBRD), commonly known as the World Bank (Francisa and Jacobs, 1999; Esteves *et al.*, 2012). The 1987 Brundtland Report by the United Nations Development Programme (UNDP) followed the lead of USAID and the World Bank in promoting sustainable growth. The social and economic indicators of USAID and the World Bank are integral to the UN's seventeen sustainable development goals (SDGs) (Carlsen and Bruggemann, 2022).

For anthropologists, sustainability is a multifaceted goal with regional, national and global implications (Bozzoli, 2000; Kottack, 1999; Morse, 2008). The trickle-down approach of sustainability is transferred from developed to less-developed countries (LDC). External development experts act as agents of change, facilitating the transfer of the development process by working closely with local, national and international development organizations (Stone, 2003). The UN SDGs (Carlsen and Bruggemann, 2022) place priority on international aid and the role of development agents in the trickling theory of wealth transfer from wealthier to poorer nations.

Ecological anthropologists have put forth the perspective that sustainable development comprehensively entails striving for a balance between environmental concerns and socio-economic growth. The scope of sustainability has expanded beyond solely external environmental conservation to encompass the survival and well-being of humanity through the deliberate management of natural resources. This has led to the formulation of forward-looking principles rooted in the foundational concepts of industrial ecology, particularly principles of social and environmental justice.

2.3 Industrial ecology and sustainable development

According to the normative assumptions of industrial ecology, “ecology is fundamentally a science of living systems. Ecology focuses on the inter-connections and community character of a system and seeks to identify and characterize the web of energy and material flow that maintain its health.” It attempts “to understand the intricate web of energy and material flows and discover the rules that govern robustness and resiliency in such systems . . . for designing more effective technologies and institutional structures” (Ehrenfeld, 2000, p. 239). Industrial ecology seeks an equilibrium between industrial processes and environmental sustainability, achieved through the reduction of material waste, prevention of pollutants, preservation of natural resources and mitigation of global warming. Its emphasis is on fostering sustainable consumption and production, in alignment with the UN SDGs 2030; Awan (2020).

Striking a balance between sustainable resource exploitation and environmental protection stands as the focal point of industrial ecology (Ehrenfeld, 2006). The concepts of exchange, intervention and interconnection drive technological innovations and forge connections between societies and natural habitats.

When symbiosis exists between economic growth and sustainable development, governmental organizations can harmonize resource utilization and conservation to navigate the interplay between competition and social responsibility (Sisaye, 2011). The ecological anthropology and industrial ecology approaches toward fostering sustainable growth have brought positive transformations in environmental and natural resources conservation initiatives undertaken by USFGA.

3. The evolution of sustainability within the USFGA

Environmentalists challenged the economic-oriented production approach for industrial growth, recognizing its potential to undermine the natural resource base supporting development. They advocated for environmental conservation and the protection of natural resources. When conflicts arose between the environmental movement's goals and those of businesses, environmentalists advocated for governmental regulations and legislation to minimize environmental impacts (Rudel *et al.*, 2011).

Conservation efforts expanded to include industrial ecological systems management, incorporating water, sustainable natural resources management and pollution control – all of which are primary concerns within the USFGA (McLaughlin and Khawaja, 2000). The USFGA introduced laws and regulations to protect the environment and adopted a climate policy among states to mitigate global warming (Rudel, 2011, pp. 226–227).

In 1969, the Federal Government enacted the National Environment Policy Act (NEPA), committing the United States of America to “sustainability, declaring it a national policy, to create and maintain conditions under which humans and nature can exist in productive harmony, that permits fulfilling the social, economic, and other requirements of present and future generations” (US EPA, 2021a). Even before the Brundtland Commission’s 1987 report, the United States of America Government demonstrated its commitment to sustainability. In December 1970, President Nixon’s administration established the EPA (US EPA, 2021b). The federal government also passed clean water legislation and developed programs to address environmental issues and concerns (Rudel *et al.*, 2011).

With the establishment of the EPA, the federal government incorporated the principles of the Brundtland Report (1987) into the management of sustainable programs. The EPA plays a pivotal role as the primary agency responsible for enacting regulatory legislation to control environmental degradation.

3.1 The U. S. Environmental Protection Agency (EPA)

The 1969 National Environmental Policy Act, enforced by the EPA, stressed the priority of creating and maintaining “conditions under which humans and nature can exist in productive harmony, that permits fulfilling the social, economic, and other requirements of present and future generations” (US EPA, 2021a; Pew Center, 2011; Securities Exchange Commission (SEC), 2010); US Government, EPA, 2021b). Subsequently, other federal government agencies were granted regulatory authority to manage national natural and environmental resources.

3.2 Other U.S. Federal government regulatory agencies

The U.S. Department of Commerce oversees fisheries and administers the Malcolm Baldrige Award. It has adopted the SIA, akin to programs by USAID and the World Bank. The Malcolm Baldrige Award recognizes both for-profit and not-for-profit organizations with sustainability initiatives (U.S. Department of Commerce, 2023). The National Oceanic and Atmospheric Administration (NOAA) administers fisheries services (US Department of Commerce, 2023). The US Forest Service (USDA, 2012) manages natural parks, recreational centers and road management strategies in national forest systems. The Department of State manages sustainability programs, including international development initiatives and recently conducted an environmental impact evaluation of the Keystone XL Pipeline project (US Government, Department of State, USAID, 2023).

The most important bilateral agency overseeing international development is USAID, utilizing SSA for its programs. The World Bank employs SIA. Both SIA and SSA are rooted in ecological anthropology and industrial ecology principles for sustainable agricultural and industrial development aid programs in LDC (USAID, 2022; IBRD, 2023; Hoben *et al.*, 1996). The business management approach to sustainability follows the lead of USAID, the World Bank and the USFGA sustainability programs and policies.

4. External reporting sustainability guidelines

The Brundtland Commission Report (1987) positioned sustainability as an international development aid program. Business organizations embraced the Brundtland Report to formulate guidelines for measuring business performance. The GRI captured business

organizations' performance in three key areas: economic, environmental and social (Sisaye, 2021). While GRI is based in Europe, a comparable institution in the United States of America, the Dow Jones Sustainability Index (DJSI), has advanced the importance of sustainability within its investment portfolio.

4.1 Dow Jones Sustainability Index (DJSI)

Established in 1999, the DJSI comprises a family of indexes evaluating the sustainability performance of publicly traded businesses (Christofi *et al.*, 2012; SAM, 2010; S&P Global, 2020). DJSI screens and lists global leaders in sustainability across environmental, social and economic dimensions. It aims to attract socially and environmentally conscious investors (DJSI, 2019).

Deloitte and Touché (2021) oversee the assurance of the assessment process. DJSI aligns with GRI guidelines in selecting corporations for inclusion in its list of sustainable business leaders (DJSI, 2019; Sisaye, 2021). Beyond DJSI, other similar indexes for global sustainable organizations have emerged (SAM, 2023).

4.2 Morgan Stanley Capital International Index (MSCI)

Furthermore, the Morgan Stanley Capital International Index (MSCI) introduced sustainability investing in its Environmental, Social and Governmental (ESG) Index, known as the MSCI ESG Indexes. Originating in the 1990s, this index compiles listings of sustainable corporations for institutional investors and mutual fund organizations (MSCI, 2021). The index has been administered by the JP Morgan Chase Group since 2000. In 2004, Chase Manhattan's Bank merged with investment bank J.P. Morgan (Morgan Chase and Co, 2021, Morgan Stanley, 2021, 2022). The institute empowers clients to choose investments that yield market-rate returns and positive environmental or social impact. MSCI fulfilled the investment needs of mutual funds and institutional investors.

Environmental concerns have captured public attention and interest. In 2002, The Federal government implemented bipartisan legislation, supported by both Democrats and Republicans, mandating business organizations to prepare reports addressing sustainability development and business performance.

4.3 The United States of America government legislation

In 2002, Congress enacted the Sarbanes-Oxley Act (SOX) of 2002, which includes provisions for Environmental and Sustainability Reporting (SOX, 2002; Deloitte and Touché, 2022, 2021; KPMG, 2023; PricewaterhouseCoopers, 2010). Ernst & Young (E&Y) report recognized that the SOX 2002 guidelines serve as benchmarks for financial reports concerning materiality, stakeholder engagement and assurance services (E&Y, 2021).

In addition, the American Institute of Certified Accountants (AICPA) emphasized the importance of preparing separate reports addressing social, environmental and economic aspects, along with oversight committees. Ernst and Young (2021) have issued guidelines for these oversight and assurance reports.

5. Sustainability accounting and reporting systems

Ecology considers the significance of environmental factors in shaping both internal and external strategies and policies. In dynamic environments marked by uncertainty, intense competition and survival of the fittest, strategies often assume a functional and normative approach, focusing on adaptation. Sustainability becomes an ecological evolutionary going concern for organizations to adapt to environmental changes.

Sustainability accounting is an innovation of new reporting guidelines. It is an outcome of organizational growth, development and transformation processes. As organizations evolve over time, they create accounting mechanisms that, among other purposes, serve to maintain

functional stability and performance. These changes overhaul the existing accounting rules and regulations by giving birth to new accounting rules and procedures. Organizations develop new accounting rules only when they are necessary to address “new problems that do not seem to be covered by existing rules and when these problems are fairly recurrent, consequential or salient” (Schultz, 1998, p. 845). Policy makers and/or stakeholders initiate accounting rule changes.

Sustainability accounting is an accounting innovation and an outcome of the organizational change process. As organizations face increasing demands from their constituencies for transparency, they adopt incremental innovation to develop new avenues to disclose information to these constituencies. This evolutionary process to restructure and change current rules is incremental, necessitating the birth of new accounting rules (Sisaye, 2021). Sustainability accounting and reporting are these new guidelines but not bureaucratized rules.

Sustainability accounting as a reporting strategy links businesses with their organizations’ external and internal ecological environments. There is a recording of the interaction between business and production economies. Sustainability covers a company’s activities for economic, social and environmental performance (AICPA, 2021). The accounting framework provides guidelines to ensure that sustainability becomes an organization’s day-to-day operations to evaluate the risks and opportunities associated with the implementation of sustainable strategies.

The concept of sustainability accounting is related to sustainability management and reporting. The reporting of sustainability appears in GRI, CSR, TBL and IR. These reports are interrelated, as the ecology of sustainability accounting is broader than and inclusive of all these reports (Sisaye, 2021, 2022). Ecological anthropology and industrial ecology incorporate corporate governance responsibilities, which is necessary when meeting sustainability accounting practices of environmental, social and economic performances and then disclosing them in these reports.

5.1 The industrial ecology approach and the various roles of accounting measurement and reporting

The industrial ecology approach examines the evolution of sustainability accounting reporting (KPMG, 2021; Hopwood and Fries, 2010). The measures included in financial indicators of sustainability are composed of a variety of measures. Each is intended to capture an important element of a firm’s contribution to sustaining the quality of society’s environment. Much of this information about the industrial Ecology approach . . . of the firm’s activities related to sustaining the environment is included in the firm’s annual report.

The role that sustainability plays in the economy comprises two critical aspects. The first aspect involves effectively communicating the extent and contributions of an organization’s activities to potential information consumers. The second aspect involves understanding and measuring how potential consumers utilize these data. Both aspects must work together for the system’s success.

The reporting and communication of relevant sustainability data by the organization are integral components of the process. The measurement process’s details demonstrate the extent to which sustainability indicators are “bureaucratized,” ideally becoming part of financial accounting rules. As of now, sustainability remains voluntary and has not yet become part of a formalized or bureaucratized reporting system. It is offered voluntarily in the form of TBL or corporate social responsibility (CSR) (DJSI, 2019; Sisaye, 2021). TBL reports consist of three main parts: economic, social and environmental performance reports.

Overlap of concerns between TBL and CSR has emerged on issues of sustainable growth, ethics and conservation issues. CSR reports include environmental and social data

(Sisaye, 2022). Compared to CSR, TBL reporting is more comprehensive. TBL integrates multi-functional and multi-purpose financial accounting and environmental/social data disclosures for sustainability accounting information. However, like CSR, TBL remains a voluntary rather than mandated disclosure.

5.2 The ecology of sustainability accounting and the evolution of TBL reports

TBL reports are more comprehensive than CSR because they incorporate explicit financial, social and environmental performance data within annual reports (Aras and Crowther, 2008; Sisaye, 2022). TBL has become the most widely accepted comprehensive ecological business sustainability report.

The TBL approach to financial reporting is regarded as the most effective method for highlighting and integrating sustainability data for potential users. Ijiri designed and promoted this approach as a useful supplement to traditional double-entry financial accounting (Ijiri, 1982, 1986). Ijiri argued that firms engage in activities such as profitability, where significant indicators of organizational health and/or goal attainment matter to stakeholders. TBL measures a firm's performance against its goals. His reasoning (1982 and 1986) resembles how a manager evaluates a subordinate's performance. The report detailing the performance of the "manager" (the organization) for a given measure in each period should reflect the change in that measure during the period. The incorporation of the third indicator of the bottom line was to serve this purpose. When applied to sustainability reporting, Ijiri's model implies that the "individual" performing the evaluation is the stakeholder and the "manager" being evaluated is the organization.

The attractiveness of applying this approach to report an organization's enhanced sustainability performance is evident. It creates a reporting scheme that highlights an organization's performance in this area. Unfortunately, Ijiri's plan primarily aimed to provide deeper insight into dimensions or activities already captured by the accounting system. For this to hold, the measures must possess two characteristics valued by accountants: "objectivity" and "hardness." These two dimensions are critical for the disclosure and transparency of accounting data.

The dimension of *objectivity* refers to the ability of multiple individuals to arrive at the same numerical answer to the question. This typically results from a consensus on a common set of rules for performing measurement, coupled with the relative ease of applying these rules. The second dimension, *hardness*, requires that resulting measures are not easily manipulated or altered as the firm structures its activities. The rationale behind the two properties is obvious. Without objectivity, there would be ambiguity in attributing the correct value to the property (in this case, sustainability). If the measure is easy to manipulate (i.e., lacking hardness), it loses trustworthiness. In either case, a measure lacking hardness, if reported, loses its irrefutability and cannot be confidently used by decision-makers. In short, his innovation aligns with the objective of maximizing the utilization of pre-existing (accounting) data.

Applying Ijiri's (1982 and 1986) argument of "objectivity" and "hardness" of financial data in triple reporting forms the basis to evaluate whether TBL applied to sustainability meets these criteria. While TBL argues that financial reporting needs to have three dimensions, it does not address how the information presented can be objective, solid and irrefutable. Full disclosure and verifiability are central to external financial reporting. When these concerns are part of TBL, it can transform TBL from voluntary to mandatory reporting. TBL currently does not meet these criteria. In addition, organizational goals are strategic and long-term, not formulated annually. This may explain why Certified Public Accountant (CPA) firms have been active in consulting in this area. TBL's voluntary reporting has boosted business for CPA accounting firms. Thus, there is little economic incentive and need for advocating

mandatory TBL reporting of sustainability. TBL has not yet fully matured into a reporting device for accounting data within formal financial statements.

The underlying concepts of the TBL approach were initially adapted for sustainability reporting by entrepreneur and business writer John Elkington in 1994 during his tenure at the think tank SustainAbility (Elkington, 2021). The idea is to systematically include aspects of a firm’s sustainability performance in the annual report. However, these data are considered supplementary and subject to *management’s discretion*, consequently carrying obvious caveats. An example of this adaptation of Ijiri’s approach can be seen in Shell Oil’s first sustainability report in 1997. Shell has consistently prepared sustainability reports since 1997 (Shell Oil Company, 2021), wherein TBL reports supplement external annual accounting reports (AICPA, 2017; GRI, 2020, 2021).

Most TBL information is not part of the financial statement but appears as a supplement to financial accounting reports (Sisaye, 2021). These reports echo the calls for accountability and transparency from ecological anthropologists and industrial ecologists regarding ecological and environmental audits. Unfortunately, as Birnberg and Lewis (1989) point out, these data are not included as a formal element of financial statements and are less frequently used than the data included in statements. Thus, various forms of supplementary reporting offer a secondary means of disclosing information.

5.3 Current data availability on sustainability

Available data to potential users are collected through various methods ranging from financial market studies (Baker et al., 2022), direct surveys of user behavior (Arnold et al., 2022) and laboratory experiments (Martin and Moser, 2016). All research suggests that when potential users become aware of available sustainability data, they are more likely to view it favorably and pursue it. However, such studies from national and international development organizations, noted in Table 2, while insightful, they also offer valuable insights of policy and practical implications and not universally applicable conclusions about the use of sustainability data.

Name of organization	Sustainability recommendations	Citation sources
AICPA	TBL	2021 and 2017
AICPA	Sarbanes-Oxley Act Environmental and Social Reporting	2018 and 2014
Deloitte and Touche	Sarbanes-Oxley Act	2022
Deloitte and Touche	Assurance of DJSI Index	2021
FASB	Evolution of Sustainability accounting	2022
GRI	GRI three G’s- economic, Environmental and social Performance	2021 and 2020
IBRD	SSA- Social Impact Analysis Reporting	2023
KPMG	Inclusive reporting	2023
KPMG	Going concern	2022
Morgan Stanley	Sustainability ESG Index	2022 and 2021
PriceWater House	Sarbanes-Oxley Act	2010
SEC	Sarbanes-Oxley Act	2023 and 2010
Shell Oil Company	Sustainability reporting	2021
USFGA	Environmental legislation/Protection	2023, 2022, 2012 and 2001

Source(s): Table by authors

Table 2. Sustainability recommendations of national and international development organizations

6. Summary and conclusion

Sustainability accounting provides the underlying framework for sustainability development. The United States of America and bilateral organizations and the UN with the publication of the Brundtland Report in 1987 have policies and programs in place to promote sustainable development. The most recent comprehensive sustainability program by the UN is the United Nations Sustainability Development Group (UNSDG, n.d) has 17 sustainable development goals focusing on low income and emerging economies.

The EPA, USFGA, the big four accounting firms and international development organizations have programs comparable to the UNSDG goals. These organizations have developed accounting indicators to report sustainability. These reporting mechanisms include, among others CSR, GRI and IR to report on business sustainability programs in the sectors that they are operating. Other business organizations publish sustainability information in external financial reports. These reports address the sustainability goals of UNSDG focusing on natural and environmental resources. While sustainability is inclusive, sustainability accounting and TBL focus on industrialized economies and multinational corporations (MNCs) that also operate in developing countries. The MNCs can be instrumental in eradicating poverty, providing a sustainable living environment and managing natural resources for the present and future generations. Eventually, while the degree of sustainability concerns varies by countries, regions and continents, they all have a common goal of sustainable use of environmental and natural resources. Sustainability accounting in the form of TBL are external accounting innovative reporting guidelines for disseminating UNSDG goals and business sustainability policies.

External financial reporting has evolved over the years. Various supplementary reports, including CSR and TBL, have expanded the scope of financial reporting to encompass social and environmental performance (Sisaye, 2021). TBL is a byproduct of GRI and IR.

The endorsement of sustainability by the USFGA since the late 1960s has led to wider use of TBL among United States of America business organizations. EPA policies have gradually expanded from regulatory enforcement to the promotion of sustainability programs aimed at managing and conserving environmental and natural resources. Since its establishment, the EPA has issued environmental guidelines about energy, environmental regulations and carbon reporting (US EPA, 2021a, b (c)).

Following the EPA, federal government agencies, including the US Department of Commerce and State and the USDA National Forest Service, hold regulatory authority over the administration of national natural and environmental resources. USFGA policies and environmental legislations have expanded the adoption of TBL by accounting firms as reporting mechanisms for voluntary social and environmental data. These metrics are incorporated into reporting frameworks such as GRI, DJSI and the MSCI ESG Indexes for business sustainability reporting. These indexes have induced changes in external financial reporting. Consequently, TBL has evolved into the primary framework for reporting corporate sustainability performance. Public accounting firms have embraced TBL to extend their consulting, tax and auditing services within the domain of business sustainability. TBL has now become the benchmark for accounting CSR. Although CSR reports are prepared in both North American and European countries, the breadth of coverage of TBL is comparable to GRI and IR. TBL is broader, covering three major areas of corporate responsibility.

Ecological anthropology and industrial ecology serve as theoretical frameworks for transforming TBL into a mandatory reporting system. Eventually, upon adoption by the FASB, it will transition from being voluntary to becoming a mandatory disclosure in external financial reports (Sisaye, 2021, 2022).

In the accounting realm, the frameworks of ecological anthropology and industrial ecology explain the sustainable development process in the United States of America and the evolution of TBL. The research contributions span three interconnected areas of behavioral

management accounting literature. First, the study is the first to examine the evolution of sustainable development and TBL in the United States of America. Second, TBL is examined within the context of USFGA, particularly the EPA. Its implications extend beyond accounting reporting and disclosure. Third, the ecological approach links both the evolution and corporate governance of sustainability to understand the external environmental context that gave rise to TBL. The research applied the population ecology of rulemaking and bureaucratization to explain the genesis of sustainability accounting. This evolution has not yet reached maturity and growth to become a bureaucratized set of rules by FASB (FASB, 2022). Sociologists emphasize that guidelines and promulgations cannot evolve into bureaucratic rules, referred to as the ecology of rulemaking and bureaucratization unless they are fully accepted and institutionalized by standard-setting bodies.

In accounting, the main standard-setting body for accounting rules is the FASB. The resource-based view of the firm predominantly guides FASB's approach to external financial reporting guidelines. Essentially, the FASB is setting two hurdles that the Board believes disclosure of outlays for sustainability do not meet: The outlays made in the firm's efforts to achieve a more sustainable environment cannot be easily ascertained and there is not a clear relationship between the outlays and the firm's pursuit of profits. Thus sustainability has traditionally been considered from a philanthropic and trickle-down economic theory perspective. This approach may not be entirely aligned with the resource-based view of the firm, which constitutes the predominant underlying theory for FASB's external financial accounting reporting.

The evolution of TBL as a supplement to financial reporting has been significant. Accounting firms have fully endorsed TBL as it creates consulting opportunities with business organizations. They have developed guidelines on how to record and report indicators for financial, environmental and social performance. The indicators are not uniform since the type of social and environmental data reported varied by the nature of business activities. Manufacturing and mineral producing firms in the oil and petroleum industries have prepared sustainable reports, but these reports are not uniform. The FASB has noted the importance of sustainable reports although these reports are not uniform.

TBL has been rooted in the philanthropic view of business that does not support the cost-benefit analysis of TBL. Nevertheless, the TBL approach to sustainability has transitioned over time as organizations emphasize that sustainability while costly and the economic benefits are mixed, is a long-term strategic framework for business to operate indefinitely as a living concern. Living organizations have reciprocal relationships with the environment as they depend on the ecology of the surrounding natural resources for their survival and growth. The resources-based view of the firm is an ecological approach that links business with the environment. The FASB approach to financial reporting has the underlying framework of the resources-based view of the firm.

As accounting firms and business organizations develop measures that link environmental and social performance to economic indicators that are quantifiable and measurable, sustainability accounting will expand the resources-based view of the firm to include both financial and environmental performances. This evolution of TBL as a resource-based approach to business organizations is in transition. When there are quantifiable measures to account all sectors of business performances, it paves the way for TBL to become a mandatory reporting mechanism for organizations. At present the evolution of TBL has not been consonant with quantifiable indicators of business performance. It remains voluntary for external reporting. However, the current trend and developments in TBL provide credence that the FASB will develop guidelines to make TBL mandatory for external financial, environmental and social reporting.

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About the authors

Seleshi Sisaye is Professor of Accounting at the Palumbo-Donahue School of Business, Duquesne University. His research interests are in organizational sociology, management control systems, process innovations, sustainable development and reporting. He has published several books and numerous peer reviewed journals in accounting, management and sociology. He has presented papers at national and international conferences and published in their proceedings. He has assumed leadership positions within the Accounting, Behavior and Organization Sections of the American Accounting Association. He holds two Ph.Ds. in Development Sociology from Cornell University and Accounting from the University of Pittsburgh. Seleshi Sisaye is the corresponding author and can be contacted at: sisaye@duq.edu

Jacob G. Birnberg is The Robert W. Murphy Jr. Professor Emeritus of Management Control Systems at Katz Graduate School of Business, University of Pittsburgh. He has published over one hundred papers in refereed journals, books and conference proceedings in areas such as accounting, human behavior, management science, behavioral accounting, management control systems and behavioral decision-making, among others. His publications have appeared among others in *The Accounting Review*, *Administrative Sciences Quarterly*, *Accounting, Organizations and Society* and *Behavioral Research in Accounting*. He has served as Associate Editor and member of the editorial boards of leading accounting journals. He has received several outstanding research, teaching and service awards from the University of Pittsburgh, American Accounting Association, Accounting, Behavior and Organizations and Management Accounting Sections. His Ph.D. is in accounting from the University of Minnesota.

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