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The Evolution of Sustainable Accounting and Carbon monitoring: A Decade on Decade Analysis

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Abstract: The aim of this essay is to define sustainable accounting and how it has evolved over the years, highlighting the need and the formation, and the changes implemented on a decade-by-decade basis. The initial trend is thought to be inexistent when climate change was relatively not as big an issue as it is today, slightly existent when developed nations started waking up to changes in the climate and lastly, strongly existent, when sustainable accounting and carbon monitoring is not an option, but mandatory for a large subset of countries, multinational firms, and organizations all over the world.

Keywords: Greenhouse gases, Emissions, Environment, Sustainability, Accounting frameworks, Economy.

1. Introduction

In recent years, sustainable accounting and carbon monitoring is being incorporated with traditional accounting, with the prevailing underlying condition of integration with the needs of corporate management, and the requirements by external parties, such as governments and regulatory authorities. Carbon monitoring and sustainable accounting can be considered terms that supplement each other. Hence, it is imperative to understand the need for the two chosen themes in the present corporate climate, and to identify the evolution of the concepts over the years to be able to analyze what drove the rise in prominence and interpretation of the terms as we see them today. Additionally, this paper also aims to use this analysis to identify what lies in the future for these topics, and the dynamic changes followed due to the integration of such concepts in practical applications.

Traditionally, there have been three major types of accounting, namely, traditional accounting, environmental accounting and sustainability accounting. Although traditional accounting has been around since the 18th century, sustainable accounting and carbon monitoring are phenomenon’s which have been developed over a recent number of years, with the increase in global warming and climate change causing nations to adopt innovative practices and account for the damage caused to the environment when undertaking capitalist activities. The aim of this essay is to delve deeper into sustainable accounting and how it has evolved over the years, highlighting the need and the formation, and the changes implemented on a decade-by-decade basis. The initial trend is thought to be inexistent when climate change was relatively not as big an issue as it is today, slightly existent when developed nations started waking up to changes in the climate and lastly, strongly existent, when sustainable accounting and carbon monitoring is not an option, but mandatory for a large subset of countries, multinational firms, and organizations all over the world.

2. Defining Sustainable Accounting and Carbon Monitoring

The main definition of sustainability can be stated as a strategy towards development that aims to strike a mutually beneficial balance between social justice, environmental protection, and economic growth. This idea calls for creating an optimal and scalable balance between human activity and the surrounding environment which includes social, environmental, and economic factors (Jiao et al., 2023). Alternatively, it can also be defined as, sustainability aims to develop and implement methods that satisfy current requirements without sacrificing possibility for future growth and the ability of upcoming generations to take care of themselves. This implies that in addition to taking an activity's economic characteristics into account the long-term effects on society and the environment must also be considered and incorporated in a decision making process (Ogbonna et al., 2020; Dahash & Abdlamer, 2022).

The rapid expansion of industries and large corporate conglomerates around the world has lead to the imminent effect on environmental conditions (Zhou et al., 2018). Human activity leads to adverse consequences such as a higher rate of depletion of natural environments, the release of greenhouse gases and accumulation waste. Social metabolism refers to a term which relates the material exchange between the overall society and the natural environment while also incorporating production chains and consumption patterns. Academics have found that this plays a key role in promoting methods that allocate resources sustainably (Phu et al., 2020). Accounting records are also a key tenet when assessing the financial and environmental impacts and performances of an organisation Fuentes et al. (2022). Such records aim to provide information about the company's environmental management by fusing environmental justification with economic facts. Sustainability accounting and carbon monitoring are becoming crucial topics in contemporary corporate management as people become more conscious of the detrimental impacts that economic activity has on society and the environment.

In the present world, sustainable accounting is undertaken in almost all large corporations across the globe, with all of them preparing and publishing reports on their sustainability, social or environmental impacts and mitigation strategies (Ehnert et al., 2015). Hence, it can be concluded that to a large extent, this process has been institutionalised and is a de facto instance for most companies, despite being voluntary. Sustainable accounting can briefly be defined as frameworks which are non-financial in nature and aims to analyse a

company based on their social, environment and economic impact reports (Larrinaga & Bebbington, 2021). Formally, sustainability accounting practice is a subcategory of traditional financial accounting which requires companies to report, collect and analyse their sustainability related information and act as crucial triggers for corporate management under corporate sustainability (Schaltegger et al., 2006). The term also is known by multiple terms across the globe, such as triple bottom line accounting, carbon accounting, emissions accounting etc.

Carbon monitoring is complimentary to sustainable accounting and can be defined as recognizing and monitoring the emissions of carbon dioxide and greenhouse gases across the supply chain of a company, and then using this information to perform a monetary and non-monetary evaluation when integrated with sustainable accounting methods (Stechemesser & Guenther, 2012). Calculation approaches to carbon monitoring also differ depending on geography, regulations and standards followed. However, the two most prominent methods of carbon monitoring are, firstly, an approach based on territorial limits, which is principally used to generate inventory reports after analysing greenhouse gas emissions within defined territories, and secondly, the carbon footprint approach, which undertakes carbon monitoring for an organization or area, and the impact of a product in each stage of their life cycle on carbon emissions (Brohé, 2017).

3. 1960s: Pre-existence Era of Sustainable Accounting and Carbon Monitoring

Prior to 1960s, a few academics had begun to introduce the concept of Corporate Social Responsibility, where a noted academic, Harvard R Bowen, in his book named Social Responsibilities of the Businessman (SRB) argued that businesses should not focus solely on short term gains from consumers which are economic in nature, and rather focus on how their decisions may impact society and integrate such outcomes in their decision making processes (Acquier et al., 2011). Sustainable accounting and carbon monitoring are terms which have been of complementary importance since global warming, climate change and carbon emissions had consequences which became increasingly apparent. However, in the 1960s, the prevalence of such terms was relatively inexistent.

The late 1960s saw increasing awareness of environmental problems and issues, with phenomena such as the Earth Week, which saw organizations and institutions acknowledge the degradation to the environment, and state and federal level control laws being introduced and implemented well until the 1970s (Buttel, 1974). The 1960s was a landmark moment in the history of sustainable accounting and carbon monitoring, as the environmentalist movement gained traction. The green awareness movement, in the mid 1960s lobbied against the Congress in the US, and directed their attention towards pollution concerns, with the effective outcome of forcing the government to adopt legislation which would encourage cleaner land and water (Peterson, 2022). The catalyst to the 1960s movement was understood to be a general rise in interest of conservationist causes globally in the post World War 2 era. In the United States, the then President Lyndon B Johnson signed over 300 conservation and beautification initiatives, between 1963 to 1968, with the backing of approximately $12 billion from public funds.

In the 1960s decade, the growing interest in sustainability practices inevitably found its way to corporate institutions and consequently, accounting methods. The stand-alone non financial reports of companies were initial reporting tools which distributed information to the external stakeholders of the company. Europe saw an increase and the first instances of social reporting being undertaken, in countries such as France and Netherlands. Subsequently, other European countries such as Austria, Switzerland and Germany used the established social reporting standards to form the initial basis of implementing the reporting of environmental standards, marking a significant milestone (Hyršlová & Kubáňková, 2009). Independent research studies undertaken in the 1960s critically identified rising carbon emissions and a marked increase in CO_2 concentration in the atmosphere, sparking environmentalists to raise awareness and begin the process of implementing carbon monitoring systems. In essence, the revolutionary social movements in the 1960s, to some extent, led to the formation of sustainable accounting and carbon monitoring in the years to follow.

4. 1970s and 1980s: The Emergence Era

The 1970s decade saw the emergence of the key fundamentals of sustainable accounting that we see in the developed world today. This decade saw the initial and first real wave of corporate sustainability emerge through the creation of social reports generated by companies in the developed parts of the world. The Environmental Protection agency was also established in 1970, which created additional obligations for businesses and led to the creation of new regulatory frameworks to be implemented (Latapí Agudelo et al., 2019). Although it is difficult to ascertain the level of priority with social and environmental issues in focus, the latter increasingly became a part of the former, within this decade. Importantly, an initial vision for sustainable development was formally introduced in 1972, ideating the three key pillars for its development, being society, economy, and the environment (Asian Development Bank, 2024). The 1980s decade saw adverse economic impacts within global economies transition to sustainability accounting development, with a consequent slowing down in the progress of the subject. Adverse environmental events such as the Chenobyl disaster and the discovery of the ozone hole led to greater interest in mitigation and reduction strategies for environmental degradation across the globe. Individuals struggled with employment pressures and inflationary periods due to an economic recession. Contrastingly, a large array of environmental and climate events increased in frequency and attracted the interest of the larger public, who slowly began to pay attention to the underlying behind these events, and came to the conclusion to focus on company activity which lead to adverse environmental conditions. Due to the increasing environmental challenges which arose in 1980s, there was a direct positive correlation to a growing trend in environmental reporting by corporate institutions.

In the 1980s, mutual funds in the United Kingdom and the United States adopted a practice known as ‘negative screening’ which essentially took into account the ethical factors and environmental concern resolution performance of a company when making investment decisions (Hyršlová & Kubáňková, 2009). This was a key point in the adoption of

sustainable accounting, as companies looking to raise funds and attract demand for their shares listed in the public markets increasingly adopted social reporting and environmental frameworks to align with these requirements. Additionally, the World Commission on Environment and Development, in the year 1987, had brought forward a broad definition of sustainable development which stated that companies should endeavour to meet present human needs without adversely affecting future human needs (Asian Development Bank, 2024).

5. 1990s and 2000s: The Existence Era

In the 1990s, the need for sustainable accounting was becoming increasingly evident, and the concepts around this framework began to take shape, and a key outcome of this focus was the highly concurrent relationship between accounting and reporting, which was seen to be a problem. The first issue was, that corporate reporting focuses on only the financial related interests of an organization, and discounts the need for an extensive disclosure of sustainability, social and environmental impacts. The second issue was the inexistence of mandatory requirements by regulations and government organisations, which led companies to hide negative information and lead to the survivorship bias, wherein only the positive outcomes and impacts were reported, and the negative impacts were not included, leading to a disjointed view of the reality. Finally, the apparent conception of the overall market was to focus only on financial reports and data, and a lack of focus on environmental data, which meant that the sustainability performance of companies was hard to evaluate.

The Centre for Social and Environmental Accounting Research (CSEAR) was founded in 1991 by Gray R., who dedicated his life to social responsibility frameworks. In his book, 'Greening of Accounting', he stated the importance of including the impact on the environment in accounting and financial decisions (Gray, 1990). In the same year, Gray established three major models for sustainability accounting, namely, natural capital inventory accounting, cost of sustainability and input output analysis (Hyršlová & Kubáňková, 2009). These models formed a framework for the evolution of sustainable accounting practices, however, the relative nascency of the models meant that they lacked support from experimental and theoretical avenues, and their feasibility was not verified.

In 1999, the Triple Bottom Line approach was introduced by Elkington, and was a relatively new framework for sustainable accounting, with the underlying tenets of documenting the economic, environmental and social impacts of organisations (Timothy F. Slaper & Hall, 2011). It divided sustainable accounting into three main areas, namely people, profit and planet, where the first term people referred to an organisation's social impact on its employees, stakeholders and society, profit, meant the maximization of shareholder value, and most importantly, planet referred to the level of commitment of a company towards sustainable development and the protection of the environment, and included promoting the inclusion of sustainable development in organisational activities.

In 2005, Geoff Lamberton provided the basic framework for accounting systems under sustainability across five key frameworks. Firstly, the framework defines sustainability, and follows on to an organization perspective, stating that companies should clearly evaluate indicators used to measure sustainability impacts. Thirdly, when evaluating economic, environmental and social impacts, it is critical to choose and define appropriate units. Fourthly, the interdisciplinary nature of sustainable accounting requires the collaboration between accounting and sociology and ecological disciplines to ensure a holistic and comprehensive outcome. Lastly, traditional accounting should still be the core when undertaking sustainability accounting and should not fade when the latter is undertaken (Lamberton, 2005). Despite the growing prevalence of suatinable accounting within this decade, a large array of academics and experts, until 2007, debated the distinctions between environmental accounting, social accounting and sustainability accounting. The first side believed that sustainability accounting is a concept which will be derived from environmental and social frameworks already developed, despite stating their doubt of their existence in the coming future. The second side, inspired by the work of Gray, believed that the scope of accounting standards would reach new heights if social and environmental accounting was transformed into sustainability accounting (Bebbington & Larrinaga, 2014).

In 2009, in an attempt to enable corporate institutions to incorporate and apply the concept of sustainability accounting and carbon monitoring, the Czech Republic proposed a wide array of standards for sustainable accounting methods. These frameworks were proposed based on a survey conducted in 2005. This framework was considered a major step forward in the implementation of sustainable accounting in a developed nation, and in the eurozone as a whole. The framework clearly defined tenets of sustainability accounting, including the definition, objectives of the overall system to be put in place, while also explicitly stating the benefits to the company. Furthermore, the clear defining of this system laid clear groundwork towards a more distinct view of sustainable development and corporate sustainability. The release of this framework also served as a model for other eurozone nations to begin adopting sustainable accounting practices within their countries.

6. 2010 to Present: The Adoption Era

In the present world, the importance of sustainability accounting and carbon monitoring cannot be understated. A primary driver behind the implementation of such frameworks can be largely credited to growing awareness and regulations, which companies are required to comply with in order to continue their operations in a specific geography, as well as to showcase transparent operations to meet the demands and expectations of a stakeholder related the organisation (SEC, 2024). In 2014, The European Union participated in the growing integration on sustainability accounting by releasing an established framework regarding sustainability reporting, which was a type of non-financial reporting. This framework essentially made it mandatory for large companies to disclose non-financial and their diversity compositions. Furthermore, the European Commission, in 2017, also came up with an explicit guide which aimed to assist companies when publishing information related to the environment and social aspects, and in 2019, these guidelines were altered and climate change was added. This framework was further extended and the European Commission, in the year 2021 released a new proposal for a Corporate Sustainability Reporting Directive, also known as CSRD, which amended previous requirements. This plan mandated the auditing of reported information and established extensive

reporting obligations for all major corporations and companies listed on markets which were regulated by authorities, with the sole exception of microenterprises which were also publicly listed. Additionally, a trend towards a Community Sustainability Reporting Standard was observed, with the drafts of the framework having been developed by the European Financial Reporting Advisory Group (EFRAG). The first set of standards were published in 2022, and aimed to be compliant with EU regulations and supporting global standardisation efforts (EU Consultation, 2020). Hence, in the developed nations who were also members of the European Commission, the adoption of sustainability accounting practices grew multi-fold within this decade, and remains a major focus of the organisation.

A key development at the start of the 2010 decade was the establishment of the Sustainability Accounting Standards Board, also known as the SASB by its foundation members (SASB, 2023). The underlying goal of the SASB and the primary reason for its creation was to improve disclosure practices and establish a series of industry-wide standards in an attempt to help corporate organisations with disclosing sustainable development information which had a direct financial impact and would ultimately provide greater transparency to investors when making decisions (Rodriguez et al., 2017). The initiative taken by the SASB was a giant leap in the adoption and implementation of sustainability accounting standards across industry while creating a benchmark for other institutions to follow. The key role of the SASB foundation was to oversee, manage, fund and monitor the standards setting process of the SASB, and also appointing board members to achieve the same objective. Additionally, the SASB also has an independent committee which ensures the timeliness and process outcomes of the SASB standards (SASB, 2023).

It is important to note that the SASB sustainability accounting standards covered a wide range of specific areas with a broad mandate, such as the environment, leadership and governance, business models social innovation and human capital. The availability of disclosures and compliance with these standards provides investor with critical information which is industry specific and also about the sustainable accounting measures of a company and assists them in incorporating these decisions in their decision making processes. Carbon monitoring statistics and other sustainability measures and indicators have also been incorporated within these standards. The SASB, in order to enhance the comparative abilities and collect complete data from the companies, mandates the inclusion of accurate definitions of the material factors, also improving the accuracy of the data collected (Pizzi et al., 2024). There exists a contrasting nature amongst the shareholders, the management and the society, with the growing adoption of sustainable development and practices, people become more concerned and responsible with regards to the environment, however, the objective of the management is to provide the maximum economic benefit to their shareholders. This is an important feature and a key limitation or challenge when mandating companies to adopt sustainable accounting standards.

This decade has also seen the Triple Bottom Accounting method, defined earlier in the paper, be adopted at a faster rate in an attempt to depict their commitments to sustainable business operations, while also showcasing to investors their ability to generate returns (Gabrusewicz, T., 2013). The key feature of sustainability accounting within this decade was to expand on the inclusion of environmental cost and social responsibilities while also including tenets of traditional accounting and retaining a net economic benefit. In 2013, sustainability accounting was divided into two sub parts, with the first being sustainable financial accounting and the second being sustainable management accounting, proposed by Tomasz Gabrusewicz in his paper (Gabrusewicz, T., 2013). He stated that using socially relevant information, companies can monetize the environment and use the economic, social and environmental performance of the companies to generate and analyse improved results.

More recently, in 2021, the International Sustainable Development Standards Board was established by the International Financial Reports Standards foundation (IFRS), which creates and monitors the globally recognised accounting practice also known as the IFRS accounting standards. The aim of establishing the ISSB was to ensure a global standard of sustainability accounting and a special focus on aligning the requirements of investors and the financial markets when incorporating new accounting practices. They key distinction between standards by ISSB and historical standards was the dynamic nature, where the underlying standards were based on market driven initiatives which were focused on reporting to the investors and also ensuring the standards by SASB were of industry standards. ISSB enabled investors to access sustainability reports from companies in the global markets, while also assisting companies in providing sustainable development information to the investors. Additionally, the ISSB continues to provide sustainable accounting reports which are globally aligned, hence larger companies with multiple regional operations do not have to align with differing standards, which reduces red tape. This feature also helps institutions and promotes the adoption of sustainability accounting standards as corporations will not have to align with conflicting and burdening standards based on different characteristics and can follow a well defined standard set by the ISSB. Hence, in the recent years, the rising importance of ISSB has significantly been a positive impact on sustainability accounting and carbon monitoring as a subject.

7. Future Implications & Current Limitations (900)

Sustainability accounting, despite its advancements can still be considered to be in a nascent or research stage. The development of the subject will undoubtedly be influenced by a few key factors with the progress of time within the 21st century. The first factor is the advancement of technology, which enables data collection and analysis at a quicker and more efficient rate, which will inevitably improve the granularity of sustainability reports. The second key factor is globalisation, and increasing cooperation amongst nations around the globe can facilitate a consistent nature of sustainability accounting standards.

This stage can be led by different industries, companies, and international standard setting organisations to make sure the sustainability accounting practices of various companies are more consistent with the set objectives and goals (Gray, 1994). To also ensure companies to align with sustainability accounting practices, inventors' emphasis on certain aspects like environment, social, and governance can also be important. In the past few years, investors have been mindful

to ensure sustainability aspects into their businesses and investments due to public affluence and pressure, which has led to more and more companies to report clear and transparent sustainability reports.

In the last few decades, Corporate Sustainability has been made a more important issue within accounting literature (Epstein, 2001). There are two primary reasons for this interest and emphasis on different organisations: one is the improvement or better performance on financial aspects and the other is public's pressure and demand for the emphasis on ecological sustainability (Dyllick and Hockerts, 2002). The literature available now suggests that companies who focus on sustainability reporting usually improves financial performance (McWilliams and Siegel, 2000). And, the public pressure and demand for ecological sustainability enforces various policies that make sure organisations and companies to mindfully use nature's resources and waste management responsibilities (Knudsen, 2017).

Despite the above, there have been widespread conversations regarding sustainability reporting and whether it should be implemented and enforced or optional. 131 One side argues that sustainability reporting should be made mandatory due to the rising global environmental and social issues, and that the transparent reporting will enhance corporate accountability and responsibility; for examples some countries like Malaysia, Denmark, China and South Africa have made sustainability reporting mandatory (Hyršlová & Kubáňková, 2009). Some Investors and stakeholders agree that when they look forward to a company or organisation's future progress and prospects, mandating sustainability reporting can help them provide more depths and details on the company's/ organisation's long-term goals on sustainability, which in turn helps them make a more informed and effective decision. On the other hand, others argue that mandating sustainability reporting may overload small and medium-sized companies and organisations, which may in turn cost them more money and resources, hampering their regular operations (Ioannou & Serafeim, 2019). To add to this, some also suggest that sustainability reporting mandate may not necessarily enhance sustainability performance of the organisation, but lead to unnecessary and excessive bureaucracy and regulations for them.

A wide array of literature studies has also shown that the inability to manipulate and analyse both structured and unstructured data, the growing need for real-time data access, the lack of motivation amongst employee, compatibility problems, and the lack of a flexible IT infrastructure are some of the major technological and human resource-related obstacles that prevent improvements in sustainable accounting quality (Dumitru et al., 2023).

8. Conclusion (300)

Sustainable accounting and carbon monitoring, two complimentary and widely researched subjects have evolved significantly over the years. The aim of this essay was to highlight the journey and the extensive nature of the subject. The time periods covered in this essay have highlighted the growth of the subject and its adoption within corporate financial practices around the globe, with a pre-existence era of the 1960s, the emergence era of the 1970s, the existence era of the 1990s and finally, the adoption era of 2010 to present. From being virtually inexistent in the 1960s, sustainable accounting forms a large part of contemporary corporate frameworks in the present world. Undertaking the analysis within this essay on a decade-by-decade basis, it becomes increasingly evident that the complete emergence of sustainable accounting from a nascent idea to an essential component of corporate reporting is highly correlated with the worldwide recognition of challenges faced by environmental issues and the corresponding regulatory advancements. The essay follows a decade by decade analysis, highlighting the progress of sustainable accounting as a subject and deconstructing it into the multiple standards and regions it covers, with origins being traced back to early environmental movements, which provided the spark for the emergence of this subject, to today, where it is a formal requirement globally, and is underscored in theories such as the Triple Bottom Line accounting methods, and the SASB standards. Every decade has seen multiple significant milestones in the emergence of sustainable accounting and carbon monitoring, highlighted by events such as the establishment of the ISSB, directives by the European Commission, the role of Czech Republic as a catalyst, and the overall awareness of including sustainable accounting practices in corporate governance and investor decisions.

However, despite these advancements, sustainable accounting still remains in a state of evolution, with a substantial grey space for further research, refinement and new standards. The essay has also attempted to identify specific avenues wherein future research should be targeted which includes adoption of advanced technological methods when collecting and analysing data for carbon accounting, and globalisation to help the implementation in multiple countries with harmony and ensure consistency and reduced manual burden on companies. It is important to highlight that despite how far the subject of sustainability accounting ahs come, it still has a long way to go.

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