



Review

Designing a general set of sustainability indicators at the corporate level



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ABSTRACT

There is a widespread confusion in practice as to which indicators to choose from the vast universe of sustainability indicators that not only transparently reflect performance but also represent the most widely used sustainability guidelines. This study attempts to address one specific question. What are the most common indicators of sustainability at the corporate level? To do so, it examines corporate governance, corporate social responsibility, and sustainability normative frameworks, management systems, guidelines, and rating systems using a comprehensive four-pronged approach to find the most common indicators for the assessment of environmental, social and governance aspects of business performance. The study attempts to transcend the current literature on sustainability indicators by providing a general set of the most common indicators that are clustered into a hierarchical normative framework. Moreover, this general set of most common indicators provides a guidance for the implementation of indicator systems in companies and enables them to assess their sustainability performance, which in turn will help the business sustainable development agenda. The results of the study showed that environmental indicators account for almost half of the extracted most common indicators. The study contributes to the literature by highlighting the most common indicators of sustainability at the corporate level and their utility to companies and stakeholders. This work extends, updates and complements previous efforts to find the most common indicators of sustainability. It also provides the building blocks for future studies that could explore the usefulness of these indicators to companies and stakeholders in various contexts.

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1. Introduction

Over the past several decades, sustainability and Corporate Social Responsibility (CSR) rapidly expanded from marginalized concepts into complex and interdisciplinary ones (Cochran, 2007). Social responsibility was first formally discussed by Bowen (1953), the father of CSR, in his seminal book “Social Responsibilities of the Businessman” where he referred to CSR as the obligations of businessmen to follow the objectives and values of society and produce social goods beside economic goods. The concept, however, can be traced back to the 1930s (Dodd, 1932; Chester, 1938; Clark, 1939). Then, Boulding (1956) expatiated on the general

systems theory and argued that organizations are complex structures and need to be seen as open systems that are intricately linked to a larger environment. McGuire (1963) highlighted the greater responsibility of business towards society. He elucidated upon the four approaches taken by business towards CSR namely traditional, enlightened, confused, and responsible (McGuire, 1969). In a brilliant synthesis, Murphy (1978) classified CSR progress into four epochs: philanthropic era (hitherto 1950s), awareness era (1953–1967), issue era (1968–1973), and responsiveness era (1974–1978). However, it was Carroll's seminal paper (1979) that paved the way for a better understanding of CSR. He defined CSR as “the social responsibility of business encompasses the economic, legal, ethical and discretionary expectations that society has of organizations at a given point in time” (Carroll, 1979, p. 500).

The concept of CSR and sustainability at the corporate level has taken many forms and has been defined in numerous ways based on the time and/or the context of the discussion including

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Abbreviations

AHP	Analytical Hierarchy Process
CG	Corporate Governance
CSR	Corporate Social Responsibility
DEMATEL	Decision Making Trial and Evaluation Laboratory
DVFA	Deutsche Vereinigung für Finanzanalyse und Asset Management (Society of Investment Professionals in Germany)
ESG	Environmental, Social and Governance
GRI	Global Reporting Initiative
GS	Goldman Sachs
IMS	Integrated Management System
ILO	International Labor Organization
KPI	Key Performance Indicators
MCI	Most Common Indicators
OECD	Organisation for Economic Co-operation and Development
PAM	Process Analysis Method
PSR	Pressure-State-Response
SBM	sustainable business model
SIs	sustainability indicators
SR	Sustainability Reporting
UNGC	United Nations Global Compact
WBCSD	World Business Council for Sustainable Development

stakeholder theory (Freeman, 1984), corporate social performance (Wood, 1991), corporate social responsiveness (Frederick, 1994), triple bottom line (Elkington, 1999), Bottom of the Pyramid (Prahalad, 2004), corporate citizenship (Crane et al., 2008), corporate sustainability or application of sustainability at the corporate level (Gray, 2010), shared value (Porter and Kramer, 2011), corporate sustainability and responsibility (Visser, 2011), conscious capitalism (Mackey et al., 2013) etc., but there is still no unanimous agreement on a certain definition (Chen and Fan, 2011) while innumerable research studies have been conducted in the past half a century (Kolodinsky et al., 2010). There is no universal corporate sustainability definition either (Roca and Searcy, 2012). Dahlsrud (2006), after content and frequency analyses of 37 definitions of CSR categorized its common aspects in five dimensions: The environmental dimension, the social dimension, the economic dimension, the stakeholder dimension and the voluntariness dimension. At any rate, the essence of this notion has remained unscathed and it emphasizes that companies should cease externalizing and socializing their costs and privatizing their profits.

In order to assess the level of CSR and sustainability performance at the corporate level various models and methods have been developed that are discussed in section 2. One of the main methods for sustainability performance evaluation is with the use of indicators (Bell and Morse, 2008). Sustainability indicators (SIs) are significantly important for comprehensive firm valuations (Bassen and Kovacs, 2008). Many studies have tried to develop industry specific sets of SIs (Strezov et al., 2013; Villard et al., 2015). However, few studies have focused on developing general sets of sustainability indicators (Roca and Searcy, 2012).

Furthermore, there is a general agreement about the key corporate sustainability issues, but not necessarily on the specific indicators that are used to measure them (Soyka and Bateman, 2012). The objective of this study is to develop a general set of sustainability indicators at the corporate level to help managers, investors, and other stakeholders to overcome this challenge.

It examines some of the most prevalent rating systems, normative frameworks, and guidelines of Corporate Governance (CG), CSR, and sustainability using a comprehensive four-pronged approach to extract the Most Common Indicators (MCIs) for the assessment of Environmental, Social and Governance (ESG) aspects of business. This article particularly addresses the problem of translating the ambiguous Brundtland's definition of sustainable development (Brundtland, 1987) into an operational definition of sustainability at the corporate level or corporate sustainability (Tahir and Darton, 2010). It worth mentioning that the two concepts of sustainability and sustainable development are two related but distinct phenomena. However, the overlaps between the two concepts are significant. Interestingly, the growing field of SIs was instigated and later on greatly influenced by the sustainable development movement within sustainability literature (Sneddon et al., 2006).

Carson's magnum opus *Silent Spring* (1962) can be cited as one of the first in a series of enlightening works that shed light on the rapidly growing economic, environmental, social, and governance challenges. Similar works continued to emerge criticizing the business as usual approach with varying tones and providing solutions, based on relativism¹ (Braungart and McDonough, 2002; Hawken et al., 2008). Parallel to the rising social challenges, environmental degradation, and CG failures, many scholars started to realize that the current system is not adequately equipped to deal with these problems.

Visser (2011) argued that CSR, as we know it (CSR 1.0), has failed to change the direction of our trajectory to sustainability and we need a transformative CSR (CSR 2.0) in the age of responsibility. He is not alone in his call. Recently, McIntosh (2015) calls for a shift from the traditional sustainability concepts that are predicated upon the foundations of neo-liberal economics and the current model of capitalism to a new political economy order and emphasizes that a new understanding of social responsibility and sustainability is under way through five systemic changes but needs to be expedited. This spirit is also visible in practice and, in fact, quite rife. Peter Bakker, the president of World Business Council for Sustainable Development (WBCSD), in Sustainability Science Congress in Copenhagen boldly said "CSR is dead. It's over!"²

These revolutionary perspectives would have been impossible without the impact of sustainability measurement. The impact assessment literature, both social and environmental, has been very influential in this matter. They have been promoted as evidence-based procedures that assess the economic, social, and environmental impacts of public policy, boost transparency, and provide solutions for sustainable development (Rodrigues et al., 2010) especially in monitoring and evaluation where indicators are mostly used. One eminent epitome in this case, at the global level, is the planetary boundaries (see: Rockström et al., 2009; Steffen et al., 2015). Indicators are often used as a method to measure sustainability performance (Bell and Morse, 2008; Pinter et al., 2005) or to describe issues (Tahir and Darton, 2010). However, sustainability performance evaluation is the most prevalent use of indicators. Sustainability indicator systems were originally developed to warn us of the economic and non-economic repercussions of trespassing planetary life support systems (Holden, 2013), as well as violating social boundaries of human society.

The contributions of this paper are tripartite. Researchers can use the extracted construct of the MCIs as a general set of common

¹ Relativism doctrine posits that discussions and their materiality would change in relation to the societal, cultural, and historical contexts within which they are proposed as opposed to absolutism.

² Available at: <http://www.greenbiz.com/article/csr-dead-now-what> (17th of February, 2015).

indicators in their research studies. Furthermore, managers and professionals can utilize the MCIs as a construct for ESG performance evaluation and reporting purposes in their companies. Finally, using these MCIs, companies will be able to cut compliance costs dramatically when they aspire to comply with multiple sustainability or CSR guidelines. This study also creates value for the sustainability literature by providing a review of the most prevalent sustainability guidelines, frameworks, and rating systems and their indicators.

The rest of the study is organized in the following manner. In the next section, the four-pronged approach for the selection of MCIs under three categories and the rationale behind the selection of each source are explained. Then, the third section methods including the extraction process and criteria selection are explained. The results and discussion of the study are presented in the fourth section. The final section concludes the study.

2. Materials

There are a number of formalized approaches for deriving indicator sets like Pressure-State-Response (PSR) (OECD, 1993), nonetheless, the mainstream trends in CG, CSR, and sustainability measurement have been the evaluation of the performance SIs in rating systems, reporting guidelines, management systems, and normative frameworks, because when SIs are looked upon as in a set of indicators, they provide a better understanding of corporate performance in relation to economic, social and environmental issues (Lodhia and Martin, 2014). The next sub-sections will elaborate on indicators, eminent rating systems, reporting guidelines, normative frameworks and management systems and the rationale behind choosing the best benchmarks in each category.

2.1. Indicators

One of the most common methods for evaluating performance is using indicators. Indicators demand specific qualitative or quantitative bits of information with regard to the non-financial³ performance associated with the organization that are generally comparable and also is able to demonstrate change chronologically (GRI, 2011).

The past few decades have witnessed a dramatic increase in the demand for CG, CSR, and sustainability rating agencies (Scalet and Kelly, 2010). With more than a hundred rating agencies (and counting) in the field of sustainability, that almost each one follows its own method and measures sustainability with a different set of indicators from others in conjunction with over a hundred sustainability codes (Visser et al., 2010), recognizing the general determinants of CG, CSR, and sustainability is a cumbersome task (Márquez and Fombrun, 2005). The surge in the number of these resources have caused confusion among researchers, corporations as well as practitioners and users of non-financial information especially because of the lack of convergence. This fact was cogently articulated by van den Brink and van der Woerd (2004).

Herva et al. (2011) reviewed the environmental indicators for process-oriented and product-oriented approaches. They alluded to the similarities and the complementary characteristics of indicators and also emphasized that there are certain aspects of performance that can rarely be captured by indicators.

³ Non-financial performance covers the social, environmental, governance impacts/performance of companies. Non-financial performance is usually non-monetary, however, there are cases such as Puma where the company financially accounts for its environmental impacts. Puma introduced its Environmental Profit & Loss (E P&L) account to financially measure for its environmental impacts in terms of land use, air pollution, waste, and GHG emissions.

The EEA defined an environmental indicator as an observed value representative of a phenomenon under study that provides a description of the quantity and quality of that phenomenon (European Environmental Agency, 1999). SIs are the barometers of socio-economic conditions and provide the necessary tools for the assessment of various aspects of overall performance of the entity (Liu, 2014). They help managers to integrate non-financial aspects of performance into their decision making and ensure long-term viability of their companies. Investors are also quite convinced that the integration of ESG into their investment process maximizes their long-term interest. This is evident in the rapidly growing upward trend in socially responsible investing. At least US \$13.6 trillion of professionally managed assets incorporate ESG in portfolio selection and investment management (Global Sustainable Investment Alliance, 2013). Indicators have long been considered as a driver of performance but recently they have also been attributed to driving innovation (Luz et al., 2014) and strategic product development (Askham et al., 2012). Moreover, evaluation of ESG issues at corporate level using SIs enables a thorough review of the risks and opportunities a company encounters in the long-term, which in turns allows for better selection of securities and risk management. It can also be a sign of management quality and the sustainability of the firm in the long-term (Bassen and Kovacs, 2008).

Developing and synthesizing appropriate SIs in practice has a noticeable track. Corporate Knights published a report synthesizing ESG indicators using Asset4 Thomson Reuters, Bloomberg ESG indicator, Goldman Sachs (GS) and Corporate Knights indicators which yielded 33 indicators that after the expert panel discussions resulted in 10 Key Performance Indicators (KPIs) (Corporate Knights, 2010). Threadneedle followed a four-step process to yield its ESG KPIs (Threadneedleinvestments, 2013). The first step was selecting relevant and common global guidelines such as United Nations Global Compact (UNGC) and Organisation for Economic Co-operation and Development (OECD). The second step was to select internally defined thematic sector key issues using MSCI ESG research and Global Reporting Initiative (GRI) Broker Sector indicators. The third step encompassed integrating Company's specific situation including Geographic scope "Age" and Size Ownership structure and at the last step the relevant ESG Indicators were obtained.

2.2. Rating systems

Sustainability rating institutions connect stakeholders and companies (Schäfer, 2005) by providing stakeholders with valuable information about companies ESG performance. By rating institutions both sustainability and CSR rating institutions are implied. Despite the notable number of sustainability rating institutions, there are but only a few of the internationally active rating agencies left from the proliferation of rating agencies in the past decades (Sakuma and Louche, 2008). There are numerous other regional rating agencies in countries across the world that rank companies with regard to their CSR. An overwhelming number of these agencies are allocated to rating companies with regard to their CSR performance which comprise a wide variety of issues such as environment, human rights, society, governance, etc.

Forty-one CSR and sustainability rating systems/indexes⁴ were screened using the trade-off among four criteria of availability of indicators, credibility, comprehensiveness and relevance, nine of the most credible CSR and Sustainability rating agencies that were also ranked as the most credible rating systems by "rate the raters" report were selected. They are the MSCI ESG Research, the Dow

⁴ 26 International and 15 regional/local/specialized.

Table 1
Matrix of rating systems' characteristic are presented in this table.

	Extension	Peripheral CSR rating	Core CSR rating
Solicited rating	Common in banking industry e.g. CoreRating (mutual fund), Swiss Banks	GMI, Stakeholders and Institutional Investors coalition	Independent rating institutions e.g. Vigeo, MSCI
Unsolicited rating	Bloomberg ESG indicator	Mostly NGOs; Worlds most admired companies	CorporateKnight (UK)
Both/neither	Banks, lending institutions, international corporations (supply chain assessment), etc.	Ethibel, Co-op America, ECRA, Veite	E.Capital (Italy), SERM (UK), CSR Hub, Oekom

Jones Sustainability Index (DJSI), the FTSE4Good Index Series, Climate Counts, Bloomberg ESG Data, Corporate Knights Magazine, Thompson Reuters (Asset4), GS Sustain and oekom Corporate Ratings (*GlobeScan/SustainAbility Survey, 2013*). These institutions are listed in [Appendix A](#).

The process of rating encompasses gathering data over these MCIs and synthesizing it into an overall rating based on which investors can make decisions and take actions (*Schäfer, 2005*). Sustainability, including CSR and CG, rating systems are generally of two types. The first type is the normative rating which are customer-oriented and deductive. The second type is descriptive rating which are economic-oriented. Depending on the way rating systems are constructed, some utilize filters to prune away non-complying companies. These filters are usually of two main types: exclusive social/environmental filters and financial filters after/before social/environmental filters. The matrix ([Table 1](#)) summarizes the most common characteristics of rating institutions.

All indexes and rating systems are not expected to be consistent as they were developed by different agents and with various perspectives and objectives (*Giannetti et al., 2015*). Despite these incongruities, experts are optimistic about the prospect of ratings by 63% of the expert surveyed by Rate the Raters believed ratings will be more important in driving improved corporate sustainability performance in 2016 (*GlobeScan/SustainAbility Survey, 2013*). Therefore, rating systems and indexes play an important role in both external and internal SIs selection processes in companies' policy. Regarding CG, indicators of three most renowned CG rating agencies namely GMI, ISS and S&P based on four criteria of availability of indicators, credibility, comprehensiveness and relevance were used. CG has been an indispensable pillar of CSR, ESG, and Sustainability rating systems/indices and well-covered in the aforementioned Rating systems/indices.

2.3. Reporting guidelines, normative frameworks and management systems

A growing number of companies communicate their social responsibility and sustainability activities in the realm of social responsibility through reporting. Sustainability Reporting (SR) dates back to the social reports of 1970s that were issued along the conventional financial reports. Then, in the 1980s corporate environmental reports and environmental disclosures in conventional reports surfaced (*Ceurstemont et al., 2001*). In the 1990s, through the convergence of social and environmental dimensions, embryonic versions of SR began to appear (*Hahn and Kühnen, 2013*). In the beginning of the 21st century, 2000, GRI released the first generation of SR framework (G1) which was later revised several

times in 2002, 2006, 2011, and 2013 (G2, G3, G3.1, G4) then became the most prominent framework for non-binding reporting of non-financial performance by the businesses worldwide (*Brown et al., 2009*) GRI framework facilitates the reporting of sustainability performance and increases consistency among them (*Global Reporting Initiative, 2002*). As it is evident from the SR trend figure ([Fig. 1](#)), GRI is adopted by a growing number of companies throughout the world. Due to its comprehensiveness and popularity, this study considers GRI as one of the most credible sources for the extraction of CSR indicators. Its diffusion corroborates this assertion. A list of leading reporting guidelines and frameworks is presented in [Appendix B](#).

Normative frameworks such as UNGC or Tripartite Declaration of Principles Concerning Multinational Enterprises and Social Policy of International Labor Organization (ILO) are non-binding frameworks that are put forward to guide business organizations through their path towards sustainability. UNGC is a voluntary set of principles designed to be followed by business organizations to change the business environment into a more humane one, encompassing ten principles concerning human rights, labor, the environment, and corruption, it is intended to increase and diffuse the benefits of global economic development through voluntary corporate policies and actions. UNGC is not a standard, management system, or code of conduct (*Williams, 2004*).

OECD Guidelines are a set of non-binding principles and standards for responsible business conduct in a global context recommended to multinational enterprises (*OECD, 2011*). ILO guideline is focused on labor and work standards and voluntary principles on security and human rights is designed for companies in the extractive industry (*ILO, 2006*). The UNGC asks companies to adopt, support and implement, within their sphere of influence, a set of core values in four main areas of human rights, labor standards, the environment, and anti-corruption and these principles attempt to address critical dimensions of concern to stakeholders (*UNGC, 2009*). UNGC signatories should report annually. GRI and UNGC Memorandum of Understanding (renewed in May 2013) allow users to use both complementarily. UNGC principles to guide sustainability strategy and actions and G4 Guidelines to communicate progress to stakeholders (*UNGC & GRI, 2013*).

UNGC signatories' performance are assessed using Global Compact Self-Assessment Tool⁵ which help organizations to evaluate their performance with regard to the four core principles of UNGC. It basically translate the ten principles into practical self-assessment questions and performance indicators and help organizations to discover their strength and weaknesses. This tool contains 45 questions with a set of 3–9 indicators for each question. However, UNGC often has been called a "blue wash" strategy meaning companies that adopt UNGC as a public relations initiative are similar to companies that practice green washing activities. A list of leading normative frameworks is presented in [Appendix C](#).

Management guidelines are mostly self-assessment tools provided by firm and research institutions specialized in CSR and sustainability issues to help managers to assess the performance and status quo of their organizations against social, environmental and governance metrics and indicators and implement their sustainability plans. Most of the management guidelines follow the five steps of Start, Plan, Do, Check and Act. There are multitudes of other management tools such as: EMAS, ISO 9001:2000, AschG, OHSAS 18001, SCC, Investors in People, ISO 9000, AA1000, BASC, SA8000. ISO 26000 entitled social responsibility encompasses seven core subjects including human rights, labor practices, the environment, fair operating practices, consumer issues, community

⁵ Available at: www.globalcompactselfassessment.org.

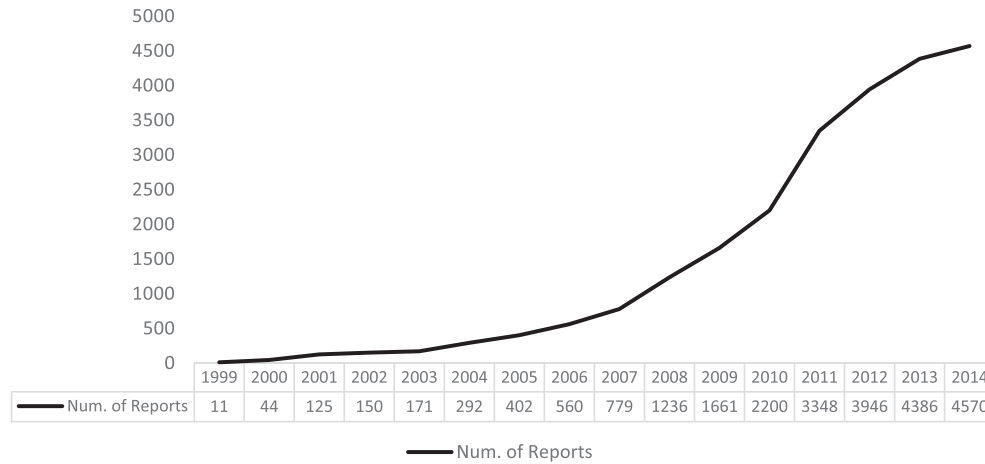


Fig. 1. GRI reports in the year 2014 are expected to increase even higher than the current shown level as a considerable number of sustainability reports are released or submitted to the database several months after the covered period. (Based on GRI's SD Database, as of 11th of April, 2015.)

involvement and development and finally the organizational governance that connect all these cores (ISO, 2010). Since its inception in 2010, ISO 26000 has gained a great momentum fueled by its adoption by businesses of all kinds and sizes. Its title “social responsibility” implies that this set of standards is not merely limited to corporations. A list of leading management guidelines is presented in Appendix D.

3. Methods: SIs extraction process and indicator selection filter

The extraction process started with collecting the benchmarks based on the rationale explained in section 2. Then, the best (and available) benchmarks were selected from each source for the purpose of analysis. The benchmarks contain sets of indicators that their amalgamation has been termed “the indicators universe”. Next, all indicators from the selected benchmarks entered the indicators universe (Exhaustive stage) where they were evaluated by the presented model of indicator selection. Then, the MCIs that satisfied the pre-specified conditions for the aforementioned reasons (confusion among practitioners, high costs of simultaneous compliance with several guidelines, etc.) were filtered and entered the indicators pool universe where they constitute an ESG construct. In fact, the input and the output are of the same type but their usefulness, measurability, and relevance, among other features, are different and, therefore, the resultant construct creates considerable value for practitioners (reporting, performance measurement, compliance, etc.) and the academics (research and analysis). The following figure (Fig. 2) describes the extraction process of the MCIs of sustainability using a four-pronged approach and a model of indicator selection.

Bauler (2012) use usability which is defined as “the inherent, mostly implicit, potential of indicators to be considered by policy actors during their decision activities” to evaluate the value of indicators. Legitimacy, credibility, and salience are the three core analytical elements of usability method (Cash et al., 2003). These elements, based on the perspective of the researchers, can be understood and implemented differently and as a result yield inconsistent results (Holden, 2013). To avoid such ambiguity, this study clearly defines the properties for the selection of the corporate level SIs based on the recent and/or relevant literature. Following Bouyssou (1990) and Rowley et al. (2012), we recognize five properties for the selection of the corporate level SIs and add three properties to constitute a model that functions as a filter for

the selection of apropos SIs. These properties are described in the following table (Table 2).

Darton (2015) develops heuristics for a set of SIs that has 7 steps. The first step is to have a clear definition (system boundary must be specified) and a purpose of assessment. In the second step, the nature of a sustainable outcome should be explicitly defined. These two steps correspond to minimal (relevant) step. The third step is coverage (key aspects are included). Here, Darton emphasizes on a systematic Methodology to ensure indicator's coverage (eligibility). The fourth step is data availability and quantification which are consistent with the eligibility and measurability properties in the selection filter. Duplication is stymied in the fifth step (communal). The sixth stage, Excluded, ensures that only operational indicators are taken into account. The use of composite indicators is recommended in the last stage that corresponds with cumulative property. Autonomous property is accounted for implicitly in the last stage. However, Darton does not consider condition B of the communal property, monotonic and autonomous properties. Although, the last two can be implicitly accounted for in the last stage of Darton heuristics.

All these steps are also covered in Indicator Selection filter of this study. Mascarenhas et al. (2015) through a participatory approach and data reduction techniques (Principal Components Analysis and sensitivity analysis with Monte Carlo simulation) tried to develop a set of SIs for strategic monitoring of regional spatial plans. One important aspect of their study was the development of a Set of selection criteria that were used to select indicators. All of their criteria are covered in this study. One of the main criterion for the selection of an indicator in their model was compatibility with other indicator systems. This criteria is quite unique in the literature and is equivalent with the Communal criteria of the Indicator Selection filter in the study. The desirable indicators selection properties are not always gratified by the selected criteria set (Bouyssou, 1990) and the ultimate set is often grounded on the trade-offs between these properties.

The first phase of the SIs extraction process is carried out using the Exhaustive property of indicator selection filter. The following table (Table 3) shows the number and the distribution of indicators that entered the indicators universe.

In the next step, following the Minimal or Relevant property of the selection filter, irrelevant and/or redundant indicators were excluded. For inclusion, each indicator must be (1) properly defined, (2) within the system boundary of the study (corporate level), and (3) congruent with the study objectives. The indicators that did not meet his criteria were eliminated. Then, following the

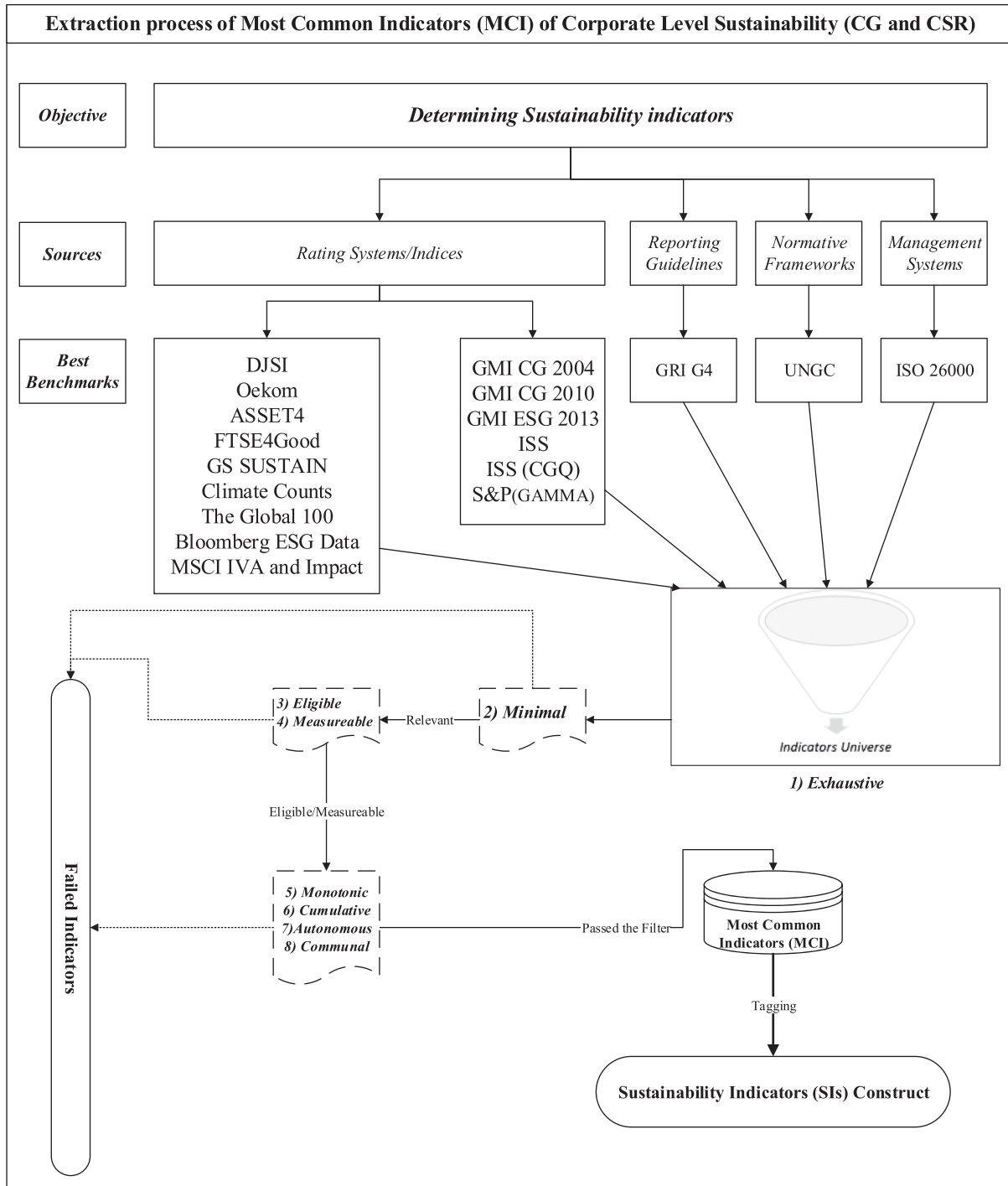


Fig. 2. Extraction process of the MCIs for sustainability is presented in this figure.

Eligibility property of the selection filter, indicators that did not satisfy three elements of the Eligibility property namely generality, credibility, and availability of data, were eliminated. Generality means that the indicator should not be specific to an industry. Credibility means that the indicator should be reliable and accurate (Darton, 2015). Availability of data also ensures that the majority of companies provide information on this specific indicator.

The fourth property is one of the most important properties in the indicator selection filter. It states that “Indicators should be either quantitatively measurable or be operationally used to represent a value qualitatively”. This property makes sure that only

measurable, whether quantitatively or qualitatively, indicators are qualified as SIs. The fifth property, Monotonic, preserves the consistency between partial and global preferences. It stipulates that the indicators should uphold a hierarchical structure to be in tandem with the normative-oriented approach. The next property, Cumulative, ensures that both individual and composite indicators can be used by following the hierarchical structure of the Monotonic property. The seventh property, Autonomous, excludes the functionally-related indicators to avoid criteria inter-dependency effects. Finally, the Communal property states that the selected indicators should have the highest frequency among the similar

Table 2
Indicators selection filter is presented in this table.

Property	Definition and scope	References
Exhaustive	Maintaining a “wide funnel” approach in including indicators that covers both economic and ESG issues. This step ensures that the final SI construct is inclusive.	(Darton, 2015)
Minimal (Relevant)	Systemic exclusion of irrelevant and/or redundant indicators. The criteria for evaluation of an indicator as relevant are: defined properly, within the system boundary, and congruent with objectives of the study.	(Dalal-Clayton and Bass, 2002; Mascarenhas et al., 2015)
Eligible	A sufficiently small number of indicators so as to be a discussion basis allowing the analyst to assess inter-indicators information necessary for the implementation of an aggregation procedure. The criteria for evaluation of an indicator as eligible are: generality, credibility, and availability of data.	(Mascarenhas et al., 2015; Darton, 2015)
Operational/measurable	Indicators should be either quantitatively measurable or be operationally used to represent a value qualitatively.	(Liu, 2014; Tseng, 2013; Mascarenhas et al., 2015)
Monotonic	Consistency between partial and global preferences which implies consistency of the indicators between alternatives (maintaining the principle of monotonicity). Indicators should uphold a hierarchical structure.	(Dalal-Clayton and Bass, 2002)
Cumulative	Ceteris paribus, it is just as legitimate to compare alternatives on a subset of the indicators as on a single criterion.	(Darton, 2015)
Autonomous	In other words, both individual and composite indicators can be used.	
Communal	The chosen indicators should not be functionally related. In cases where there are a plethora of references for the indicators selection; selected indicator should have: A) The highest frequency and/or the greater importance among the similar criteria from diverse sources that were pooled, with diversity taken into account (frequency and importance). Min. frequency = 2. B) The most common features of similar indicators, when there is overlaps between the definitions of the indicators.	(Mascarenhas et al., 2015) (Darton, 2015; Mascarenhas et al., 2015)

Table 3

The number and the distribution of indicators in the indicators universe is presented in this table.

Source	Typology of the source (rating system/index)	The number of indicators
DJSI	Index	77
Oekom	Index	33
ASSET4 ^a	Rating	755
MSCI IVA	Index	34
MSCI Impact	Index	25
FTSE4Good	Index	49
GS SUSTAIN	Rating	16
Climate Counts	Rating	22
The Global 100	Index	9
Bloomberg ESG Data	Rating	134
GMI ESG 2013	Rating	150
GMI CG 2010	Rating	89
GMI CG 2004	Rating	50
ISS (Corporate Governance Quotient)	Rating	48
ISS	Rating	51
S&P(GAMMA)	Index	79
GRI G4	Guideline	91
ISO 26000	Guideline	37
UNGC	Guideline	21
Societe Generale	Investment bank	56
Total		1826

^a Asset4, which accounted for around forty-one percent of the raw indicators, had an influence amount to a little over ten percent of the final MCIs. Therefore, it was not proportionately influential.

criteria that were pooled from diverse sources and have the most common features of similar indicators. Indicators that pass the indicator selection filter become MCIs.

4. Results and discussions

This section answers the research question that was discussed earlier. What are the MCIs of sustainability at the corporate level? It also provides an answer to what aspects of business impacts can be reflected by these indicators?

MCIs that were yielded from the extraction process after successfully passing the filter of criteria selection, were clustered into a 3-dimensional ESG framework with ten main-criteria, thirty sub-criteria and 70 indicators, derived from 1826 raw indicators. The extracted MCIs of sustainability along with their frequency count are presented in the following table (Table 4). The yielded KPIs cover Corporate Knights (Corporate Knights, 2010) final KPIs and general

corporate level ESG KPIs of thread needle (Threadneedleinvestments, 2013), though they have used different methods. Kocmanova and Dočekalova also reached a similar categorization based on their un-systematic observation of ESG KPIs (Kocmanová and Dočekalová, 2012). Deutsche Vereinigung für Finanzanalyse und Asset Management or the Society of Investment Professionals in Germany (DVFA) also present ESG's KPIs in four dimensions of Environmental, Social, Governance and Long-term Viability which are all covered by the presented construct (DVFA, 2010). Though, the DVFA bifurcated its indicators into General and Industry Specific.

Environmental, governance and social dimensions yielded 69, 111 and 89 indicators in the frequency count respectively. However, the normalized frequency count, which account for both the number of indicators in each dimension and the number of observed indicators in each criteria, showed that environmental dimension indicators account for almost half of the MCIs (48.63%), governance dimension indicators taking 26.82% and social dimension indicators comprise 24.55% of all indicators.

The consistency observed in the environmental dimension is congruent with the results of the previous research studies. In a comprehensive interdisciplinary analysis of quality-of-life, macro-economic, environmental, welfare and SIs, Pissourios (2013) found that only macroeconomic and environmental are supported by a coherent theoretical body and SIs lack such well-organized structure in its research agenda. The resulted constructed is predicated upon the normative oriented approach that is based on ethical and consumer-oriented perspectives (Mitnick, 1995).

The results of the study show that the extracted MCIs bear a striking resemblance to ESG model. Fig. 3 depicts the MCIs' construct. Roca and Searcy (2012), in a bottom-up study, found that indicators used in CSR reporting in Canada are distributed across the triple bottom line of sustainability. However, they also found broad diversity among the indicators which can obfuscate the process of developing a general set of indicators through practice-based inductive methods. For indicators to be ubiquitously used, a consensus among organizations and their stakeholders is needed (Lodhia and Martin, 2014). Nonetheless, such bottom-up approaches can be useful when they are used for customized cases rather than general sets. In that case, Tahir and Darton (2010) proposed Process Analysis Method (PAM) which is based on an objective analysis of specific business operation and its processes and developing indicators based on the circumstances and the context.

The following table shows the extracted MCIs of sustainability and their frequency count.

Table 4
MCIs of the ESG construct are presented in this table.

No.	KPI/indicator	Code ^a	Method/reference to indicators measures/status/compliance/main components	frequency	Extraction sources (Frequency)
1	Investment Risk Management	G11	Equator Principle	2	Societe Generale; Equator Principle
2	Internal Controls and Monitoring	G12	Internal Controls Report, auditing report	4	GMI, ESG Rating, 2013; Standard & Poor's; FTSE4Good
3	Risk Management	G12	Risk Profile and ERM	3	GMI, ESG Rating, 2013; DJSI-Eco.
4	Political risk	G12	Lobbying costs and political donations above us\$10,000, as disclosed by the US Senate Office of Public Record/US \$ EBIT	4	Corporate knights report ^b ; GMI, 2010; GRI G4
5	Financial Disclosure and Timeliness	G13	Choice of accounting standards made clear, and details of minority interests, intra-firm and related-party transactions fully disclosed	3	Standard & Poor's; GMI, ESG Rating, 2013
6	Non-financial information	G13	Disclosure and reporting	2	Standard & Poor's; GMI, ESG Rating, 2013
7	Disclosure on Board and Committees	G13	Disclosure and reporting	2	Standard & Poor's; GMI, ESG Rating, 2013
8	Chairman/CEO separation	G21	Disclosure and reporting	6	Standard & Poor's; DJSI-Eco.; ISS; ISS Corporate Governance Quotient; GMI, ESG Rating, 2013; Corporate Knights Report
9	Board Composition – Board size	G21	Board Size (Average Deviation)	2	ISS Corporate Governance Quotient; ISS
10	Board Composition – Board expertise	G21	Financial and Industry expertise	2	GMI, 2010; Corporate Knights Report
11	Board Effectiveness – board meeting	G21	# of board meeting	2	GMI, ESG Rating, 2013; Societe Generale
12	Board Effectiveness – committee	G21	# of committee	2	ISS Corporate Governance Quotient; ISS
13	Board Effectiveness – committee meeting	G21	# of committee meeting	2	GMI, ESG Rating, 2013, DJSI-Eco.
14	Board Effectiveness – Board Attendance	G21	% Present	3	Standard & Poor's; Societe Generale; DJSI-Eco.
15	Board Diversity – Women	G21	Women board members/Total board members	2	Corporate Knights Report; GMI, ESG Rating, 2013
16	Board Composition – Classified/Staggered boards	G21	Does the company has a staggered board	2	Corporate Knights Report; GMI, 2010
17	Board Independence – Independent directors	G21	Independent directors/Total directors	3	Corporate Knights Report; GMI, ESG Rating, 2013; Societe Generale
18	Board Independence – Meetings of Outside Directors	G21	Y/N	5	Corporate Knights Report; ISS Corporate Governance Quotient; ISS; Standard & Poor's; Corporate Knights Report
19	Audit and Risk Committee	G22	Y/N	5	Societe Generale; ISS; ISS Corporate Governance Quotient; GMI, ESG Rating, 2013; Corporate Knights Report
20	Audit contract, report and Auditors Selection and Remuneration	G22	Audit committee and Audit contract, report and Auditors Selection and Remuneration	6	Societe Generale; ISS; ISS Corporate Governance Quotient; GMI, ESG Rating, 2013; Corporate Knights Report
21	Committees Independence	G22	Independent directors/total directors	2	GMI, ESG Rating, 2013; Corporate Knights Report
22	Nomination and Compensation committee	G22	Y/N	5	Societe Generale; ISS; ISS Corporate Governance Quotient; GMI, ESG Rating, 2013; Corporate Knights Report
23	CG, CSR and ESG committees	G22	Y/N	4	Societe Generale; ISS; GMI, ESG Rating, 2013; Corporate Knights Report
24	Sustainability Pay Link	G23	Pay-sustainability performance link	2	Corporate Knights Report; GMI, ESG Rating, 2013
25	Executive compensation	G23	Salary, bonus, options	5	ISS; Corporate Governance Quotient; GMI, ESG Rating, 2013; Standard & Poor's; oekom
26	Compensation plan	G23	Salary, bonus, options, Golden hellos and parachutes	2	GMI, ESG Rating, 2013; Standard & Poor's
27	Performance evaluation criteria	G23	Qualitative and quantitative factors; Financial performance and compensation	3	Standard & Poor's; FTSE4Good; ISS Corporate Governance Quotient
28	UN Global Compact	G31	UNGC Y/N and other soft law	2	GMI, ESG Rating, 2013; Corporate Knights Report
29	Legal Compliance	G31	Obeying all relevant laws	2	GMI, ESG Rating, 2013; FTSE4Good
30	Litigation	G31	Company has pending criminal litigation against it, has been found guilty within the last 3 years	2	GMI, 2010; GMI, ESG Rating, 2013
31	Codes	G32	Codes of conduct	3	DJSI-Eco., GRI G4; FTSE4Good
32	Corruption and Fraud	G32	Whistleblowing and corruption	3	ISO 26000; GMI, ESG Rating, 2013; FTSE4Good
33	Business Ethics	G32	Education, Work and employees ethics	4	Oekom; ISS; ISS Corporate Governance Quotient; MSCI-Impact
34	Shareholder rights	G33	a shareholder rights plan ("poison pill"), TIDE provision, proxy voting, 10% shareholders can convene an EGM	7	GMI, ESG Rating, 2013 ISS; ISS Corporate Governance Quotient; Standard & Poor's; FTSE4Good; oekom
35	Ownership structure and institutional investors	G33	Executive and Director Stock Ownership Guidelines; insider ownership	3	ISS; ISS Corporate Governance Quotient; Standard & Poor's
36	Socially Responsible Investing	S11	KPIs linked to CSR (social, community, and environment), Product Safety	2	MSCI-IVA; Corporate Knights Report
37	Social Risk Management	S11	Supply Chain Risk Management, Country risk	2	DJSI-Eco.; UNGC

Table 4 (continued)

No. KPI/indicator	Code ^a	Method/reference to indicators measures/status/compliance/main components	frequency	Extraction sources (Frequency)
38 Social Education & Training	S12	(Total training hours/Annual average workforce) and (Total training expenditures in us\$/Annual average workforce)	6	Corporate Knights Report; FTSE4Good; ISO 26000; DJSI-Soc.; GRI G4; oekom
39 Social Disclosure	S13	SR, Workplace Safety Reporting, Details of training disclosed	4	GMI, ESG Rating, 2013; DJSI-Eco.; FTSE4Good
40 Product Safety	S21	Total number of incidents of non-compliance with regulations and voluntary codes concerning marketing communications, including advertising, promotion, and sponsorship, by type of outcomes (G4)	4	GMI, ESG Rating, 2013; GRI G4; MSCI-Impact; MSCI-IVA
41 Customers	S22	Customer Privacy (Privacy and Data Security)	6	DJSI-Eco.; MSCI-Impact; FTSE4Good; GRI G4; Societe Generale; oekom; ISO 26000
42 Supply Chain	S22	Supplier Assessment for Labor Practices (Significant actual and potential negative impacts for labor practices in the supply chain and actions taken)	6	DJSI-Eco.; MSCI-Impact; MSCI-IVA; GRI G4; UNGC; oekom
43 Anti-competitive Behavior	S23	Fair trading agreements; Total number of legal actions for anti-competitive behavior	4	GMI, ESG Rating, 2013; ISO 26000; MSCI-IVA; MSCI-Impact
44 Innovation capacity	S23	R&D expenditures in us\$/us\$ EBIT	2	Corporate Knights Report; ISO 26000 ^c
45 Employees compensation	S31	Total compensation in us\$/Total employees	3	Corporate Knights Report; DJSI-Soc.; UNGC
46 Employee turnover	S31	Employee departures/Annual average workforce	2	Corporate Knights Report; DJSI-Soc.
47 Labor Practices	S31	Number of grievances about labor practices filed, addressed, and resolved through formal grievance mechanisms (G4)	5	GRI G4; MSCI-Impact; MSCI-IVA; ISO 26000; GMI, ESG Rating, 2013
48 Employees work-life balance and family	S31	Flexible working arrangements and family benefits	2	FTSE4Good; oekom
49 Health and safety management	S32	Occupational safety and health (OSH); Occupational Health and Safety Assessment Series (OHSAS); Total injuries/million hours worked; Employee and contractor fatalities/1000 employees; Type of injury and rates of injury, occupational diseases, lost days, and absenteeism, and total number of work-related fatalities, by region and by gender (G4)	9	Corporate Knights Report; MSCI-Impact; MSCI-IVA; GRI G4; GMI, 2010; Societe Generale; oekom; ISO 26000; UNGC
50 Employee productivity	S32	US \$ EBIT/Annual average workforce	2	Corporate Knights Report
51 Sweatshop, child labor and forced labor	S33	Company used childlabor/sweat shops	4	FTSE4Good; GMI, ESG Rating, 2013; UNGC; GRI G4
52 Human Rights	S33	(Signatory to the Voluntary Principles on Security and Human Rights (y/n)); contracts that include human rights clauses (G4)	5	Corporate Knights Report; MSCI-Impact; UNGC; oekom; DJSI-Soc.
53 Community Development	S41	Community investments (Cash and in-kind donations in us\$/us\$ capital expenditures)	6	Corporate Knights Report; ISO 26000; UNGC; oekom; MSCI-Impact; GMI, ESG Rating, 2013
54 Philanthropy	S41	Type of Philanthropic Activities	2	DJSI-Soc.; FTSE4Good
55 Stakeholders	S42	Stakeholder Perception Analysis; Trade unions	3	DJSI-Eco.; DJSI-Soc.; UNGC
56 Non-discrimination and Equality	S43	Equal Opportunities Systems	5	FTSE4Good; oekom; UNGC; MSCI-Impact; GRI G4
57 Women and Minorities	S43	Composition of governance bodies and breakdown of employees per employee category according to gender, age group, minority group membership, and other indicators of diversity (G4); % of women within the various management bodies	3	FTSE4Good; Societe Generale; GRI G4
58 Compensation fairness	S43	CEO-to-average worker pay; Tax gap (average gap between company's stated statutory tax obligation and actual cash tax paid over the past 3 years/# of employees); CEO Compensation/average compensation for all firm employees	2	Corporate Knights Report; GRI G4
59 Environmental Risk Assessment	E11	Reduction goals; Overall Environmental Impact	3	MSCI-IVA; Climate Counts; GMI, ESG Rating, 2013
60 Environmental Education	E12	Technology and Environmental Opportunities	3	MSCI-IVA; UNGC; Climate Counts
61 Environmental Reporting	E13	Discloses its environmental policies; water, waste and carbon reporting	4	FTSE4Good; GMI, ESG Rating, 2013; Climate Counts; DJSI-Env.
62 Climate change and carbon	E21	Climate change mitigation and adaptation; (US\$ sales/Scope 1 & 2 metric tons of co2e emitted); CDP initiative	6	Corporate Knights Report; GMI, ESG Rating, 2013; oekom; ISO 26000; MSCI-IVA
63 Land Use, environmental protection & Biodiversity	E22	Total environmental protection expenditures and investments by type	6	GMI, ESG Rating, 2013; GRI G4; ISO 26000; MSCI-Impact; MSCI-IVA
64 Waste	E23	Waste Productivity (us\$ sales/Metric tons of hazardous and non-hazardous waste produced) and (Millions of cubic metres of water consumed/us\$ sales); Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the BaselConvention2 Annex I, II, III, and VIII, and percentage of transported waste shipped internationally (G4)	6	Corporate Knights Report; GMI, ESG Rating, 2013; oekom; Climate Counts; GRI G4; MSCI-IVA; DJSI-Env.
65 Emission and pollution	E23	EP (Scope 1,2); Toxic Emissions; CO ₂ emissions (T CO ₂); NO _x , SO _x , and other significant air emissions (G4)	9	GMI, ESG Rating, 2013; Societe Generale; ISO 26000; FTSE4Good; oekom; Climate Counts; GRI G4; MSCI-IVA; DJSI-Env.
66 Environmental Management System (e.g. ISO 14000, ISO 26000)	E31	EMS Adoption (e.g. ISO 14000, ISO 26000); Commitment to use of targets and monitoring; Environmental internal control	8	ISO 26000; GMI, ESG Rating, 2013; oekom; FTSE4Good; MSCI-Impact; GRI G4; UNGC; Climate Counts
67 Energy Efficiency	E32	Energy Productivity (US\$ sales/mw or Joules of energy consumed); Energy consumption; Total energy consumption per occupant (kWh/OCC); use of renewable energies	9	Corporate Knights Report; GMI, ESG Rating, 2013; Societe Generale; ISO 26000; GRI G4; oekom; MSCI-Impact; MSCI-IVA; DJSI-Env.
68 Water Use	E32	Water Stress; water use reduction Amount of water consumed (e.g., cubic meters) by quality/source and percent water usage from recycled sources; Intensity measure: Water consumption per unit of sales	7	GMI, ESG Rating, 2013; Societe Generale; ISO 26000; GRI G4; oekom; MSCI-Impact; MSCI-IVA

(continued on next page)

Table 4 (continued)

No. KPI/indicator	Code ^a	Method/reference to indicators measures/status/compliance/main components	frequency	Extraction sources (Frequency)
69 Products & Services	E33	Product impact; impacts of products and services	3	Oekom; MSCI-Impact; MSCI-IVA
70 Supply Chain	E33	Supply Chain Impact (e.g. Patagonia); Third parties' Emissions	5	GMI, ESG Rating, 2013; Societe Generale; ISO 26000; Climate Counts; GRI G4
Total frequency			269	

^a Codes Composition: D: Dimensions [E,S,G]; MC: Main Criteria[1-2-3-(4)]; SC: Sub-criteria [11-12-13- ... -(43)].

^b Corporate knights report includes: Asset4, Bloomberg ESG data, corporate knights, and GS SUSTAIN.

^c Under skill development.

Giannetti et al. (2015) identified three sustainability models (weak, medium and strong) at the macro level and asserted that SIs can be associated with any of these models. This assertion is also true for the indicators at the institutional or organizational level that corresponds with the macro sustainability agenda. In the strong model of sustainability environmental services are the foundation of socio-economic development and human systems (social dimension) are contained within the limitations of the biosphere and limited natural resources. A robust set of SIs would demonstrate a higher level of association with the strong model of sustainability as it is evident by the results of the study.

One important implication of reviewing SIs is their growing utility in policy making and strategic planning (Cassar et al., 2013). Participatory approach (Mickwitz et al., 2006) is an alternative method particularly used in developing sustainable development indicators at the macro level in the European countries (Rosenström and Kyllönen, 2007). This approach usually encompasses a diverse and large body of participants but can also utilize a single stakeholder like academia (Ramos, 2009).

Many scholars have attempted to find the benchmarks in a particular industry (e.g. Sardinha et al., 2011). For instance, Zhao et al. (2012) developed a CSR indicator system for the construction industry consisting of indicators grouped in 30 performance issues within 11 stakeholder categories. Even though, industry-specific indicators are of great significance in the evaluation of ESG performance of the firms, due to the magnitude of the data and

the detailed analyses of each individual indicator, we did not include any industry-specific indicator. This general set of indicators provides guidance for CSR implementation and enables enterprises to assess their CSR performance, which in turn will help with progress in the business sustainable development agenda. The results also showed that there is a sense of commonality between ESG indicators of rating agencies (i.e. sustainability, CSR and CG rating agencies), guidelines and frameworks while they are or appear to be quite different in method, philosophy, developers and functionalities (Tahir and Darton, 2010).

As stated earlier, McIntosh (2015) and Visser (2011), among many other scholars, have pointed out that a transformation in the way we do business in order to ensure survival is non-negotiable. These ideas can be pointed out as awareness element. However, there are two other elements, other than awareness, that play key roles in such transformation.

“The most important things cannot be measured”, William Edwards Deming, the distinguished American scholar.

This is often quoted as an antithesis to the McKinsey Maxim. McKinsey Maxim states that “What you can measure, you can manage”. Although, there has been long debates on the concepts of measurement, the general consensus is that sans measurement, there is no evaluation and as a result there is no change. Furthermore, Deming emphasized that the most important issues are long-

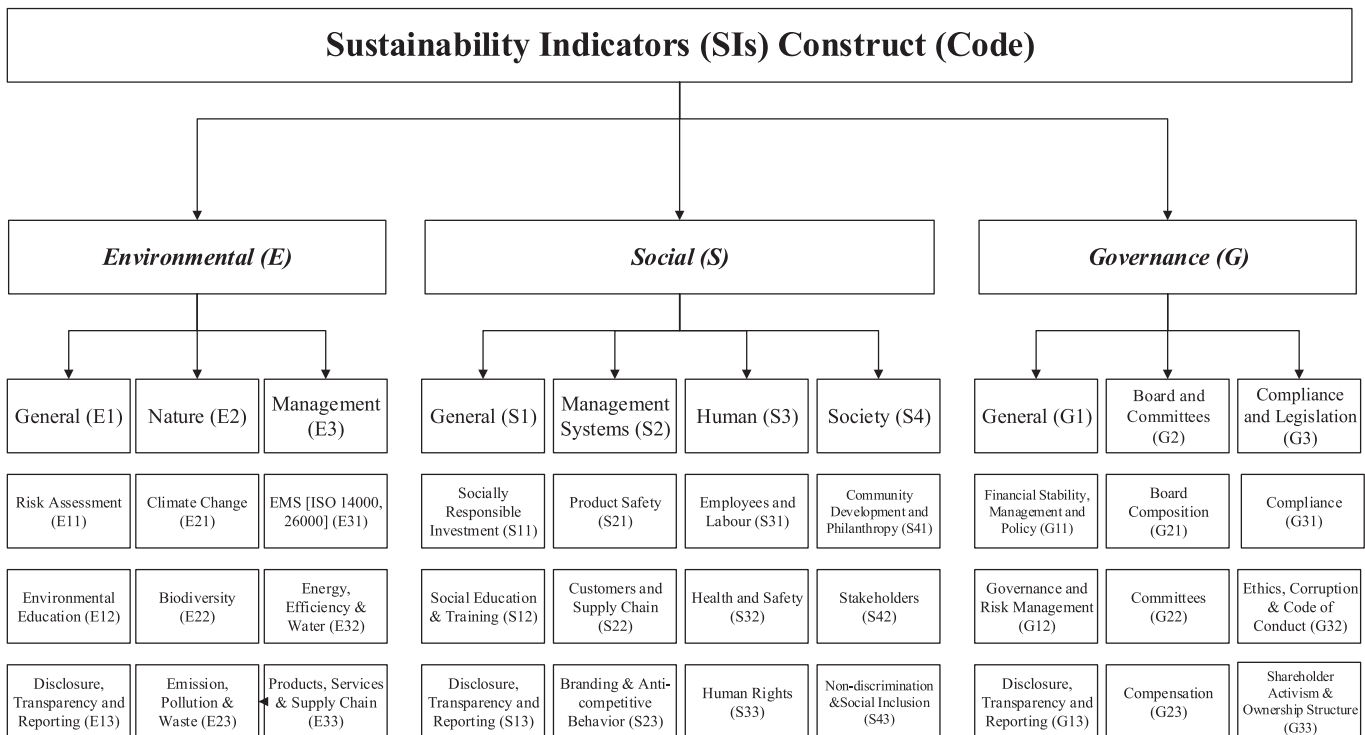


Fig. 3. ESG construct that was yielded from the extraction process.

term and are not usually measured in advance, which is called the McKinsey fallacy. In the light of technological advancements and rapid growth, this is changing today. Therefore, measurement is a key element for a transformation in the world. One of the key contributions of SIs is that they provide the equipment for this vessel of change in the key areas of concern.

One key remaining element is the political and business volition which is predicated upon the conflict of interest between individuals and society, the classical case of the tragedy of the commons. The pay-performance link, as an example, may put this aspect into perspective. Golden hellos, gratuitous bonuses, golden parachutes, and most of the non-equity based compensations are epitomes of pay without performance (Bebchuk and Fried, 2004). In the recent decades, there has been a shift towards integrating pay-performance link into corporate strategies. However, considerable portion of executive compensation literature is predicated upon financial performance of the firm as the basis for senior executives' remuneration. Nonetheless, in reality, companies have social and environmental impact beside their economic performance which is not accounted for in the executive compensation schemes. There is a shift towards integrating ESG into executive compensation plans so that senior executives will be provided with the proper incentives to act in the long-term interests of the company and society. This will help the business to act upon sustainability issues and SIs play a significant role in it. This study attempts to straighten this process by mainstreaming a general set of SIs. The political will, however, seems to be more impeding than business one (McIntosh, 2015).

5. Concluding remarks, limitations, and future research

This study contributes to the literature by highlighting the MCIs of sustainability at the corporate level and their utility to companies and stakeholders. This research also provides the building blocks for future studies that could explore the usefulness of these indicators to companies and stakeholders in various contexts. This work extends, updates and complements previous efforts to find the MCIs of sustainability especially in the rating systems and indexes. Moreover, this analysis attempted to transcend the current literature on SIs by providing a general set of the MCIs that are clustered into a hierarchical normative framework. Furthermore, this general set of MCIs presents a guidance for the implementation of indicator systems in companies and enables them to assess their sustainability performance, which in turn will help the business sustainable development agenda.

Generally, this paper had three major contributions for academic and professional practice of SIs. Firstly, researchers can use the MCIs construct as a general framework for their research purposes and secondly managers and professionals can utilize them for sustainability performance evaluation and reporting purposes. Thirdly, MCIs lay the foundations in the context of international reporting convergence efforts. These high frequency MCIs that have satisfied general properties of SIs help companies to calibrate their reporting such that with minimum effort they can comply with new reporting guidelines, management systems or become eligible for listing in the sustainability/CSR/ESG indices and rating systems provided that they adjust their behavior accordingly. Moreover, both investors and stakeholders complain about the difficulty of understanding incomparable corporate ESG data. MCIs can help them to better understand the sustainability performance of the companies they are investing in and compare their performance.

The study examined rating systems and guidelines of CG and CSR using a comprehensive four-pronged approach to find the MCIs for the evaluation of business performance using an eight-factor indicator selection filter. However, one may argue that academic research and articles are valuable sources for SIs. In the initial run of

the process, a fifth source namely "the academic articles" was included. The outcome showed that the effect of the extracted indicators from the academic articles on the results of the study are insignificant. This is not to say that academic articles contribution to the field and this particular question is insignificant. The reason behind such outcome might be two-fold. Firstly, the academic research is often very specific. For instance, many studies focus on one industry and industry-specific SIs. Secondly, due to the financial and technical limitations in academic research, most of the studies are purpose-oriented and are not expeditiously comprehensive.

The first phase of the extraction process resulted in 1826 raw indicators which were later passed through the other seven properties of the filter clustered into a sustainability or ESG framework with ten main-criteria, 30 sub-criteria and 70 indicators (MCIs). All extracted indicators are general indicators of sustainability and are suitable for application in all sectors which is one of the merits of this study. However, this is also a limitation as industry-specific indicators are important in the evaluation of sustainability performance at the corporate level. Therefore, while the extracted construct provides a general framework for sustainability evaluation across all industries, it is not necessarily comprehensive in the case of a specific industry sustainability evaluation at corporate level.

An additional industry-specific construct in conjunction with the general construct, presented in this study, can be useful in that case. Although, this study examines a number of leading CG, CSR, and sustainability rating systems and guidelines, it is by no means an all-inclusive study and therefore this is one of the main limitations of the current study. One of the other limitations of the study is the ambiguities in temporal and spatial scales⁶ which are among the inherent inhibitions in SIs. However, in the development of industry specific sustainability indicator sets, due to the limited scope of such studies, the researcher (s) can control these and similar factors (see: Mascarenhas et al., 2015). Additionally, contextual factors may affect the presence and weighting of the indicators and need to be taken into account while applying the proposed MCIs.

Future research can focus on developing industry specific SIs sets, considering the interactions among indicators, and designing general and industry specific weighting systems. Furthermore, adding thresholds to a finite set of SIs can provide a robust control system. Martinet (2011) proposed a criterion characterizing sustainability with indicators and thresholds acting as constraints. The results also suggest that the future research can focus on the development of a new sets of indicators suitable for entering the age of sustainable development. The exigency behind developing new sets of indicators stem from the significant changes that have transpired in the world such as climate change, loss of biodiversity, social exclusion, and gender inequality.

These new sets of indicators should be developed at international, regional, national, and corporate levels to track the progress towards sustainability with the idea of Glocality principle in mind. As the name suggests, (sustainability) indicator can be used to measure and report (sustainability) performance and, as a result, help to identify the strengths and weaknesses in performance. Although recognizing the problem is of great importance, it is not sufficient. For the change to take effect, businesses should let sustainability into their DNAs. One possible approach to do this is developing a sustainable business model (SBM). SBMs integrate a triple bottom line approach and contemplate a wide range of stakeholder interests to ensure long-term social and environmental sustainability. One direction of future studies can revolve around driving change in corporate behavior through embedding indicators in the SBM.

⁶ The temporal scale is the period over which the impacts of business operations are considered.

Future research can also look into the method-related aspects of SIs studies. The majority of methods used in practice to conduct detailed analyses on indicators rely on static models like Analytical Hierarchy Process (AHP) that do not account for the inter-criteria dependencies in the evaluation process. However, the use of dynamic methods like Decision Making Trial and Evaluation Laboratory (DEMATEL) in the SIs and rating studies with the big data revolution will be possible. This may lead to improvements in the Autonomous property of the SIs selection filter of this study.

Appendixes

A. Rating systems

The following table reviews the rating systems and indices that were used in the analysis.

Table A
Rating systems.

Rating agency	Method/indexes	Additional comments
MSCI ESG ^a (2012)	MSCI Best-in-Class Indexes; The MSCI World ESG Index, MSCI World ex US ESG Index, MSCI EAFE ESG Index, MSCI North America ESG Index, MSCI Europe ESG Index, MSCI Pacific ESG Index, MSCI USA ESG Index, MSCI USA Large Cap ESG Index, MSCI USA Mid Cap ESG Index, MSCI USA Small Cap ESG Index, MSCI USA IMI ESG Index, MSCI USA SMID ESG Index, MSCI USA ESG Select Index, MSCI USA Catholic Values Index, MSCI Global Climate Select Index MSCI KLD 400 Social Index Including ESG Impact Monitor Analytical Framework Intangible Value Assessment (IVA); a seven-point scale ('AAA–CCC'); 34 ESG issues	All sectors; MSCI ESG Business Involvement Screening Research (BISR) Covers 30,000–40,000 companies World-based Acquired RiskMetrics (which had ISS, Innovest and KLD) in 2010 Familiarity Rank ^b : 12 Credibility Rank ^c : 8 All sectors; 90% large cap, 9% mid cap, 1% small cap US-based, 400 companies from 3000 largest corporations 5 main pillars Over, 5000 companies, World
FTSE	FTSE4Good Index Series (2001) (family index): Europe 50, Global 100, US 100 FTSE KLD 400 Social Index	All sectors 77 countries, World, US, UK, Europe, Japan; UK-based Familiarity Rank: 3 Credibility Rank: 4
Oekom Corporate Rating (1993)	Global Challenges Index; Estimated Rating, Comprehensive rating; 18 exclusion criteria (e.g. alcohol, nuclear power and armaments, and controversial business practices, such as violations of human rights or labor rights); Sustainability Matrix. A+ (excellent) to D-(poor) Social Rating, Environmental Rating (100 social and environmental criteria); 100–150 indicators; covering MSCI World, MSCI Emerging Markets and Stoxx 600 and national indexes such as Austrian ATX, the French CAC40, the German DAX family and the Swiss SMI	Industry-specific criteria World-based 1000 companies from 52 countries ORBIT analysis Familiarity Rank: 11 Credibility Rank: 5 (Oekom, March 2013)
Thompson Reuters	ASSET4: 4 pillars of Economic, Environmental, Social and Governance Performance; Based on 250 + ESG key performance indicators	All Sectors Over 3200 global companies Familiarity Rank: 16 Credibility Rank: 14
Corporate Knights Magazine	The Global 100 Most Sustainable Corporations in the World (2005); Universe of all large/mid-Caps reduced using four screening criteria. Remaining stocks selected to index based on their performance against same-industry peers on twelve quantitative sustainability indicators, Equally weighted. The MSCI All Country World Index (ACWI) [As benchmark]	All Sectors World-based, Canada-based; 100 Companies Familiarity Rank: 5 Credibility Rank: 12
Climate Counts	The Climate Counts Company Scorecard; 0 to 100 score; 22 criteria; 4 categories	All Sectors World-based Familiarity Rank: 13 Credibility Rank: 6
GS Sustain	GS SUSTAIN brings together our analysis of the sustainability of corporate performance; 20–25 ESG indicators; scores 1–5 (Comprehensive Analysis)	All Sectors World-based Familiarity Rank: 15 Credibility Rank: 11
Bloomberg ESG Data ^d	Data compilation into ESG classification (3P: Products, Planet, People)	All Sectors World-based, 5000 companies of 68 countries Familiarity Rank: 6 Credibility Rank: 7
Sustainable Asset Management (Robeco SAM) (1999, 2006)	Dow Jones Sustainability Index (DJSI) (1999); The corporate sustainability assessment Questionnaire; Economic, Environmental and social Rating; Rules-based method, Economic, social and environmental aspects, Assurance by Deloitte	World-based Familiarity Rank: 1 Credibility Rank: 2

^a Due to the acquisition of KLD, FTSE KLD Indexes were re-named.

^b Familiarity and Credibility ranks of rating systems are based on the Rate the Raters professional panel.

^c Credibility is derived from the positive impact of that specific rating system on corporate sustainability performance (GlobeScan/SustainAbility Survey, 2013).

^d Data provider.

B. Sustainability, integrated, and CSR reporting

The following table (Table B) introduces three of the most prevalent SR frameworks.

UK. There are numerous management tools for the assessment and implementation of CSR in the world such as the Small Business Consortium in the UK, Bilan Societal, Le Guide de la Performance Globale, CSR Europe–Alliances Guide in France, Vastuun Askeleita in

Table B
Sustainability, integrated, and CSR reporting frameworks.

Organization	Missions of the organization/standard and Foci
Global Reporting Initiative (GRI)	Providing guidance on contents and implementation <i>Content Principles:</i> Shareholder Inclusiveness, Sustainability Context, Materiality, and Completeness.
International Integrated Reporting Committee (IIRC)	Strategic focus and future orientation, Connectivity of information, Stakeholder relationships, Materiality, conciseness, Reliability and completeness, Consistency and comparability.
Sustainability Accounting Standard Board (SASB)	SASB Standards include (A) disclosure guidance and (B) accounting standards on sustainability topics. Both for discretionary and mandatory cases. <i>4 constituent parts:</i> Scope of Disclosure, Reporting Format, Timing, and Limitations. (Elements are industry-specific) – Six Sectors (Planning for 80 industries and 10 sectors)

C. Normative frameworks

Leading general normative frameworks are presented in Table C.

Finland, Albatros in Belgium, Institutional and Transparency Indicators in Mexico, Global Citizenship 360 – GC 360 in US and Japan, SD Planner™ in US, The Good Company Index in Canada,

Table C
Leading general normative frameworks.

Organization	Missions of the organization/standard	Foci
United Nations Global Compact (UNGC)	The UNGC has two objectives: “Mainstream the ten principles in business activities around the world” and “Catalyze actions in support of broader UN goals, such as the Millennium Development Goals (MDGs)”.	10 principles in 4 areas Human Rights, Labor, Environment and Anti-Corruption Reported: Communication on Progress (COP). Principle-based framework: sustainable and socially responsible policies and implementation. 12,000 signatories based in 145 countries
OECD Guidelines for Multinational Enterprises (2000)	These are non-binding recommendations to enterprises, made by the thirty-eight governments that adhere to them. Their aim is to help multinational enterprises (MNEs) operate in harmony with government policies and with societal expectations.	Concepts and Principles, General Policies, Disclosure, Employment and Industrial Relations, Environment, Combating Bribery, Consumer Interests, Science and Technology, Competition, Taxation
Tripartite Declaration of Principles Concerning Multinational Enterprises and Social Policy (ILO, 2006) (2001, 1991, 1977)	Social policy guidelines, Supporting UNGC, Millennium Development Goals. (MDGs) and after 2015 Sustainable Development Goals (SDGs).	Voluntary principles in the fields of employment, training, conditions of work and life and industrial relations which governments, employers' and workers' organizations and multinational enterprises are recommended to observe. Human Rights, labor.
Voluntary Principles on Security and Human Rights (2000)	The promotion and protection of human rights throughout the world and the constructive role business and civil society, maintaining the safety and security of their operations	Risk Assessment, Interactions between Companies and Public Security, Interactions between Companies and Private Security. Human Rights, labor; safety and security of their operations

D. Management guidelines

There are several management tools that integrate these management guidelines to help companies to comply with all of these standards at the same time, such as the Integrated Management System (IMS) of ECO4WARD in Austria, Sistema de Gestión de Responsabilidad Integral® or SGRI in Colombia and SIGMA in the

AutoevaluaRSE in Panama, IndicaRSE 2006 in Guatemala, Corporate Social Responsibility Practices Self-Assessment in El Salvador, Peru 2021 Social Responsibility Mode in Peru and Corporate Social Responsibility Self-Assessment Guide in Uruguay. The following table (Table D) presents some of the leading sustainability Management Guidelines.

Table D
Leading general sustainability management guidelines.

Organization/Standard	Missions of the organization/standard	Foci
ISO 26000 – social responsibility	ISO 26000 is one of ISO's International Standard giving guidance on social responsibility for business organizations and public sector organizations of all types.	Accountability, Transparency, Ethical behavior, Respect for stakeholder interests, Respect for the rule of law, Respect for international norms of behavior, Respect for human rights
ISO 14000	ISO 14000 gives the generic requirements for an environmental management system.	Aspects covered: Emissions, Discharges, Waste management, Storage facilities, Suppliers, Customers (Whitelaw, 2004)
EMAS	The Eco-Management and Audit Scheme, is a voluntary initiative designed to improve companies' environmental performance.	A formal specification for Environmental Management Systems, for companies that go beyond minimum legal compliance and continuously improve their environmental performance. Available to companies in the EU, it enables an organization to achieve certification. 4600 organizations and 7900 websites are EMAS registered.
Social Accountability International (SAI) – SA 8000	SAI is a U.S.-based, nonprofit organization dedicated to the development, implementation and oversight of voluntary verifiable social accountability standards that are reputable and publicly accessible.	The social accountability system, SA8000, is a standard and verification system for organizations to maintain just and decent working conditions throughout the supply chain, for assuring humane workplaces.

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