Measuring Sustainable Development. Challenges and Solutions

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Abstract
In this paper, the authors present a framework for defining the term 'Corporate Sustainability Performance' (CSP) and a method for measuring it. In this framework, which is based on RobecoSAM's methodology and the Dow Jones Sustainability Index, CSP is a multidimensional construct that has three dimensions - economic, social and environmental. Each dimension comprises a number of factors (91 in total) that should be measured. These factors have various weights and some of them are industry-specific. Based on data collected from RobecoSAM (2015, 2016a), the authors created a database with the 59 industries represented in DJSI, and calculated the importance of each factor, according to its average weight for all industries combined (AV). Then, based on the set of factors that are specific to each industry, the authors calculated the weight of each of the three CSP dimensions for each industry. These weighting factors are used as parameters in the equation that the authors propose for the measurement of CSP.

Key words: Corporate Sustainability (CS), Corporate Sustainability Performance (CS), Dow Jones Sustainability Index DJSI).

JEL classification: M10, M14, Q50, Q56.

1. Introduction

For more than 25 years, researchers have been studying the relationship between the 'corporate sustainability performance' of a firm (CSP) and its financial performance. Some researchers have found a positive relationship and others have found a negative relationship. However, others found no relationship at all. The fact is that scholars who have attempted to measure the 'CSP' concept have heterogeneous backgrounds, including management, sociology, environmental sciences, social work, etc. Each of them measured this concept by using one or more metrics with which he or she was most familiar. Accordingly, they use different frameworks, constructs and variables, and obtained contradictory results. These contradictory results can be explained by "a low construct validity of the models" (Orlitzky et al., 2011, p. 16) and "a serious problem that has plagued researchers to date: the problem of measuring" (Waddock and Graves, 1997, p. 304). This paper discusses these specific weaknesses in the academic literature in management and proposes a broad conceptual framework for the measurement of CSP, which is based on RobecoSAM's methodology and the Dow Jones Sustainability Index. Launched in 1999 and now in its 18th year, DJSI uses RobecoSAM's methodology, which has proved to be a credible measurement tool of corporate sustainability. Our framework combines the extensive knowledge of index-based concepts of the S&P Dow Jones Indices with the resources and capabilities for sustainable investment of the RobecoSAM organization.

2. Literature review

This Section presents the basic concepts related to corporate sustainability and emphasizes the main controversies and debates over the definitions of the concepts and the various ways to measure them.

The term 'Corporate Sustainability' (CS) emerged in the early 1990s, suggesting that

companies should develop strategies that make their local and short-term goals consistent with society's global and long-term goals (Costanza, 1991).The set of the 'three pillars of sustainability' at the corporate level (the economic, social and environmental dimensions of the CS) is termed 'Triple Bottom Line' and refers to all strategic initiatives of a firm that are designed to improve its corporate sustainability performance (CSP) and to reduce the related costs of its products and processes (Dyllick & Hockerts, 2002). Table 1 presents some of the CSP constructs that have been proposed by the authors of 186 empirical or theoretical articles that are reviewed in this paper.

Economic factors
▪ Innovation capacity, product stewardship and product differentiation (e.g., McWilliams and Siegel, 2001; Mackey et al., 2007; Hart, 1995; McWilliams et al., 2006; Barin Cruz and Boehe, 2010)
▪ Good governance systems and stakeholder management - including employees' satisfaction, shareholder activism and protection of minority shareholders (e.g., Barnett, 2007; Jansson, 2005)
▪ Firm's reputation – firm's rank in Forbes List (e.g., Hart, 1995; Orlitzky, 2001)
▪ Good practices in Supply Chain Management (Searcy, 2009; Porter and Kramer, 2006)
▪ Social Investment, including socially conscious investors (Clarkson, 1995; Mackey et al., 2007)
▪ The economic value created by the firm (Dyllick and Hockerts, 2002)
▪ Business ethics and code of ethics (e.g., Andriof and Waddock, 2002; Porter et Kramer, 2006)
▪ Risk Management process (e.g., Castello Branco and Rodrigues, 2007)
▪ Financial reporting with emphasis on sustainable development (e.g., Porter and Kramer, 2006)
Environmental factors
▪ Eco-efficiency (e.g., Wagner, 2005; Qian, 2012)
▪ Water and energy consumption-(e.g., Hart, 1995; Andriof and Waddock, 2002)
▪ The effects of pollution (e.g., Qian, 2012; Stanwick and Stanwick, 1998)
▪ Waste management, including recycling and disposal (e.g., Hart, 1995)
▪ Environmental ratings and environmental audit (e.g., Ambec and Lanoie, 2008).
▪ Intensity of green innovation (e.g., Aguilera-Caracuel and Ortiz-de-Mandojana, 2013)
Social factors
▪ Training and continuing education (e.g., Porter and Kramer, 2006; Clarkson, 1995)
▪ Employee retention rate and career planning (Clarkson, 1995)
▪ Management compensation program based on SD indicators (e.g., Porter and Kramer, 2006)
▪ Unfair dismissal proceedings (e.g., Clarkson, 1995; Porter and Kramer, 2006)
▪ Discriminatory vs non-discriminatory policies (e.g., Hillmanand and Keim, 2001)
▪ Presence of women on steering committees (Porter & Kramer, 2006)
▪ Workplace safety - workplace accident rate (e.g., Abowd et al., 1990; Porter and Kramer, 2006)
▪ Philanthropic contributions -amount per dollar of sale or of net profit (e.g., Branco and Rodrigues, 2007; Orlitzky, 2001; Clarkson, 1995; Andriof and Waddock, 2002).
▪ Reduction of social exclusion (e.g., Andriof and Waddock, 2002; Hillmanand and Keim, 2001)
▪ Social reporting - number of social initiatives reported by the firm and others (e.g., Orlitzky, 2011)

Table 1. Various CSP metrics proposed by researchers: a review of 186 academic articles
Source: the authors

Table 1 shows that researchers did not reach a consensus on the components of each pillar (Dumitriu, 2017). For instance, the economic pillar can be the "product and process stewardship" (Hart, 1995), the economic value created by the firm (Dyllick and Hockerts, 2002), or the competitive advantage that a company could acquire by environmental and social differentiation (Barin Cruz and Boehe, 2010). The same lack of consensus amongst researchers is revealed by the academic articles that focus on the social pillar of the CS (Dumitriu, 2017). For example, according to Steurer et al. (2005), research on this pillar should focus on the relationship between the company's Board of Directors and its stakeholders. However, according to Dyllick and Hockerts (2002), this pillar is about the enhancement of social wellbeing through corporate philanthropy.

Figure 1 is a symbolic representation of the research undertaken by scholars for measuring CSP with the goal of studying the relationship between corporate sustainability performance (CSP)

and financial performance (CFP).

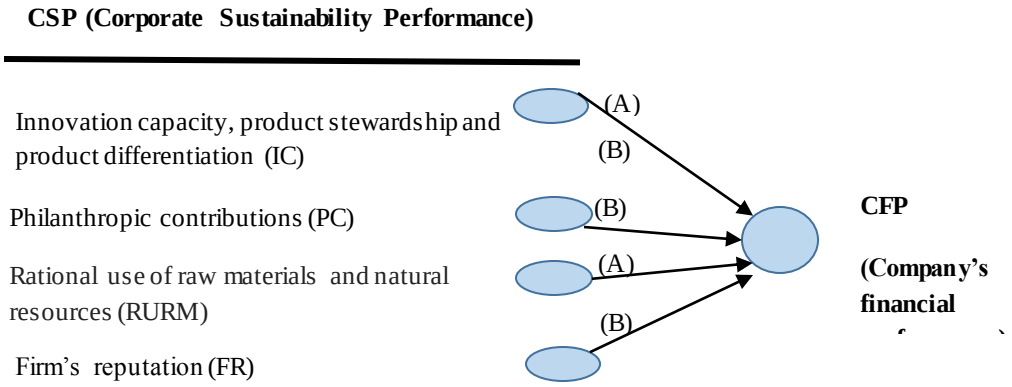

Figure 1. The state of CSP research: A symbolic representation
Source: the authors

In this figure, a hypothetical researcher "A" assumes that CSP is a combination of two factors, IC (an economic factor) and RURM (an environmental factor). With this assumption, researcher "A" measures CSP and CFP for each firm in his sample. He then tests the hypothesis that "CSP is correlated positively with financial performance (CFP)". He then finds a positive relationship. However, for researcher "B", sustainability is a synonym for the firm's philanthropic actions (PC), its reputation (FR) and its capacity for innovation (IC). He conducts the same test as researcher "A", but uses different constructs then those used by A (namely, PC, FR, and IC). Then, he translates these constructs into variables that he measures. He finds a negative relationship between CSP and CFP. Moreover, for the measurement of IC, researcher "A" uses the R & D expense to develop eco-responsible products, whereas researcher "B" uses the number of patents in the field obtained by the firms in the sample. Each researcher has measured a different multidimensional construct, which, in his mind, is a synonym for CSP.

There are four main reasons why researchers obtained contradictory results. They are that: (a) there is a lack of consensus on the definition of this concept, (b) they measure only some CSP factors and ignore others, (c) those researchers who use a multidimensional construct to measure CSP assume that its components have equal weights (i.e., they are equally important) and (d) most of them used multi-industry firms in their sample, by assuming that the relationship CSP-CFP does depend on the industry. The fact is that "measurement problems in the literature may be at least as severe as the data analysis weaknesses" (Orlitzky et al., 2011, p. 16). Moreover, "it is impossible to measure what we cannot define and, as long as we use different definitions, we will get empirical results that cannot reliably be compared" (McWilliams et al., 2006, p.10).

3. Research Framework

In this article, the authors propose a framework for measuring the CSP, which is rooted in RobecoSAM's methodology and the S&P Dow Jones Indices (Figure 2). DJSI methodology has proved its validity as the index has been used since 1999. Moreover, "because 'What gets measured, gets done,' the managers will be motivated to increase long-term shareholder value by integrating economic, environmental and social factors in their business strategies (SAM Indexes GmbH., 2015). This index comprises 1994 companies in 59 industries and 91 criteria to assess CSP (RobecoSAM, 2015; 2016a). In this framework, CSP is a multidimensional construct that is measured by a composite indicator, which has three dimensions (economic, social, and environmental). A composite indicator or synthetic index is "an aggregate of all dimensions, individual indicators and variables used to measure them" (OCDE, 2008, p.51).

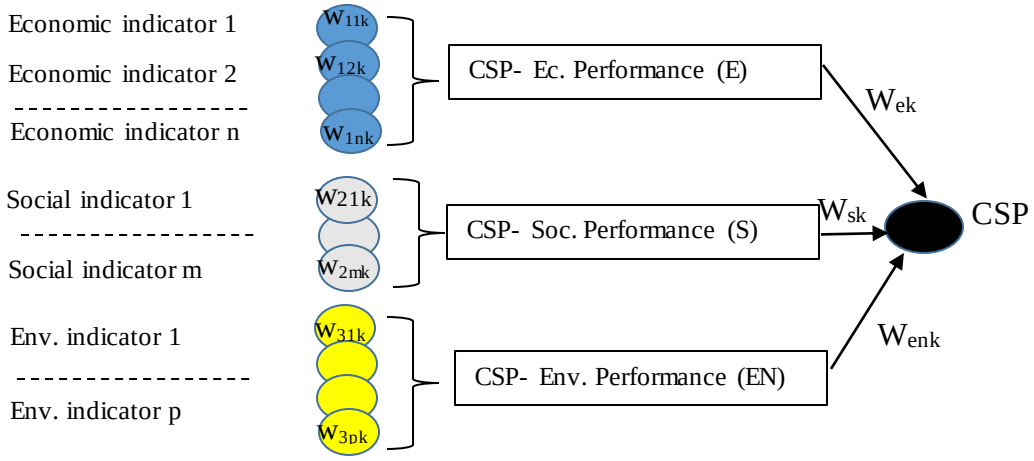

Figure 2. A Framework for measuring CSP

Each dimension of this framework is composed of a certain number of individual indicators (called factors), which provide the basis of evaluation of that dimension. The problem with such a composite index consists in deciding whether a specific factor should be included in the overall composite index and, if included, with which weight. Is this indicator equally important, more important or less important than another individual indicator that also is qualified for inclusion in the CSP composite index? Also, how many individual indicators should be included in each dimension? For instance, in Figure 1, which provides a few examples of the state of research in the field, one can question the decision of researchers A and B to include only two and three individual indicators respectively in the measurement of CSP. Do these indicators have sufficient explanatory power?

In our framework, n is the number of individual economic indicators, m is the number of social indicators and p is the number of environmental indicators. Once the representative indicators have been selected, a weight must be assigned to each (w_{ijk}). The weight of a certain factor represents its "importance" and is called "importance coefficient" (OCDE, 2008).

4. Database design, Sample and Equations Used

The framework in Figure 2 was used for collection of raw data from DJSI & RobecoSAM (2015; 2016a). The sample includes the 59 industries that are represented in the DJSI. Table 2 shows the structure of the database that we have created. The data collected for each industry includes: (a) the number of DJSI companies in that industry, (b) the list of DJSI individual indicators to be included in each dimension (in total, there are 91 individual indicators, of which 37 are economic factors, 27 are social factors and 27 are environmental factors), and; (c) the importance coefficient of each of the individual indicators for each industry (w_{ijk}).

Based on this data, the authors have calculated: (a) the weight of each industry, W_k (the number of companies in that industry divided by the total number of companies in DJSI); (b) the weight of each dimension - economic, social and environmental - for each industry k (W_{ek}, W_{sk}, and W_{enk}) and; (b) the weighted average AV for each of the 91 individual indicators (of all industries combined).

Industry (number of companies listed) and individual indicators (factors)	Industry 1 N1	Industry 2 N2	k Nk	Industry 59 N_{59}	Weighted average (all industries combined): to be calculated
Economic factor 1.1	W_{111}	W_{112}	W_{11k}	$W_{11\text{-}59}$	AV_{11}
Economic factor 1.2	W_{121}	W_{122}	W_{12k}	$W_{12\text{-}59}$	AV_{12}
…….……					
Economic factor 1.n	W_{1n1}	W_{1n2}	W_{1nk}	$W_{1n\text{-}59}$	AV_{1n}
The weight of the econ. dim. in each industry (to be calculated)	**We_1**	**We_2**	**We_k**	**We_{59}**	
Social factor 2.1	W_{211}	W_{212}	W_{21k}	$W_{21\text{-}59}$	AV_{21}
Social factor 2.2	W_{221}	W_{222}	W_{22k}	$W_{22\text{-}59}$	AV_{22}
……..……	…	…	…	…	
Social factor 2.m	W_{2m1}	W_{2m2}	W_{2mk}	$W_{2m\text{-}59}$	AV_{2m}
The weight of the social dim. in each industry (to be calculated)	**Ws_1**	**Ws_2**	**W_{Sk}**	**$Ws_{\text{-}59}$**	
Environmental factor 3.1	W_{311}	W_{312}	W_{31k}	$W_{31\text{-}59}$	AV_{31}
Environmental factor 3.2	W_{321}	W_{322}	W_{32k}	$W_{32\text{-}59}$	AV_{32}
……..……	…	…	…	…	
Environmental factor 3.p	W_{3p1}	W_{3p2}	W_{3pk}	$W_{3p\text{-}59}$	AV_{3p}
The weight of the env. dim. in each industry (to be calculated)	**W_{en1}**	**W_{en2}**	**W_{enk}**	**$W_{en\ 59}$**	
TOTAL ($W_{ek} + W_{sk} + W_{enk}$)	100	100	100	100	

Table 1. Database design (© Camelia Dumitriu)

Equation 1 represent the CSP construct to be measured.

(1) $CSP_F = W_{ek} * E_F + W_{enk} * ENV_F + W_{sk} * S_F$, where:

(2)
$$E_F = w_{11k} * E_{1F} + w_{12k} * E_{2F} + \ldots . w_{1nk} * E_{nF}$$
$$S_F = w_{21k} * S_{1F} + w_{22k} * S_{2F} + \ldots . w_{2mk} * S_{mF}$$
$$ENV_F = w_{31k} * En_{1F} + w_{32k} * En_{2F} + \ldots . w_{3pk} * En_{pF}$$

• Wek, Wenk, and Wsk are the weights that apply to industry k

• w_{ijk} is the weight of the individual indicator [j] that is part of dimension [i] for a given industry [k];

•i varies from 1 to 3 (1 stands for "economic dimension,"; 2 designates "social dimension" and 3 represents

E_F is the aggregated economic score of the firm [F] and is related to its economic sustainable initiatives. These initiatives (E_1, E_2, …, E_n) are called "economic factors." Each has a specific weight for a given industry k (w_{11k}. w_{12k},…, w_{1nk}).

S_F is the aggregated social score of the firm [F] and is related to its social initiatives. These initiatives (S_1, S_2, …, S_m) are called "social factors." Each has a specific weight for a given industry k (w_{21k}, w_{22k},…, w_{2mk}).

ENV_F is the environmental score of the firm [F] and is related to its environmental sustainable initiatives. These initiatives (En_1, En_2,…, En_p) are called "environmental factors." Each has a specific weight for a given industry k (w_{31k}, w_{32k},…, w_{3pk}).

There are, in total, 91 factors ("individual indicators"). However, some of them are representative for the CSP of the firms in a certain industry, but not for those in other industries. For example, of the 37 economic factors, only a few will be significant for a given industry k. The following notations are used in our model:

- n_k is the number of economic factors that are relevant for the CSP of firms in industry k. It varies from 6 to 11, depending on the industry.
- m_k is the number of social factors that are relevant for the CSP of firms in industry k. It varies from 6 to 11, depending on the industry.

- p_k is the number of environmental factors that are relevant for the CSP of firms in industry k. It varies from 3 to 9, depending on the industry.

Equations (3), (4) and (5) were used to calculate the weight of each of the three dimensions of CSP for each of the 59 industries in the DJSI (namely, Wek, Wsk and Wenk).

$$(3)\begin{cases} w_{e1} = \sum_{j=1}^{n1} w1j1 \\ w_{e2} = \sum_{j=1}^{n2} w1j2 \\ \ldots\ldots\ldots\ldots \end{cases} \quad (4)\begin{cases} w_{s1} = \sum_{j=1}^{m1} w2j1 \\ w_{s2} = \sum_{j=1}^{m2} w2j2 \\ \ldots\ldots\ldots\ldots \end{cases} \quad (5)\begin{cases} w_{en1} = \sum_{j=1}^{p1} w3j1 \\ w_{en2} = \sum_{j=1}^{p2} w3j2 \\ \ldots\ldots\ldots\ldots \end{cases}$$

The set of equations (6) was used to calculate a weighted average for each of the 91 individual indicators

$$(6)\begin{cases} AV_{11} = \sum_{k=1}^{59}(Wk * W11k) \\ AV_{12} = \sum_{k=1}^{59}(Wk * W12k) \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \end{cases} \begin{cases} AV_{21} = \sum_{k=1}^{59}(Wk * W21k) \\ AV_{22} = \sum_{k=1}^{59}(Wk * W22k) \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \end{cases} \begin{cases} AV_{31} = \sum_{k=1}^{59}(Wk * W31k) \\ AV_{32} = \sum_{k=1}^{59}(Wk * W32k) \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \end{cases}$$

In equations (6), the following notations have been used:

- W_k (k = 1, 2…, 59) is the weight of each industry and it has been calculated by dividing the number of companies in each DJSI industry by the total number of DJSI companies. This weight varies between 0.2% and 6.32%, with $\sum_{j=1}^{59} kj = 100\%$.
- AV_{1j} is the weighted average of the j-th individual indicator of the economic dimension across all industries (w_k are the weighting factors; k=1…59; n = 1…37).
- AV_{2j} is the weighted average of the j-th individual indicator of the social dimension across all industries; (wk are the weighting factors; k=1…59; m = 1…27).
- AV_{3j} is the weighted average of the j-th individual indicator of the environmental dimension across all industries (wk are the weighting factors; k=1…59; m = 1…27).

5. Results and discussion

Since the weight of each individual indicator that was collected from RobecoSam (2015) varies by industry, the weight of each dimension in the measure of CSP will depend on the industry. Table 2 presents a selection of data in our database for two industries. Seven economic factors are representative (non- null) for the CSP measure of the companies that operate in the aluminum industry, whereas ten factors are representative for banks' CSP. According to the data in Table 2, there is a total of 20 factors for companies in the aluminum industry that determine CSP (n_A = 7, m_A = 8, and p_A = 5) and 23 factors for banks (n_B = 10, m_B = 9 and p_B = 4). Some factors in each of the three dimensions are common to both of these two industries (e.g., CCC, SI and ER), whereas others are specific to each industry (e.g., FSSR applies to the banking sector, but not to the aluminum industry). Even if a certain factor is considered to be representative in measuring CSP, it does not necessarily mean that it is equally important for all companies in all industries. In fact, its weight depends on the industry. For example, human capital development (HCD), which is part of the social dimension of CSP, has a weight of 6% for a bank, but only 4% for an aluminum producer. According to our theoretical model in Table 1, one can say that, according to data collected from RobecoSam (2015), w_{211} = 4% and w_{212} = 6%.

		Aluminum (k=1)	Banks (k=2)
Econ. (i =1)	1.1 Anti-crime Policy/Measures (ACM)	DNA	4%
	1.2 Brand Management (BM)	DNA	3%
	1.3 Financial Stability and Systemic Risk (FSSR)	DNA	4%
	1.4 Codes of Conduct; Compliance; Corruption (CCC)	5%	7%
	1.5 Corporate Governance (CG)	4%	7%
	1.6 Customer Relationship Management (CRM)	4%	6%
	1.7 Payment Transparency (PT)	3%	DNA
	1.8 Business Risks and Opportunities (BRO)	DNA	9%
	1.9 Risk & Crisis Management (RCM)	4%	6%
	1.10 Supply Chain Management(SCM)	3%	2%
	1.11 Tax Strategy- aggressive taxation policies (TS)	2%	2%
	Economic Dimension (Total)	**25%**	**50%**
Social (i=2)	2.1 Human Capital Development (HCD)	4 %	6 %
	2.2 Labor Practice Indicators and Human Rights(LP)	4 %	5 %
	2.3 Occupational Health and Safety(OHS)	9 %	3 %
	2.4 Financial Inclusion(FI)	DNA	3 %
	2.5 Controversial Issues in Lending / Financing(CI)	DNA	4 %
	2.6 Social Impacts on Communities (SI)	6 %	DNA
	2.7 Social Reporting(SR)	5 %	4 %
	2.8 Stakeholder Engagement(SM)	6 %	2 %
	2.9 Talent Attraction & Retention(TAR)	3 %	6 %
	2.10 Corporate Citizenship and Philanthropy(CP)	4 %	3 %
	Social Dimension (Total)	**41%**	**36%**
Env. (i=3)	3.1 Water Related Risks(WR) (j=1)	5 %	0 %
	3.2 Climate Strategy (CS)	9 %	4 %
	3.3 Environmental Reporting(ER)	5 %	4 %
	3.4 Environmental Policy/Management System(EP)	6 %	3 %
	3.5 Operational Eco-Efficiency(OEE)	9 %	3 %
	Environmental Dimension (Total)	**34%**	**14%**
TOTAL (Économic + Social + Env.)		100%	100%

Table 2. An example of raw data that was collected in our database
Source: Data collected from RobecoSAM (2015) and authors' calculations for the weight of each dimension

As the data in Table 2 show, 25 percent of the total number of factors that determine CSP in the aluminum industry are economic factors, 41 percent of them are social factors and 34% of them are environmental factors. However, in the banking sector, the contributions of these three CSP dimensions are 50 %, 36% and 14% respectively. According to these results, the CSP of a given firm F in the aluminum industry should be calculated with equation (7), but that of a bank, with equation (8).

(7) $CSP_F = 0.25* E_F + 0.41 * S_F + 0.34 * En_F = (0.05*CCC_F+\ldots+ 0.02*TS_F) + (0.04* HCD_F+\ldots 0.04*CP_F) + (0.05*WR_F +\ldots+ 0.09 *OEE_F)$

(8) $CSP_B = 0.5* E_B + 0.36 *S_B + 0.14 * En_B = (0.03* ACM_B +\ldots 0.02 *TS_B) + (0.06* HCD_B +\ldots 0.03 *CP_B) + (0.04*CS_B +\ldots 0.093* OEE_B)$

The most significant factors for each dimension (all industries combined) and which have been calculated with the set of equations (6), appear in Table 3. The results for all of the 59 industries, which were calculated with equations (3), (4) and (5) are shown in Table 4.

Economic factors (all industries combined) : AV_{1j}		Environmental factors (all industries combined) : AV_{3j}		Social factors (all industries combined): AV_{2j}	
Corporate Governance	5.61%	Operational Eco-eff.	6.51%	Talent management	5.58%
Codes of Conduct	5.37%	Env. Management	4.56%	Labor Practices and Human Rights	5.56%
Risk & Crisis Management	5.22%	Env. Reporting	4.25%	Human Capital Dev.	5.20%
Supply Chain Management	4.58%	Climate Strategy	3.81%	Health and Safety	5.19%
CRM	4.53%	Product Stewardship	1.97%	Social Reporting	3.86%
Innovation Management	2.59%	Water Related Risks	1.10%	Stakeholder Man.	3.37%
Tax Strategy	1.98%	Biodiversity	0.59%	Corporate Citizenship and Philanthropy	3.19%
Strategy for Em.Markets	0.92%	Environmental Risks and Opportunities	0.44%	Social Impact on Communities	0.78%
Privacy Protection	0.54%	Building Materials	0.37%	Health Contribution	0.29%
Marketing Practices	0.47%	Electricity Generation	0.34%	Controversial Issues Lending / Financing	0.14%
Others- less than 0.47% each	6.17%	Others- less than 0.34% each	2.87%	Others- less than 0.14% each	2.04%
Ec. Dimension: weight	37.98%	Env. Dimension: weight	26.81%	Social Dimension: weight	35.20%

Table 3. The top 10 factors in each dimension and their respective weights (all industries combined).
Source: authors' calculations

6. Conclusions

In this paper, the authors present a framework for measuring the CSP that is based on RobecoSAM's methodology (2015; 2016a) and the Dow Jones Sustainability Index. CSP is a multidimensional construct that has three dimensions (economic, social and environmental), each of which has a specific weight in the final measurement of CSP. Moreover, the weight of each dimension varies by industry.

We found that the weight of the economic dimension ranges from 23% (the coal and fuel industries, the linear aggregation method and the metal and mining industry) to 51% (Software, IT services, and Internet services), with a weighted average of 37.98% for all industries combined. The weight of the environmental dimension ranges from 10% (the pharmaceutical and biotechnology industries and healthcare equipment and supplies) to 40% (electric utilities and water services sectors), with a weighted average of 26.81% for all industries combined. Finally, the weight of the social dimension ranges from 25% (the semiconductor industry) to 51% (hotels, tourist resorts and cruise lines), with a weighted average of 35.2% for all industries combined. Each dimension is measured by a specific number of individual indicators or factors whose weights were collected from RobecoSam (2015). In total, there are 91 factors (37 economic factors, 27 social factors and 27 environmental factors) that must be measured. Their number and respective weights vary by industry. The top ten factors in each dimension (all industries combined) and their average weights are presented in Table 3. The scholars who wish to use this framework, should measure each indicator score (or variable) for firms in their sample and then make a transformation of data by using normalization methods, additive aggregation methods or an ordinal scale.

Usually, researchers use non-homogeneous samples (composed by firms that operate in different industries) to study the relationship between CSP and CFP. They cannot use raw data from RobecoSam. Instead, they could use the average importance coefficient of each factor, as calculated by the authors (weighted average, AV, see example in Table 3) and our equations to calculate the value of each CSP dimension. The authors will provide, on request, to all

researchers, the full set of values from which a sample is presented in Table 3. Alternatively, researchers who are able to directly assess the economic, social and environmental components of the CSP for companies composing their respective samples, could use our results in Table 4 and our equations to calculate CSP. Moreover, as our results show, any attempt to quantify CSP on the basis of arbitrary measures, without taking into account these specific factors for each industry and their weights, will produce biased results. Consequently, the specific sections of our database, for specific industries, can be obtained on request by a researcher who wishes to use a homogeneous sample.

This research is a work in progress and continues to evolve. The authors are working presently to put this framework to the test by using a sample of Nord-American firms in a specific industry. For each firm in this sample, the data for the measurement of the CSP have been collected by using this framework. The collected data will then be used to study the relationship between CSP and CFP.

Weights (in percentage)	We	Wen	Ws	**Weights (in percentage)**	We	Wen	Ws	**Weights (in percentage)**	We	Wen	Ws
AIR: Airlines	44	26	30	GAS: Gas Utilities	36	36	28	TCD Trade & Distribution	43	19	38
ALU: Aluminum	25	34	41	HEA: HealthCare Providers	38	14	48	TEX Textiles, Apparel & Luxury	38	21	41
ARO: Aerospace & Defense	41	24	35	HOM: Homebuilding	30	36	34	THQ Computers & Peripherals	41	30	29
ATX: Auto Components	27	37	36	HOU: Household Products	48	20	32	TLS Telecommunication Services	44	21	35
AUT: Automobiles	34	31	35	ICS : Commercial Services	35	26	39	TOB Tobacco	41	23	36
BLD Building Products	38	32	30	IDD: Industrial Conglomerates	39	31	30	TRA Transportation and infrastructure	29	28	43
BNK: Banks	41	23	36	IEQ: Machinery and El. Equipment	39	30	31	TRT Hotels, Resorts & Cruise	26	23	51
BTC: Biotechnology	46	10	44	IF: Life Sciences Tools & Services	45	10	45	TSV IT & Internet services	51	21	28
BVG: Beverages	46	26	28	INS: Insurance	35	26	39	FRP Paper & Forest Products	27	38	35
CHM: Chemicals	36	32	32	ITC : Electronic Equipment.	39	31	30				
CMT: Communications Equip.	40	31	29	LEG: Leisure/ Consumer Electronics	41	30	29				
CNO : Casinos & Gaming	43	16	41	MNX: Metals & Mining	23	36	41				
COL: Coal & Consumable Fuels	23	36	41	MTC : Health Care Equipment	48	10	42				
COM: Construction Materials	32	36	32	MUW: Multi and Water Utilities	32	40	28				
CON: Construction & Eng.	30	38	32	OIE: Energy Equipment & Services	33	27	40				
COS: Personal Products	48	20	32	OIX: Oil & Gas	37	30	33				
CSV: Diversified Consumer Serv.	48	17	35	PIP: Oil & Gas Transportation	34	28	38				
CTR: Containers & Packaging	36	32	32	PRO: Professional Services	41	19	40				
DHP: Household Durables	46	25	29	PUB: Media	45	15	40				
DRG: Pharmaceutical and biotech.	45	10	45	REA: Real Estate	25	39	36				
ELC: Electric Utilities	32	40	28	REX : Restaurants & Leisure	36	19	45				
ELQ: Electrical Comp. & Equip.	38	31	31	RTS: Retailing	47	24	29				
FBN: Diversified Financial Serv.	41	23	36	SEM: Semiconductors	40	35	25				
FDR: Food & Staples Retailing	37	32	31	SOF : Software & related services	51	21	28				
FOA: Food Products	41	29	30	STL: Steel	26	34	40				

Table 4. The importance coefficient (the weight) of each dimension of the CSP, for each industry
Source: authors' calculations based on RobecoSam methodology (2015; 2016 a, b)

Acknowledgments/ Co-authorship

Camelia Dumitriu wrote the article, made the conception and design of the study and database, and designed the equations. Rachid Moustaquim conducted a review of the literature on the subject, collected the data, realized the database, and performed the calculations based on the predetermined equations - as part of his doctoral thesis (in progress). Both authors contributed to the analysis and interpretation of the data, and agreed on the final version of the manuscript.

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