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Sustainability reporting as a 21st century problem statement: using a quality lens to understand and analyse the challenges

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Abstract

Purpose – This paper explores quality science and quality management as a potential pathway to resolve the challenges of corporate sustainability reporting (CSR) by establishing the need for a common understanding of sustainability and sustainable development.

Design/methodology/approach – Secondary research on key documents released by regulatory institutions working at the intersection of sustainability, corporate reporting, measurement and academic papers on quality science and management.

Findings – Existing measurement frameworks of CSR are limited. They are neither aligned nor appropriate for accurately measuring a company's ecological footprint for mitigating climate change. Quality for sustainability (Q4S) could be a conceptual framework to bring about an appropriate level of measurability to better align sustainability reporting to stakeholder needs.

Research limitations/implications – There is a lack of primary data. The research is based on secondary literature review. The implications of Q4S as a framework could inform research studies connected to sustainable tourism, energy transition and sustainable buildings.

Practical implications – The paper connects to CSR stakeholders, sustainability managers, company leaderships and boards.

Social implications – The implications of sustainability on people, purpose and prosperity are a part of World Economic Forum's stakeholder capitalism.

Originality/value – This paper fills a research gap on diagnosing and understanding the key reporting challenges emerging from the lack sustainability definitions.

Keywords Total quality management, Sustainability, Reporting, Sustainable development, Standards, Planet, People, Profit, Prosperity

Paper type Research paper

1. Sustainable development and corporate sustainability reporting

We are not sustainable globally. We use resources of about 1.8 planets annually to satisfy our needs (Wackernagel *et al.*, 2020). We have crossed several planetary limits for a safe future (Steffen *et al.*, 2015). The reality of the limits placed by planetary boundaries was acknowledged by WCSBD [1] in 2009 in its Vision 2050 that details nine transition pathways for energy, transportation and mobility, living spaces, products and materials, connectivity, financial products and services, health and well-being, water and sanitisation, and food for a transformation to a net zero economy by 2050 (WCSBD, 2009, 2017).

> Living well means that everyone's dignity and rights are respected, basic needs are met, and equal opportunities are available for all. Living within planetary boundaries [*also*] means that global

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warming is stabilized at no more than +1.5 °C, and natural systems are protected, restored, and used sustainably.

The change towards a level of sustainability, as sustainable development, is not taking place. All stakeholders, critically companies, play an important role in steering towards a state of sustainability. This is easy to note based on the increased focus on sustainability reporting. A 2020 report, for instance, found that almost 96% of 250 of the world's largest companies release an annual sustainability report. Companies using assurance services to endorse their sustainability reporting has exceeded 50% (Threlfall *et al.*, 2020).

Sustainability reporting seems simple. It is the disclosure and communication of environmental, social and governance (ESG) goals by companies engaged in productive economic activity. The aim is clear. It is to benchmark the performance of companies, year-on-year, against themselves and others within their sectors to assess their progress towards ESG goals. One could summarise thus:

(1) Measurement of a company's ESG footprint will lead to better awareness, and by extension, a better management of that footprint.

(2) ESG footprint will result in a set of direct and indirect links to a company's overall performance connected to diversity, equity, inclusion, human rights management and environmental performance.

(3) Connecting a company's ESG footprint to its overall performance will lead to better internal processes and external business practices.

(4) Better sustainability records will create a positive impact in stock market new brand value.

(5) Companies with a good sustainability record will be rewarded by shareholders, while putting pressure on those who do not measure up leading.

(6) Approaches, methodologies and tool will evolve to make ESG measurement integrated, specific and direct.

The imagined ideal state was that the world will transition into sustainable growth where people, prosperity and planet (3Ps) will co-exist with each other. The increase in corporate sustainability reporting (CSR), however, does not correlate to carbon emissions. Sustainability reporting is still underdeveloped. Cöster *et al.* (2020) study the quality of sustainability reporting based on to what extent the right things are reported in the right way. The right thing is based on reporting the entire value chain from cradle-to-grave as proposed in the GRI 101 standard. In addition, the right thing is based on having addressed the main needs of the main stakeholders identified as humanity (people) and nature (planet). Only about 20% of the 40 studied Swedish and international companies working in Sweden reported for their carbon emissions in the value chain. Within sustainable development this could indicate that understanding what to report – the right thing – still is an issue. Reporting in the right way, according to Cöster *et al.* (2020), is described as having set globally based targets and reporting current performance as well as past performance clearly.

Only a few companies have linked their targets to science-based targets (SBTi, 2021a). A review of 23 Swedish building companies reveals that only a few defined what sustainable building means, indicating the majority are struggling with understanding what sustainable development means for them (Isaksson and Rosvall, 2020). Despite the GRI standards, companies struggle with defining sustainability and sustainable development. Isaksson *et al.* (2008) argue that to lead change, we need to be able to communicate, which requires measurements, which in turn needs to be based on a definition that is based on a common understanding.

2. The definitional vagueness of sustainability

Common understanding needs a baseline, benchmarking and improvement linked to a set of standards. Baselines, benchmarks, references and standards require a diagnosis and analysis (Cöster *et al.*, 2020) of the processes and systems of organisations. It is through diagnosis and analysis that a problem statement, common understanding in our case, can be solved. To understand sustainability and sustainable development to accurately assess an organisation's footprint requires a diagnosis and analysis of processes in the organisation, its sector and other industries. This leads us back to the vagueness of sustainability and sustainable development. The vagueness the authors are focussed on is the definitional vagueness of the terms.

This vagueness is from two points in history. The first is from community-based approaches, methods and practices in societies of a "direct relationship" with nature. Such practices are related to the "chronobiological view of ecology, nature and environment and its biochemical and circadian rhythms" (Foster and Kreitzman, 2005). Sustainability thus is reflected in policy literature as "intergenerational ways of life of civilizations and cultures" (UNEP, 2017) and academic literature as a "culturally ingrained collective intelligence" to manage the "carrying capacity of environment through traditions restricting the use of natural resources" (Sheffield Gadgil and Berkes, 1991). The second is from managing forestry resources from the late 17th and 18th century German concept of *Nachhaltigkeit* and still underpin natural resource and biodiversity conversation programmes (Magee *et al.*, 2013).

The two points conceive sustainability as an ideal state of the past and find it difficult to incorporate the complexities of global supply chain and logistics. This is visible in the way the triple bottom line (TBL) is still largely in the conceptual domain with no clear, shared and quantified set of definitions. This gap, however, has not stopped the emergence of sophisticated conceptual work on sustainability of a "thought architecture of the biological, the cognitive, the social and the ecological" (Capra, 2015).

As a functional starting point, the authors identify sustainability as a "socioecological thought process that is best approached dynamically from a perspective of an ideal state" of organisations, institutions, communities, groups and people "incorporating such a process" into their day-to-day activities (Purvis *et al.*, 2019; Capra, 2015). As set of interconnected processes sustainability is a state. A level of sustainability, to draw a logical corollary, is akin to a level of quality. Sustainable development, then, is best understood as a journey of continuous improvement with SDGs being a set of time bound milestones in that journey. A journey and a set of milestones maps change from an "as-is" state to an "as-should-be" state. The change process that leads to that state in time is seen as sustainable development compared to improvement or development that are change processes that are not changing rapidly enough. SDGs, then, are not the end state of sustainable development; they are sustainability milestones.

3. A case for quality for sustainability (Q4S)

The aim of CSR is to monitor and report the progress of companies on measures, metrics and indicators of sustainability like carbon footprint and GHG emissions. A corporate sustainability report is expected to show a change [improvement] from an "as-is" state to an "as-should-be" end state of a carbon footprint and emissions. At this point the authors referencing refer to the domain of quality science to the "common direction" laid in the 2021 Quality Manifesto that defines quality as ". . . the essence of goodness in all dimensions of humanity's experience, the lack of quality identifies those characteristics that should be avoided on behalf of society as they degrade value in our lives" (Ramanathan *et al.*, 2021). The authors engage with the concept that the "essence of goodness in all dimensions" is sustainability. In short, "lack" of quality is just another side of the same coin of a "lack" of sustainability.

Such a concept derives directly from the commonalities of quality, sustainability and sustainable development. The concept, further, can be leveraged for a framework to define,

measure, benchmark and set standards for CSR. The first commonality is their multidisciplinary nature. All three have engaged with disciplines ranging from humanities, cognitive linguistics, natural sciences to technology and philosophy (Ramanathan *et al.*, 2021; Purvis *et al.*, 2019; Capra, 2015; Epstein, 2008). This commonality has been driven by practitioners within the domains wanting to learn from the world with an aim to improve systems, structures and processes. The second commonality is the expanding boundaries of all three towards societal purpose and planetary needs. Such a move has coincided with a stakeholder approach in quality science for people and planet (Garvare and Isaksson, 2001; Isaksson 2019; Klefsjö *et al.*, 2006); a natural fit and alignment of focus and approach with sustainability and sustainable development (Deleryd and Fundin, 2020).

The historical journey of quality science over the last 100 years, from being "recognised as a legitimate discipline in the 1920s through the work of Walter A Shewhart, followed by the sampling methods to Harold F. Dodge and Harry G. Romig ... to the 1960s as a technique for extracting issues for the business plan and implementing the Plan-Do-Study-Act (PDSA) cycle ... [to the] emergence of TQM in 1990s" to the 21st century Quality Manifesto focussing on such principles as "do no harm, create trust and happiness and go beyond business" (Ramanathan *et al.*, 2021) has something to offer the domains of sustainability and sustainable development. There is potential for an overarching quality for sustainability (Q4S) framework that can be derived from Total Quality Management (TQM) that focuses on continuous improvement across all aspects of a company. Change has two components: how and what. The "how" of change is robustly conceptualised, defined and understood in TQM. The "what", in the context of sustainability and sustainable development, remains to be defined. For TQM to become sustainable development, the focus needs to be on the main stakeholders and their main sustainability impacts. Isaksson (2021) suggests a Pareto approach on the main stakeholder needs in the value chain and suggests as a starting point that all companies should at least review their impact on climate, biodiversity and poverty. A Q4S framework can equip sustainability professionals with a "fit-for-purpose" set of approaches, analytical tools, techniques and methods to measure and benchmark sustainability initiatives across sectors and industries. Benchmarking and measurement systems requires a focus on processes. The quality community is familiar with benchmarking "defined as measuring your performance against that of best-in-class companies, determining how the best-in-class achieve those performance levels, and using the information as the basis for your own company's targets, strategies, and implementation ... breaks the firm's activities down to process operations and looks for the best-in-class for a particular operation" (Keller and Pyzdek, 2013).

4. Sustainability and sustainable organisational development

There is academic work arguing that companies should move from a profit driven business model to one towards purpose and sustainable value (Edmans, 2020; Magill *et al.*, 2015; Mayer, 2018; Schoenmaker and Willem, 2019; Stout, 2012). There is evidence that by producing a public purpose will help a company create long-term competitive advantage for itself (Hart and Luigi, 2017). Isaksson (2021) suggests that: "The indication is that a paradigm shift from Profit to Planet and People focus is needed. The proposed strategy is to combine customer focus with critical stakeholder needs." There is also the literature that focusses on socially responsible investment (Bénabou and Jean, 2010; Christensen *et al.*, 2019). There is a smaller body of work that focusses on consumer power to change the behaviour of companies through their choices (Kitzmueller and Jay, 2012; Besley and Ghatak, 2007). From a process approach, sustainable development could be defined a set of

continuous improvement processes that does the right thing in the right way by bringing stakeholders needs to the centre and leveraging new technologies. Companies need to interpret sustainability for their processes and via a shared understanding define what sustainability and sustainable development are so that they can be operationalised. With this done companies can communicate and report their performance as the level of sustainability they have reached and the rate of change towards sustainability that they have. Good reporting provides benchmarks for other companies and supports leading overall sustainable development.

Sustainability reporting also depends on global standards and reporting frameworks. GRI, WBCSD, through its Framework for Portfolio Sustainability Assessment (PSA), the Greenhouse Gas Protocol (GHG), released by World Resources Institute (WRI) and continuously refined every year, play an important role. There are also voluntary disclosure initiatives, such as the UN Global Compact and the Carbon Disclosure Project (now CDP) that are meant to encourage corporations to disclose information on sustainability. The International Integrated Reporting Council (IIRC) advocates integration of financial and non-financial reports, the Sustainability Accounting Standards Board (SASB) identifies material sustainability factors across industries, and the Embankment Project for Inclusive Capitalism assembles investors and companies to define a pragmatic set of metrics to measure and demonstrate long-term value to financial markets. Still, the "what" to report remains vague.

Some requirements apply to companies of a certain size within a regional jurisdiction—for example, Directive 2014/95/EU of the European Parliament and the European Council—to issue non-financial disclosures. For example, the Swedish Government's legislation on sustainability reporting is a result of the EU directive and mandates that companies that have average number of employees during each of the last two fiscal years amounting to more than 250, with total assets of more than SEK 175 million and reported net sales of SEK 350 million and more will have to include non-financial disclosures as part of sustainability reporting. Assessing the sustainability reporting landscape from reporting and metrics may lead to a conclusion that we are moving in the right direction. However, a "factful" inquiry (Rosling, 2018) beyond standards, reporting guidelines, legal and regulatory framework indicate that despite hugely increased reporting ecological devastation, social inequalities and wealth concentration has increased significantly. This means that leading sustainable development still needs improvements. One part of this should be reporting the right things in the right way.

5. Sustainability and sustainability reporting: a challenge and an opportunity

As part of multi-stakeholder approach for climate mitigation and SDGs, institutions like WEF, SASB, GRI, TCDF, World Resources Institute (WRI), which is the nodal body metricising GHG emissions and providing calculation sheets for GHG protocol, and CDP, have started playing increasingly important roles. The WEF provides recommendations on integrating priority sectors, standards and reporting metrics as part of its push towards stakeholder capitalism, value accounting and dynamic materiality. While the approaches of SASB and GRI differ, the standards are complementary to each other, with the GRI CEO Tim Mohin saying, "The GRI Sustainability Reporting Standards (GRI Standards) and the SASB Sustainability Accounting Standards are designed for different, but complementary, purposes. Stated simply, GRI looks at the company's impacts on the world and the SASB looks at the world's impacts on the company" [2]. The TCDF provides "reliable climate-related financial information" so that financial markets can price climate-related financial and non-financial risks and opportunities correctly for a low-carbon economy.

The GHG protocol provides accounting standards used widely. Carbon emissions are divided into Scope 1, representing the direct emissions from the core business, Scope 2, corresponding to emissions generated from the energy used and Scope 3, relating to the rest of upstream and downstream carbon emissions in the value chain. The GHG protocol released a beta version of a cross-sector emissions calculation tool in 2021 as response to WEF, SASB, TCDF and GRI report to integrate priority sectors, identify common standards and create integrated reporting metrics [3]. Today, companies often choose to only report parts of the emissions, especially in Scope 3, which is the most challenging, due to problems with availability of data. However, the recommendation from GRI is to report main sustainability impacts such as carbon emissions in the entire value chain.

6. Method

The main purpose is to establish the need for a common understanding of sustainability and sustainable development. There are two research questions:

RQ1. Is there a shared understanding of sustainability and sustainable development for corporate sustainability reporting?

RQ2. Do companies in public [annual reports, CEO statements, board statements] express the need for a commonly accepted sustainability guidelines for CSR?

The reason for choosing this purpose and the research questions is a focus on "greenwashing" and its link to a lack of an integrated measurement and reporting framework that today allows companies to "pick and choose" key sustainability impacts as per their materiality interpretation. The starting point for the authors is that a common understanding of sustainability and sustainable development is a prerequisite for evolving collectively shared and accepted guidelines for CSR. As part of its main purpose, the paper identifies the potential contribution of quality science and management that can help researchers, academics and sustainability professionals arrive at a shared understanding of sustainability and sustainable development. The main contribution from quality sciences is the "outside in" perspective combined with the Pareto approach, which helps in identifying the vital few main stakeholder needs. This helps identifying what to report. The current approach for many companies is to add different good activities using different indices resulting in some type of enabler-based sustainability performance. The paper uses secondary research with a focus on three areas. The first is the study of published documents on management statements, standards, frameworks, approaches, methods and tools put out in the public domain post 2018 by WEF, SASB, GRI, GHG protocol, TCDF and WCSDB. The second is a systematic literature review of 156 articles on keywords "sustainability reporting" "climate change" and "SDGs" [4]. The third is a study of original transcripts of select global CEO annual addresses post 2018 to their shareholders The context for the research is the global efforts to integrate standards, frameworks and reporting metrics to align it to science-based targets and SDGs. The paper identifies the most relevant information to address the challenge of an integrated sustainability reporting. The analysis highlights the gaps in the current sustainability reporting and initial thoughts on how it could possibly be bridged using quality sciences in the context of changing regulations on materiality assessment, integrated metrics and advances in technology.

7. Results

The systematic literature review of 156 articles with keywords "sustainability reporting", "climate change","SDGs" found 73 were listed in "Environmental Science", with 50 in "Green Sustainable Science Technology". The review, as a starting point, answers RQ 1

and was a confirmation of the key research gap identified by the authors in the field of published literature on integrated sustainability measurement and reporting systems that the focus on reporting and measurement is minimal. It also highlights to the gap in Social and Governance metrics in terms of the principles of TBL (Elkington, 1998). The review indicates that sustainability is seen as an environmental management issue needing technological solutions, with not enough focus given to the societal and planetary implications.

There are several contemporary challenges facing sustainability reporting, with three of the critical ones being highlighted in this paper. The first is from multiple standards and reporting guidelines that while giving company a foundation to measure ESG performance also allows it to pick and choose what sustainability impacts report to adopt. This is indicative of the lack of an "outside in" approach in materiality assessment that allows for sustainability impacts to be accurately identified. This multiplicity of reporting guidelines leads to the first problem statement: *there is no common foundation to baseline, compare, reference and benchmark sustainability performance of a company*. The second emerges from the non-mandatory nature of sustainability reporting. The non-mandatory nature has not stopped companies from "voluntarily reporting" their sustainability initiatives. The extent of voluntary sustainability reporting "has soared in the past decade with 90% of the S&P 500 index issuing a sustainability report in 2020 though there are no mandatory reporting requirements and no standards to ensure reporting is comparable and complete." The lack of a mandatory framework keeps sustainability reports out of the scrutiny of compliance regime that controls financial reporting of both listed and unlisted companies. Sustainability reports do not need to undergo a comprehensive third-party auditing and assurance, as in financial audits, where the counterparty signing the audited statement is a legal signatory with a responsibility for the governance, systems, structures and the processes of an organisation. Companies typically commission a third-party [consultant] to endorse their annual sustainability report for a "negative assurance". What this means is that the third-party assurance is valid only to the extent of endorsing the accuracy of the information provided to the consultant by the company. Neither the consultant, as a third-party, nor the company can legally be held responsible for the information not submitted or found out later; neither can the legal burden of incomplete nor inaccurate information be imposed on either the company or the third-party in the form penalties and restrictions. This leads to the second problem statement: *there is no system of enforceable incentives and disincentives for companies and third-party audit providers to work towards a common understanding of sustainability*.

The third is a practical one of materiality assessment that impacts sustainability reporting professionals. The GRI framework for materiality assessment is used by majority of companies. Materiality comes from the financial domain. For an auditor, materiality is the determination of the significance of a financial transaction or a discrepancy within a financial statement. The aim of a financial audit is for the auditor, as an independent third party vested with fiduciary responsibility, to endorse that a financial statement covers "all material respects in conformity with the reporting framework of Generally Accepted Accounting Principles (GAAP)" (IASB, 2022). A key materiality principle is that an "accounting standard can be ignored if the net impact of doing so has such a small impact on the financial statements that a user of the statements would not be misled" (IASB, 2022). As an accounting rule, it allows the third-party auditor the judgement if a transaction is material or not. GRI's materiality assessment framework seeks to mimic this rule for sustainability reporting with two pieces missing: an integrated set of sustainability standards similar to GAAP and regulatory rules aligned to mandatory compliance and benchmarking. The lack of these pieces turns TBL – cradle-to-gate – and materiality – GRI's Scope 1, 2 and 3 – a subjective terrain: companies pick and choose standards and what to report. This challenge is akin to the

financial community making the key principles of GAAP and IFRS – revenue accounting – and the materiality framework derived from it –profit and loss statements and return of investment (ROI) – as a terrain of choice. This leads to the third problem statement: *Materiality assessment for sustainability reporting today is accurately accounting only for Scope 1 emissions with some degree of accuracy for Scope 2 and no accounting for Scope 3.*

These three challenges and problem statements provide a direct answer to RQ2. Sustainability reporting as it exists today has not contributed in any significant way to measurability of sustainability impacts on people, planet and prosperity. This gap has not gone unnoticed. Billionaire hedge fund manager Sir Christopher Hohn in his 2021 address of Children Investment Fund Foundation (CIFF) said:

> One of the things that needs to happen is a lot more naming and shaming of the fund management industry. It"s green-washing and hypocrite . . . funds should fire asset managers that fail to use their voting rights to ensure companies produce credible transition plans for net zero [carbon emissions].

These challenges are also reflected as specific gaps in secondary research by the authors (Berg *et al.*, 2020; Blackrock, 2022; McKinsey, 2020; Watanabe and Panagiotopoulou, 2021) [5]. The following are the key gaps:

(1) *Lack of a predictable, simple and integrated reporting framework* based on science-based targets in line with nature's limits. Though SASB, GRI, TCFD, NFRD, WBCSD, WBA are collaborating it has not yet led to integrated reporting measures.

(2) *No enforceable mandates in form of third-party auditing*, one that does not allow companies any discretion over choosing materiality and sustainability impacts. Over 90% of the world's largest companies produce sustainability reports, but only a minority of them are validated by third parties . . .

(3) *Reluctance to adopt abstract accounting frameworks* for intangible assets like intellectual property, patents, human capital, knowledge services and processes that constitute a large part of a company's valuation. This is relevant where R&D, design and process patents may rest in one country, while actual production may happen in another country. A 2020 Value Consulting Company Ocean Tomo study reveals that in 1975, less than 20% of the S&P 500's market value was from intangible assets, while today, it is approximately 90% of the total value.

(4) *No move from revenue accounting to value accounting for dynamic materiality* needed for World Economic Forum (WEF)'s stakeholder capitalism. A measurable set of metrics for intangible assets is the key, yet there is a gap in financial statements because current accounting standards are not designed to capture the value of intangible assets such as human capital though they are material for ESG goals.

(5) *False positives from irrelevant targets* from companies filing their reports without clear baselines, definitions and key criteria like ecological limits. Over 55,000 sustainability reports were filed by 1,000 of the largest companies over a period of five years from 2015 to 2020. Less than 1% of the companies stated explicitly how they are integrating goals connected to the 2030 SDGs or environmental goals with "a total of 303 targets identified, distributed across eight different corporate performance areas . . . with none found to be tied to any PB thresholds" Haffar and Searcy (2018).

(6) *No transparency in supply chains and source specific GHG emissions* that result from a continuous underinvestment in developing internal capabilities and capacities for mapping the sources of raw materials and supply chain specific GHG emissions.

(7) *Reporting the tip, not the iceberg* of GHG emissions of all parts of the value chain. GRI requires Scope 1, 2 and 3 emissions to be measured. Scope 1 are direct emissions, Scope 2 are those associated with purchased electricity and Scope 3 include all upstream and downstream emissions, including those of suppliers, distributors, employees, business travel and so on. In 2019 CDP, reported that fewer than half of the companies that disclose such data in their sustainability report track and report on scope 3 emissions though several of their global manufacturing and distribution units generate as much as 95% of their GHG emissions that would typically fall within Scope 3. Cöster *et al.* (2020) in their study of Swedish companies found that only 20% of the studied companies tracked CO2 in the entire value chain.

(8) *Lack of technology deployment for reliable ratings*, especially technologies connected to big data, artificial intelligence, blockchain, GIS and map-based location sourcing, satellites. Additionally, data quality and consistency are a major issue. MIT's Sloan School of Management research study that focussed on six top ESG ratings agencies found that the "correlations between the ratings are on average 0.54 but range from 0.38 to 0.71. This means the information that decision-makers receive from ESG rating agencies is noisy" (Berg *et al.*, 2020).

(9) *Lack of a customer-focussed sustainability information for decision making.* Many sustainability reports are often just narratives of intent. Even if specific information is available, there is no ready reckoner for a customer to make an informed decision. Many reports, for example from fast fashion brands, give information about their sustainability in the form of pounds of CO2 per unit of clothing and reduction of chemicals like phosphorous released into the environment in units like grams. What the environmental impact is, is not given. Even when easily understandable measures, like litres of water used, are deployed, the methodologies vary so much that there is no comparability for decision making. For example, two factories of a popular soft drink estimated that to produce one litre of the soft drink took two litres and 70 litres respectively.

8. Quality for sustainability (Q4S) for sustainability reporting

The narrowness of sustainability reporting impacts the sustainable finance, carbon credits and carbon tax markets. The business model of "green finance" is dependent on accurate benchmarking, referencing and globally accepted common standards. This has meant that sustainable financing institutions are handicapped by a limited set of parameters for building portfolios. According to Global Sustainable Investment Alliance nearly two out of every three dollars classified as socially responsible investment is in negative screen fund where the criteria of inclusion are a series of explicit exclusions (example: tobacco or firearms).

8.1 The managerial implications

A 2020 Barclayon two decades of ESG investing found no difference between holdings of sustainable and traditional funds. An investigation by the Wall Street Journal revealed that eight of the 10 biggest ESG funds in 2019 were invested in oil and gas companies [6]. The main issue is that the business idea is normally not included in sustainability reporting. In the GRI standards value is reported as revenue exemplified by Disclosure 201-1 "direct economic value generated and distributed". This means that it does not matter from which business the economic value comes from: it could be guns or baby food. Including the business idea and putting a user value on it is no simple task. This requires serious managerial thinking in cases

such as oil production. The key gaps identified in the Results Chapter are also acknowledged by large corporations. It is reflected BlackRock CEO Larry Fink's 2021 letter to business leaders:

> Assessing sustainability risks requires that investors have access to consistent, high-quality, and material public information. We strongly support moving to a single global standard.

The context to Fink's letter came from the September 2020 World Economic Forum (WEF) consultation paper on stakeholder capitalism and integrated metrics, which says:

> Value -creation plans must optimize performance against current and future material ESG issues. The next stage in this evolution will be the introduction of initiatives that aim to improve performance on ESG issues likely to be material for a company in the future.

The WEF paper was based on in-depth interviews and consultations with more than 200 companies, investors and key stakeholders, including IFRS, IASB, GRI, SASB and WBA. Over three-quarters of the respondents agreed that reporting on a set of *universal, industry-agnostic ESG metrics* would be useful for their company, markets, economy and the society. This answers RQ2 once again in the affirmative. *Universal metrics* includes an acknowledgement of a *universal responsibility*. The WEF paper proposes 21 core metrics and 34 expanded metrics. The core metrics integrate GRI and SASB's norms to ensure they reduce the compliance burden on companies.

The expanded metrics aggregating 34 metrics and disclosures, mainly from GRI's Scope 3 and SASB's human capital and social capital standards, brings about a a direct connection to enterprise value and value accounting. The COP 26 2021 saw the creation of International Sustainability Standards Board under the IFRS integrating the Climate Disclosure Standards Board (CDSB), an initiative of CDP and the Value Reporting Foundation (VRF) which houses both the Integrated Reporting Framework (based on WEF's Integrated Metrics) and the SASB [7].

Aggregation, consolidation and integration of metrics and disclosures expands the current scope of materiality making sustainability reporting a continuous process requiring key stakeholders like institutional funders, investment corporations to convert acceptance of expanded materiality as a key condition for accessing any sustainability funding. This framework of expanded materiality is what is called as dynamic materiality.

8.2 The conceptual implications

Dynamic materiality segments cradle-to-grave into three parts: cradle-to-gate, gate-to-gate and gate-to-grave. Additionally, each of these parts are to be put through a value accounting framework that quantifies the value that each part generates in relation to climate impacts (VBA, 2021) [8]. In conceptual terms, for those directly engaged with sustainability reporting, it means the adoption of a value chain approach as a starting point for any measurement of carbon and GHG emissions. The same value chain then must be overlaid on social and governance dimensions directly connected to value creation and addition. The second is an explicit acknowledgement that what investors, shareholders, institutions, government and regulatory bodies consider to be material ESG issues will change over time. A case in point is the microplastics in oceans and other waterbodies that is now sought be made material to sustainability reporting of a company.

Dynamic materiality is not completely new. It has evolved from the concept of double materiality: not only should material topics connected to the enterprise value of a company be measured, quantified and reported, but also material topics emerging from a company that impact the environment and society should also be reported, measured and quantified in a comparable manner. In theory double materiality was expected to bring together an organisation's positive impact in terms of profits, growth, jobs, livelihoods and shareholder

value with its negative impact on the society and planet in terms of traditional livelihood loss, sociocultural impact and ecological and environmental damage in an integrated manner and with a common impact score. In practice, the focus of the materiality analysis on enterprise value almost always outweighed the materiality analysis of the enterprise's impact on society and environment. The recent move towards a technology enabled dynamic materiality-based CSR is rapid with consolidation and integration of several institutions and mechanisms taking place in and around November 2021 CoP 26 at Glasgow. A significant example is the proposal adopted by the European Commission in April 2021 to replace the Non-Financial Reporting Directive (NFRD) with the Corporate Sustainability Reporting Directive (CSRD) to make sustainability reporting on par with financial reporting. This makes third-party audit mandatory and on par with financial reporting. The new requirements become effective by January 2023 and sustainability reports as per new standards will have to be submitted by companies in 2024 [9].

8.3 The quality lens and its implications

To implement dynamic materiality requires a capability to be built into our institutional systems. For example, the global financial markets will need to measure the sustainability of each part of the overall value chain. For such a capability then to be cascaded down to sectors and industries requires software solutions, relevant databases and datasets for benchmarking referencing and change management and, most importantly, human resources (in form of sustainability managers), continuous improvement requires diagnosis and analysis of the "as-is" existing processes. It is here that the domain of quality science and management with its over 100-year history of approaches, frameworks, methods, tools and techniques can provide inspiration for baselines, benchmarks and standards that focus on stakeholder needs.

Quality has welcomed all kinds of disciplines: from social sciences like sociology, political science, economics to anthropology, psychology and econometrics to different management and pure sciences. Quality also derived directly from the needs of the society and economy through its focus on customer and stakeholder needs helping it transform its approach towards quality management, for example, to business models connected to global supply chains in following large scale globalisation. The authors see Q4S as an approach to engage with ESG issues within the disciplinary boundaries of quality science. The history of quality shows the discipline has engaged itself with critical societal issues to the extent that "each paradigm has its own on the definition of quality . . . [where] quality changes over time and needs to be (re)defined [*sic*] in a context . . . quality management also seems to need different methods, tools and ways of thinking" (Hardjono and van Kemenade, 2020, p. 151).

CSR is at crossroads today; by extension so is sustainability and sustainable development. All three are being looked at by stakeholders to evolve a "fit-for-purpose" framework that standardises measures and metrics, creates benchmarks and allows for a cross-sectoral and cross-industry analysis in a comparable science-based manner. A defining characteristic of the quality discipline has been its practical use of a "fit-for-purpose" approach that has informed a wide spectrum of research from competency requirements and quality management to quality assurance (Baird *et al.*, 2010). The "fit-for-purpose" approach has mirrored a collective desire within the quality domain to solve a pressing challenge of that day and age. As mental models representing "paradigms", there are "four periods" in quality management: From the late 19th century till about the end of the decade of 1920s, quality aligned tightly with the key requirements of running an efficient factory shop floor like time-motion studies and effective shift management for greater shop-floor productivity. From 1930s to 1950s, the focus shifted to quality control; a need that emerged from better machines, mass production and standardisation. The period from 1950s to 1970s saw a shift to quality

assurance, a natural progression that came with a focus on customer needs, satisfaction and direct feedback.

8.4 A "fit-for-purpose" quality for sustainability (Q4S) framework

It is the "third period" where the possibility of a "fit-for-purpose" Q4S framework starts taking roots to solve the crossroad mentioned above. The third period, from 1970s to 1980s, saw a move towards total quality. The move coincided with globalisation and emergence of a global "supply-chain" economy where business models incorporated off shoring. The challenges facing CSR today, for instance the inability to measure Scope 3 emissions, are reflective of the complexities of the global supply chain. Logically, then, mapping the carbon and emission footprint of the global supply chain should provide an accurate measurement of Scope 3 emissions. "Fit-for-purpose" for purposes of understanding sustainability and sustainable development can be defined as the capability to recognise and positively contribute to the vital few sustainability impacts. TQM can provide a framework for operationalising expanded materiality. TQM was an important shift within the quality community and was seen as a "new approach in quality management" (Martensen and Dahlgaard, 1999). TQM gave strategy and culture equal importance with twin Plan-Do-Study-Act (PDSA) cycle loops brought in for each respectively. Total Quality focussed research attention on the "softer and qualitative dimensions of culture and people" bringing in new tools for assessment, diagnosis and measurement.

The shift towards dimensions like employee engagement and empowerment in 2000, referred as the "fourth period", was also reflective of an organisation's changing relationship to a globalised world, from customer needs and satisfaction to stakeholder needs, societal purpose and planetary safety. As the world "changed from a manual labour to a machine-driven economy to a knowledge intensive society" (Drucker, 2007; Conti, 2006), people became the most important asset in a company (Hardjono and van Kemenade, 2020). This focus on human capital meant quality principles, were turned inwards to internal organisational processes that enabled employee empowerment and engagement: the 360-degree feedback. Organisations had to standardise their internal processes, benchmark it as an industry, cross-reference it to different sectors and put it to test to a set of global best practices. This shift was reflected in quality management methods like Six Sigma, Lean thinking, and total productive maintenance. This "systemic perspective" (Whittington, 2000) meant that "quality management is [*sic*] not concerned so much to gradually reduce routine variations within the organisation as to ensure effectiveness in responding to crises as and when they occur" (Hardjono and van Kemenade, 2020).

Responding to crises in an *effective* manner assumes an inherent organisational capability to anticipate crises of the future and model appropriate responses for multiple scenarios. In short, the ability to respond is a dynamic ability where the outcome can neither be preconceived nor solutioned beforehand. The solution will emerge out of the process of engaging with the crisis. The quality domain is exploring this approach, which is referred to as the "Emergence Paradigm" (Hardjono and van Kemenade, 2020). The emergence paradigm comes from systems theory and relates to complex organised systems, systems-within-systems and system-of-systems where the "sum of the parts is always greater than the whole". Emergence paradigm serves as the conceptual foundation for approaches towards swarm intelligence, self-organisation, big data models and collective intelligence systems. Within the emergence paradigm, quality is a dynamic entity defined more by its continuous interactions with the constituent parts of various systems and sub-systems; a definition that aligns with Deming's 14 principles. From a Q4S perspective, the dynamic nature recognised in the emergence paradigm provides the ground to connect with sustainability in the context of a dynamic materiality-driven CSR.

9. Discussion

This paper reinforces the urgency to respond to the climate crisis that starts with establishing the need for a shared understanding of sustainability. Within that context, there is merit to explore two 21st century developments in quality domain. The first is referred to as the "reflective paradigm" (Vinkenburg, 2017) where quality is not only subjective, but the methodology of the subjectiveness is based on a knowledge gathering that is inductive in nature. Inductiveness is fundamental characteristic of three key questions of "what is going well", what is going wrong' and "why". The reflective paradigm of "shadowing, modelling, second opinion, intervision, time out, stories (tell and listen) and discussion" (Vinkenburg, 2017) is something that could be used for pre-study, diagnosis and analysis of levels of sustainability within a system. The "reflective paradigm" is employed by professionals using "design thinking" for solving "wicked societal problems".

The second is referred to as the "Emergence Paradigm". Quality in this paradigm is seen as one among several factors defined by its continuous interaction with other factors (Conti, 2010; Chen *et al.*, 2014; Ponsignon and Barouch, 2016). This intersubjectivity of quality aligns with swarm intelligence, self-organisation, artificial intelligence and machine learning. It also aligns with dynamic materiality where sustainability is sought to be measured and metricised through an intersection and interaction of several factors on real-time basis. Sustainability, within emergence paradigm, can be defined as a continuously evolving benchmark and standard, while sustainable development becomes a specific and a time bound milestone.

If one currently assesses and analyses the current state of sustainability reporting it is quite clear that ESG as a framework and methodology to measure sustainability needs to expand. The expansion is on two dimensions. One, the "E" needs to include more direct and indirect sources of GHG emissions to accurately measure carbon footprint, while evolving a lifecycle accounting process for carbon abatement and sequestration, two, the need to focus on "S" and "G". To materialise that focus there is a need to include methods of accounting and auditing social and human capital through standards like SA8000 and AA1000 and key principles like UN's Principles of Responsible Investment (PRI). A good starting point would be the 2021's reform of the European Union's Sustainable Finance Disclosures Regulation (SFDR) [10].

9.1 Renewed "S" and "G" focus for societal balance and planetary health

"S" and "G" brings the focus on the balance between people, planet and prosperity. Dynamic materiality and value accounting as proposed by WEF for a shift to stakeholder capitalism requires GRI to move away from its almost exclusive focus on revenue accounting. Any common shared understanding of sustainability turns SDGs from just a set of goals and targets to be achieved within a specific timeframe to a core value proposition for companies. Value propositions are typically never created only by goals or intent, but through a grounded set of inter-related processes of continuous action and continuous improvement.

This requires system thinking by first identifying the system boundaries as planetary boundaries, something that has been explicitly suggested by WCSBD in its Vision 2050 document. Such an effort might be useful to understand geogenic and anthropogenic stress parameters of the system.

The final dimension that emerges from this paper is that a common shared understanding of sustainability will have to be a continuously evolving value proposition as defined by stakeholder needs. What this means, in literal terms, is a complete overhaul of how we have assessed, evaluated, measured and reported growth, development and progress till now. Sustainability measurements need to account for various scenarios, contexts and maturity levels of different stakeholders and scenarios. Additionally, different frameworks need to be

classified, aligned and standardised. In short, there is an urgent need to conceptualise measurability as levels, both as absolute and relative levels. Quality can provide the inspiration here. Not only does a measurability framework, like levels of quality, provide the necessary robustness to accommodate the expansion of the ESG framework but also the space to include future proposals like the Scope 4 negative emissions suggested in CDP.

10. Conclusions

The gaps in *sustainability reporting* clearly indicates that sustainability cannot be seen anymore as incidental factors that have a marginal influence on how we live, eat, produce and consume. It has become *the* key factor. This paper makes a case that it is time to start understanding sustainability and sustainable development using a Q4S lens. From that perspective of Q4S, this paper lays out areas that are possible areas of future research as five questions:

(1) How can we move from an ownership model of shareholder value to a stakeholder model of ecological value within stakeholder capitalism?

(2) How can an organisational transformation accommodate dynamic materiality into its processes?

(3) How can science-based targets help create a shared understanding of sustainability for all stakeholders?

(4) Is there merit to focus carbon emissions to refer to carbon dioxide, while greenhouse gas emissions for non–CO2 emissions?

(5) Is it time to start measuring sustainability and sustainable development as a maturity spectrum and a set of milestones rather than as goals?

This paper makes the case that it is time to look at sustainability in the same manner as quality and integrate it into organisational processes. Such an approach turns sustainability reporting from a post facto year-end report into a set of processes that are monitored on a real-time basis. Sustainability requires genuine collaboration and partnerships as envisaged in SDG 17 and this paper seeks to contribute to that spirit.

Notes

1. WCSBD dates back to the Rio de Janeiro Earth Summit of 1992.
2. Interview with Tim Mohin at https://www.greenbiz.com/article/can-gri-and-sasb-reporting-frameworks-be-collaborative (Retrieved on 15-07-2021).
3. Please see: https://ghgprotocol.org/ghg-emissions-calculation-tool (Retrieved on 15-07-2021)
4. By Shuangqi Liu of Uppsala University as per author guidelines.
5. BlackRock's People and Money 2020 survey: https://www.blackrock.com/ch/individual/en/literature/brochure/people-and-money-2020-ch-en-rc-brochure.pdf (Retrieved on 18-07.2021)
6. Please see: https://www.wsj.com/articles/sec-review-highlights-potentially-misleading-esg-practices-among-funds-11618019507 (Accessed on 18-07-2021)
7. Please see: https://www.ifrs.org/news-and-events/news/2021/11/ifrs-foundation-announces-issb-consolidation-with-cdsb-vrf-publication-of-prototypes/ [Retrieved on 19-01-2022]
8. Please see: https://www.value-balancing.com/ [Retrieved on 28-01-2022]
9. Please see: https://www.iflr.com/article/b1w5p4mgfw070q/from-the-nfrd-to-the-csrd-long-story-short [Retrieved on January 24, 2022]

10. Please see: https://www.ipe.com/news/german-investors-expect-positive-impact-of-new-eu-disclosure-rules/10050752.article [Retrieved on 16-07-2021]

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