



# How to resolve audit matters in European Affairs? Introduction to a sustainable management accounting under IAS 37

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## Abstract

Concerns regarding the development of environmental accounting have been around for decades. This work is an update to some of the previous questions around the development of ecological accounting to see how this has changed over the last two decades. Specific findings from the paper analysis include ecological management accounting, “cost of decommissioning” (IAS 37) requires a fundamental change to organization management, different values exploring relationships such as corporate governance, inclusive of the living and physical world, with a longer time horizon, and a centrality of external factors. Environmental accounting is a more commonly used synonym for ecological accounting, though this term is distinct and does not cover many of the ecological challenges. In terms of corporate governance, the board of directors (BoDs) is the main responsible structure in meeting and safeguarding both shareholders and stakeholders’ interests. Integrated reporting’s primary aim is to improve information quality provided to shareholders while responding to stakeholders’ interests and needs. Using lenses of stakeholder theory, this study explores the relationship between board of directors’ characteristics as size, gender diversity, Return on Decommissioning Asset, outside directors, number of executive committee and, using a self-constructed Performance Disclosure Index. Applying a content analysis method, data were collected from integrated reports to determine the self-constructed disclosure index. Through quantitative analysis, we analyzed which BoDs’ characteristics are correlated to disclosure index. The analyzed sample was formed of 100 integrated reports produced by 27 European members states, published on the website for the period 2016–2020. The current study contributes to existing knowledge by exploring the voluntary adoption of integrated reporting using quantitative analysis and focusing on the European context. The obtained results highlight that integrated report alignment levels is directly correlated with the proportion of outside directors on the board and Return on Decommissioning Asset.

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Keywords: Accounting; Corporate governance; Ecological; Environmental; Integrated reporting; Sustainable development

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## 1. Introduction

This research sets out to explore how far ecological management accounting; the business community over the last two decades has developed an interest in external factors, broadly termed as social and environmental concerns (Van der Stede, 2012, 2015). The development of frameworks such as Integrated Reporting and narrative reporting guidelines have increased

the reporting on and accountability of organizations to these issues (Umar et al. 2020). This paper is exploring how far this move has developed in terms of ecological management accounting over the last two decades. This work starts with a challenge to the concept of environmentally concerned businesses, drawing a wider ecological view of the issues and business concerns (Corvo et al. 2021). In doing so, one central issue is whether the business community can carry on with small changes and become ecological enterprises, or whether this requires a significant and fundamental change in organizations to shift the focus to achieve a more ecological balance (Alexis 2017). This can be seen as a move towards relationships and away from the discrete object system that underpins much of accounting theory. More recently there have been additions to this discussion with a subsequent call as to the current state of affairs with sustainability, and the macro picture of ecological catastrophe that may be around the corner. The prevailing notion is that businesses have argued all is fine and, that under the term ‘sustainable business’, they are tackling environmental concerns (Biancone et al. 2020). This argument can be developed, and several models used to explore the permutations. There are some different ways that the environmental issues can be resolved.

So, an important sub-question is how these do (or do not) cross into the boundary of what can be defined as ecological accounting? In the end, is this a reflection on a business and whether becoming more environmental and sustainable is leading to an ecological business model and or is this something else? This paper is, in effect, updating this discussion to explore how far the notion of ecological management accounting has come over the last twenty years (Birnberg 2000). It is important to stress that terms such as environmental and sustainability have become commonly used and synonymous in the business community (Biancone et al. 2018). Previous discussions on ecological accounting have highlighted the care that must be taken to ensure these terms are not conflated in and with the ecological term and concepts and in exploring this to highlight where there are differences and how this is moving forward the discussion and debate on ecological business (Ashraf 2019). Both have covered social and environmental concerns in the accounting field over the 20 years but to what extent and specifically can this be connected back to the ecological debate? (Hopper & Bui 2016) The difference in this work is that it has a specific focus on one topic area, environmental accounting.

## 2. Literature Review

The activity of internal auditors, and the processes and control systems they deal with, are not predicabile *ex ante* and are depicted contingently, they cannot rely on a “one-size-fits-all” procedure, but need to be adjusted to the specific context of a specific firm at a specific time. That said, management accounting as a discipline is able to identify specific procedures, which can better match specifically defined situations in which the organization may be involved (Bocken, Short, Rana & Evans 2014).

According to contingency theory, situational factors (or contingent or contextual factors) influence the design of the management accounting system, while organizational performance and effectiveness depend on the quality of fit of the management accounting system, when designed *ad hoc*, and the specific situational factors that activated it (Chapman 2006). These characteristics of the discipline make it difficult to undertake big numbers-based empirical studies, as each organization is unique and the potential situational factors are infinite and nested with each other, while the effectiveness of the fit between the management accounting system and the situational factors is often not easily measurable.

The external environment and its level of uncertainty are relevant situational factors, related to change in the environment, which occur unexpectedly, such as the financial crisis of 2008 (Secinaro, Brescia, Calandra & Biancone 2020). When the conditions under which the firm operates are more stable, the external environment will be considered as more certain (Eckles, Hoyt & Miller 2014).

On the contrary, dynamic conditions are the premise for an uncertain external environment. It is documented that firms operating in a more stable and certain environment adopt a formula-based approach to the measurement of management accounting systems effectiveness, whereas firms operating in a dynamic and uncertain environment adopt a subjective approach to performance evaluation. In the current situation, a formula-based approach, which presupposes the meeting of targets, will easily fail if the uncertain dynamics of the environment make the targets inappropriate.

Uncertainty is also correlated with the level of sophistication of the management accounting system, given that a certain external environment needs only internal, financial and historical information, whereas an uncertain external environment will require a more sophisticated management accounting systems, which can also gather information that is external, less financial and future-oriented, as well as generally requiring decentralization in the organizational (and decisional) structure.

The competitive strategy adopted by the firm is also a situational factor, which is able to shape the management accounting systems. A low-cost competitive strategy will require a formula-based approach, requiring significant attention paid to cost

control mechanisms and frequent and detailed quantitative reports on performance. On the other hand, a differentiation strategy will control costs less effectively and be mainly focused on non-financial measures of performance.

Sustainable destination can then appear in their holistic vision, as integrated, adaptive socio-ecological system (Clarke 1997).

These are the elements that will be discussed:

- a. destination as an integrated systems;
- b. destination as a social system;
- c. destination as a socio-ecological system;
- d. destination as an adaptive system.

In this context, the stakeholder theory is also employed to explain stakeholder relationship in business belonging to different sectors, including the tourism sector. The theory can contribute to regulating relationship between tourism actors at the destination level. In particular, the principles of the theory are considered more significant in the case of destinations involved in sustainable tourism development, due to the role stakeholders should play. Indeed, as described in previous paragraphs, international and European sustainable tourism organizations consider the involvement and the commitment of all stakeholders in planning and in the decision-making process at the destination level as a fundamental step in sustainable tourism development (Fischer 1995).

Many studies aim to identify stakeholder of tourism. Sautter and Leisen (1999), refer to workers, local enterprise, residents, tourists, public administrators, competitors, activists and international chains as the stakeholders involved in tourism planning at a destination level. Ryan (2002), considering potential stakeholders of an hypothetical tour operator in an hypothetical destination, identifies government, travel agencies, local administrators, accommodation enterprises, natural and urban environment, workers, brokerage houses and other special interest groups. Currie (2009) considers the Mitchel (1997) categories and identifies local indigenous enterprises as dormant stakeholders, fishing and sailing enterprises as discretionary stakeholders, the water managing authority as demanding stakeholders, governmental authorities as dominant stakeholders, tourism and accommodation enterprises as dependent stakeholders, environmentalists as dangerous stakeholders, and natural resources managing enterprises as definitive stakeholders. Byrd (2007) selects the current and potential community and tourists as the stakeholders principally involved in sustainable tourism development at the destination level.

According to the traditional approach, the interests of the three stakeholder groups are incompatible. For example, actions aimed at the maximization of business profits could cause damage on the natural environment. Expectations of workers could be conflicting with business profit objectives. Environmental associations and local authorities could conflict in the management of natural resources.

However, according to a different perspective, stakeholders interests can be considered complementary. In destinations focused on tourism development, and especially sustainable tourism development, business cannot pursue economic goal that negate the efforts to safeguard the natural and cultural environment. This is because natural and cultural attractions represent the core of tourism products and the most interesting destination features for tourists

### 3. Methodology

Empirical research conducted in order to understand the characteristics of the financial statement disclosure concerning decommissioning funds in listed European non-financial companies (significant amounts exceeding 1 million euro of decommissioning funds) for the years 2016-2020 for the 27 member countries of the European Union (Stoval, Higham & Stephenson 2019). We voluntarily excluded banks, insurance companies and other financial companies from the analysis due to the wide existing regulatory differences and the peculiarities of the typical activities of these companies.

From the reading of the financial reports it emerges that in the section dedicated to the presentation of the accounting principles adopted, the non-financial companies report the letter or in any case the indications provided by the accounting standard IAS 37 although only some companies make explicit reference (Baxter & Jack 2008).

For these reasons, the purpose of the research is to verify how the information contained in the accounting documents is managed with the relative level of transparency provided about the characteristics that determine the values of the items in question (Currie, Seaton & Wesley 2009) (Table1).

Table 1. Data sampling of European business corporation with cost of decommissioning.  
Materiality: substantial amounts exceeding 1 million euros.

European Members	2016	2017	2018	2019	2020
Austria	1	1	0	1	1
Belgium	3	4	2	2	2
Bulgaria	4	3	3	4	3
Croatia	4	5	4	3	4
Denmark	2	1	1	1	2
Estonia	1	1	0	0	1
Finland	1	1	0	0	1
France	13	14	17	15	16
Germany	15	17	23	19	20
Greece	2	0	0	0	1
Ireland	3	1	1	0	1
Italy	12	16	17	20	18
Netherlands	4	2	2	2	2
Poland	5	3	2	5	3
Portugal	6	8	7	6	7
Czech Republic	3	3	2	2	2
Romania	3	3	2	3	2
Slovakia	1	0	0	0	0
Slovenia	1	0	0	0	0
Spain	10	11	12	12	9
Sweden	3	3	3	2	3
Hungary	3	3	2	3	2
Other	0	0	0	0	0
<b>Total Annuals Reports</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: Author's elaboration on European Commission data set.

The quality of the external information regarding the provisions for risks and charges relating to the dismantling of plants, the repurposing of sites and reclamations in the financial statements of the 100 listed companies is rather heterogeneous (Battaglia 2011). It can certainly be said that if the disclosure required by the accounting principle were expected by the companies in a complex manner, there would certainly be an improvement in the level of transparency. Below is an example of a summary checklist for the Italian context which highlights the information required by the accounting standard with its presence in the financial statements being researched (Table 2).

Table 2. Summary of empirical evidence of disclosure for cost decommissioning: Italy checklist 2016

IAS 37 indications	Presence of information	
	Yes	No
<b>84. For each class of provisions, the company must highlight:</b>		
a) the book value at the beginning and end of the financial year;	29	0
b) the additional provisions made during the year, including increases to existing provisions;	23	6
c) the amounts used (ie costs incurred and charged to the provision) during the year;	22	7
d) amounts not used and reversed during the year;	11	18
e) the increases in the discounted amounts that occurred during the year, due to the passage of time, and the effect of any change in the discount rate.	11	18
<b>85. The company must indicate for each class of provisions:</b>		
a) a brief description of the nature of the obligation and the expected timing of the resulting outlay;	11	18
b) an indication of the uncertainties relating to the amount or timing of such disbursements. Where it is necessary to provide adequate information, the company must highlight the main assumptions made about future events.	6	23
c) the amount of any compensation provided, specifying the amount of each asset recognized for the expected compensation.	0	29
<b>86. Unless the likelihood of engaging any resource to settle the obligation is remote, the company must disclose for each class of contingent liability at the reporting date a brief description of the nature of the contingent liability and, where feasible:</b>		
a) an estimate of its financial effects,	0	29
b) an indication of the uncertainties relating to the amount or timing of each disbursement; is	0	29
c) the probability of each indemnity.	0	29

Source: Author's elaboration

The table highlights the lack of information required by paragraph 86 regarding contingent liabilities. The reader of the financial statements cannot be certain either that the company is not exposed to potential liabilities or that these, although they exist, are not indicated (Castellani & Sala 2010).

By categorizing the indications present in the accounting standard, it is possible to reach the following groupings:

- a. indications of paragraph 84: quantitative information expressed with numerical values and through the use of tables.
- b. indications of paragraph 85: information of a descriptive nature that can be expressed in discursive form.

c. indications in paragraph 86: information on elements that are not reflected in the numerical values of the financial statements.

This categorization allows us to identify, in summary, how the information reaches a good level of transparency regarding the formation and variations of the elements that are represented by numerical values. Lower levels of information concern the description of the phenomena that generated the values that feed the financial statements (Bryman & Bell 2007). Finally, an even lower level of disclosure can be found in all the elements that are not reflected in the book values.

Once the results of the empirical analysis have been summarized in an aggregate manner, the understanding of the level of transparency in the financial statement disclosure concerning the decommissioning funds can be carried out through the construction of a transparency index (Cook & Reichardt 1979). Although it is generally recognized that information transparency is an abstract concept, difficult to measure and undermined by the subjectivity of the researcher in the appreciation of phenomena, in the context of empirical research the use of these indices is widely used. This is due to the fact that the indicators are capable of giving a representation of the observed phenomenon which, although it does not exist in reality, can still be appreciated. In order to limit the subjectivity inherent in the choice of variables to be considered in defining the indicator, it is considered appropriate to include only the information required by IAS 37 and reported in the paragraphs indicated above (Acar & Ozkan 2017). For the study it is considered appropriate to construct two indicators. The first having as variables the information required by the accounting standard, each considered with the same importance as the others in defining the level of transparency (Corbetta 2003). This indicator allows to minimize the subjectivity of the researcher regardless of any consideration regarding the relevance of the researcher's subjectivity regardless of any consideration regarding the relevance of each single element. The second considers the same variables but attributes a different weight to each of them due to the subjectivity inherent in the sensitivity of the writer (Le, P. T. A. 2019).

Below is the first unweighted disclosure index used, which is based on the presence of the elements required by the accounting standard in paragraphs 84, 85 and 86.

Unweighted disclosure index

$$= 1/11\ 84a + 1/11\ 84b + 1/11\ 84c + 1/11\ 84d + 1/11\ 84e + 1/11\ 85a + 1/11\ 85b + 1/11\ 85c + 1/11\ 86a + 1/11\ 86b + 1/11\ 86c$$

The attribution of an equal weight to all variables, although it reduces the subjectivity of the researcher in attributing different weights, implicitly assumes that each variable has the same relevance for the reader of the report. This assumption, although it may not be completely correct, at the same time it could be less incorrect than the attribution of a different weight to the individual variables due to the subjectivity of the evaluator.

In the doctrine, there are different possibilities for attributing weight to variables. In particular, the criterion of distinction is used in two main types:

a. specific variables of the issuing company, corporate variables, which depend on the choices made by the company and which an investor can only become aware of through the information provided by the company;

b. market variables, publicly available, from which the reader of the financial statements can learn through alternative instruments to the financial statements.

This distinction therefore makes it possible to attribute greater weight to company variables, information that is characterized by having the specific company as the only supplier of these elements (Brasini 2010). In the context of liabilities, the elements referred to by the accounting principle are characterized by exclusively relating to company-type variables and therefore the possibility of distinguishing the weights based on this classification is precluded. It is therefore necessary to identify possible solutions in order to distinguish the relevance of the multiple information requested.

For this purpose, it is possible to distinguish how the information required by paragraphs 84 and 85 represents charges whose probability of occurrence is judged by management as high unlike those required in paragraph 86 and relating to charges whose possibility of future manifestation is remote. From this point of view, at least double importance can be attributed to the elements referred to in paragraphs 84 or 85 with respect to those indicated in paragraph 86 (Creswell 2013). In consideration of the fact that the quantitative information required by paragraph 84 may allow the reader to be more aware of the numerical values only if supported by an adequate description, it is believed that the information required by the two paragraphs can be attributed the same importance. The reasoning illustrated leads to attribute a weight of 0.4 to the information required by paragraph 84, of 0.4 to that required by paragraph 85 and, finally, of 0.2 to that referred to in paragraph 86 (Cook & Reichardt 1979). At this point it is necessary to identify within each paragraph of the weights based on the most basic information required. Also in this circumstance it is important to consider the trade-off between desired objectivity and sensibility of the evaluator. Based on the assumption that the elementary variables mentioned contribute to the definition of the information transparency of the same aspect, it is particularly complex and risky to attribute different weights.

On the basis of the reasoning described, it is considered reasonable to attribute the same weight to each variable referred to in the same paragraph.

Weighted disclosure index  
 $= 4/10 ( 1/5 84a + 1/5 84b + 1/5 84c + 1/5 84d + 1/5 84e) + 4/10 ( 1/3 85a + 1/3 85b + 1/3 85c) + 2/10 (1/3 86a + 1/3 86b + 1/3 86c)$

The index reported considers the information required by the accounting standard in paragraphs 84 and 85 as equally relevant in the definition of a transparency standard and overall suitable for the definition of 80% of the level of disclosure due to the presence of the individual elements mentioned.

The information required by paragraph 86, due to the remote probability of occurrence, is therefore suitable for defining 20% of the level of disclosure due to the presence of the individual elements referred to in the paragraph (Table 3).

Table 3. “Unweighted” disclosure index by macro sector: year 2016

Sector	Average paragraph 84	Average paragraph 85	Average paragraph 86	Overall average
Consumer services	0.389	0.000	0.000	0.399
Industrials	0.323	0.043	0.000	0.363
Oil & Gas	0.233	0.019	0.000	0.309
Tecnology	0.183	0.000	0.000	0.189
Telecommunications	0.132	0.000	0.000	0.189
Utilities	0.289	0.043	0.000	0.333

Source: Author’s elaboration

Once the disclosure indicators have been defined as illustrated above, it is possible to quantify the average value of the index for each macro-sector, divided between the paragraphs of the accounting standard where such information is referred to (Table 4).

Table 4. “Weighted” disclosure index by macro sector: year 2016

Sector	Average paragraph 84	Average paragraph 85	Average paragraph 86	Overall average
Consumer services	0.343	0.000	0.000	0.343
Industrials	0.283	0.059	0.000	0.443
Oil & Gas	0.256	0.027	0.000	0.283
Tecnology	0.161	0.000	0.000	0.163
Telecommunications	0.161	0.000	0.000	0.163
Utilities	0.253	0.067	0.000	0.319

Source: Author’s elaboration

The differences in the statistical results obtained from the application of the two different indices are summarized below (Table 5).

Table 5. Results of financial statement disclosure performance index (ID (1;2): weighted and unweighted index: year 2016

Statistical Quantities	Weighted index 1	Unweighted index 2
Average	0.336	0.329
Std. Dev.	0.019	0.017
Median	0.343	0.273
Minimum	0.081	0.091
Maximum	0.533	0.545
Q <sub>1</sub>	0.243	0.273
Q <sub>2</sub>	0.443	0.455

Source: Author's elaboration

This study aims to outline a modeling system to measure sustainability and the aggressiveness of European corporate governance in non-financial companies, concerning activity and analysis of decommissioning asset with environmental issues. Hypothesis testing (Table 6) uses the following design sustainability research model:

$$ID(1;2) = \beta_0 + \beta_1 (\text{Size}) + \beta_2 (\text{Gender Diversity}) + \beta_3 (\text{RODA}) + \beta_4 (\text{Out-side Director}) + \beta_5 (\text{Number of Executive Committee}) + \xi$$

Table 6. Framework and hypotheses

Independent Variable	Previous Studies of Irrituals Rites	Expected Sign	Evidence
Size	(H <sub>1</sub> ). Companies having larger boards issue integrated reports that have a higher alignment level to disclosure index (ID). BoDs' monitoring capacity increases with the number of its constituting directors, a benefit that might be surpassed by the disadvantages related to inadequate communication and inefficient decision-making process, specific for large groups (Andriotis 2018). After reaching a specific size, the larger the board is, the	+	



	<p>more ineffective it becomes. A board larger than 7–8 members is less likely to function effectively, diminishes its monitoring capabilities, and is much easier to be controlled by the CEO. Board size positively impacts the integration of various reports, whether mandatory or voluntary, influencing ID<sub>(1;2)</sub> voluntary adoption and dissemination of integrated CSR (Jones, Atkinson, Lorenz &amp; Harris 2012). Larger boards, being formed of more experienced and knowledgeable directors, can deal with integrated report preparation, playing a central role in the integrated reporting process. Environmental performance and disclosure are higher for companies with larger boards, where a larger board increases the probability of having the required expertise and diversity to enhance environmental performance (DeNichilo 2020c).</p>		Log(Asset)
Gender Diversity	<p>(H<sub>2</sub>). Companies with higher board gender diversity issue integrated reports that have a higher alignment level to disclosure index (ID).</p> <p>BoDs should be composed of an appropriate mix of independent directors having relevant knowledge, competence, and industry experience to bring a diverse perspective and take objective decisions, enabling their preferential access to outside and additional resources, broader social networks, and build new business relationships (Arena et al. 2010). Board diversity is closely related to board composition, as group diversity can improve the quality of the decisions in that group, and can be referred to gender, age, nationality, cultural background, and educational attainment. Environmental performance is higher for firms having a board composed of more legal experts and active CEOs. Moreover, companies that have a more significant proportion of Western European directors record higher Environmental Corporate Social Responsibility (ECSR) governance mechanisms, while those with a higher number of colored directors report a higher quality of the integrated report. Companies should disclose their diversity policy (including gender, ethnicity, cognitive, and social) regarding senior management and board, reporting on diversity with measurable</p>	+	Dichotomous variable (0/1)

	<p>targets and the progress made (Baltaretu 2011). Regarding gender, it is considered that men and women have different moral reasoning, women using more care reasoning and protective attitudes. The presence of women directors on boards positively impacts the integration of various reports, whether mandatory or voluntary, while ID<sub>(1;2)</sub> quality is higher for companies that have more women directors.</p>		
Return of Decommissioned Assets	<p>(H<sub>3</sub>). Companies that have a higher profitability of decommissioning asset have a lower alignment level to ID.</p> <p>The profitability is one of significant determinants of financial reporting disclosure of decommissioned assets (DeNichilo 2020 (a) and (b)). Companies with high levels of profitability of decommissioned assets improved influence in investor decision and have more interesting stakeholders, so there is a lower propensity of performance index ID.</p>	-	Return on Decommissioning Asset (RoDA)
Out-side Director	<p>(H<sub>4</sub>). Companies that have a higher proportion of outside directors on the board issue integrated reports that have a higher alignment level to ID.</p> <p>Board composition and independence are closely related, the last one increasing with the proportion of independent outside directors (Chenhal &amp; Morris 1985). The presentation of CSR information is impacted by outside directors, meaning that they have a role in ensuring that companies take into consideration the interest of their shareholders and stakeholders. Board independence is closely linked to independent non executive directors' presence, which should be in the majority. Companies having a board formed in majority by independent non executive directors record higher levels of voluntarily disclosed information and voluntarily disclose more strategic and forward-looking information. Moreover, boards formed in a higher proportion of outside directors have greater control over management's decisions and improved monitoring effectiveness (Modica 2012). Outside non executive directors are more objective and independent when managing and analyzing a company's actions than executive directors, offering additional assurance to market participants that their interests are safeguarded</p>	+	Dichotomous variable (0/1)

	and reducing the agency costs (Stoval, Higham & Stephenson 2019). The integrated report quality is higher for companies that have more nonexecutive directors.		
Number of Executive Committee	(H <sub>5</sub> ). Companies that have a more active board issue integrated reports that have a higher alignment level to ID. Board activity has contrary views an active board with more meetings can be interpreted or viewed as inefficient, while others believe that more board meetings enable directors to supervise the company better (Buckley 2012). By having more meetings, the board can debate, analyze, and decide on a broader range of topics, including the information included in the integrated report.	+	Number

Source: Author’s elaboration

## 4. Results

The study analyzes the characteristics and determinants of the sustainability index on investment projects with cost of decommissioning. First we see the results of the descriptive analysis of the sustainability model of the projects (Tables 7 and 8). Next we present the results of multivariate analysis (Tables 9, 10 and 11).

Table 7. Descriptive statistics of independent variables

Variable	Mean	Std. Dev	Min	Max
Size	25.95	4.25	10.75	44.88
Gender Diversity	0.44	5.33	0	1
Return of Decommissioned Assets	4.55%	0.99	-17.55%	10.33%
Out-side Director	0.55	6.55	0	1
Number of Executive Committee	7.88	1.25	3	12

Source: Author’s elaboration

Table 8. Descriptive statistics ID<sub>(1;2)</sub> index from 2017 to 2020

Variable	Mean ID <sub>1</sub>	Std. Dev ID <sub>1</sub>	Min ID <sub>1</sub>	Max ID <sub>1</sub>
2017	0.339	0.021	0.081	0.553
2018	0.411	0.022	0.085	0.552
2019	0.421	0.024	0.089	0.554
2020	0.441	0.023	0.082	0.555

Source: Author’s elaboration

Table 9. Descriptive statistics ID<sub>(1;2)</sub> index from 2017 to 2020

Variable	Mean ID <sub>2</sub>	Std. Dev ID <sub>2</sub>	Min ID <sub>2</sub>	Man ID <sub>2</sub>
2017	0.331	0.019	0.091	0.545
2018	0.333	0.021	0.092	0.549
2019	0.339	0.023	0.094	0.548
2020	0.411	0.022	0.092	0.549

Source: Author's elaboration

Table 10. Multivariate analysis of ID<sub>(1)</sub> model

Model	Coefficient ID <sub>(1)</sub>	T and P Value
Intercepts	1.33	1.75***
Size	1.55	-1.09
Gender Diversity	0.25	1.11
Return of Decommissioned Assets	-1.07	2.22***
Out-side Director	2.22	2.19***
Number of Executive Committee	0.22	1.29
2017	0.01	Dichotomous variable (0/1)
2018	0.01	
2019	0.02	
2020	0.02	
R <sup>2</sup>	0.38	F value 3.33

Source: Author's elaboration

\*, \*\*, \*\*\* p-value at 0.10, 0.05 and 0.01

Table 11. Multivariate analysis of ID<sub>(2)</sub> model

Model	Coefficient ID <sub>(2)</sub>	T and P Value
Intercepts	1.22	2.75***
Size	1.45	-1.11
Gender Diversity	0.22	1.22
Return of Decommissioned Assets	-1.15	3.33***
Out-side Director	2.44	3.55***
Number of Executive Committee	0.44	1.22
2017	0.01	Dichotomous variable (0/1)
2018	0.01	
2019	0.02	
2020	0.02	
R <sup>2</sup>	0.59	F value 2.85

Source: Author's elaboration

\*, \*\*, \*\*\* p-value at 0.10, 0.05 and 0.01

Model 1 is significant (p value 0.01 level) and R<sup>2</sup> is 0.38.

Model 2 is significant (p value 0.01 level), and R<sup>2</sup> is 0.59.

The independent variable that have a significant result (level 0.01) are: RoDA and Out-side Director.

An optimal solution for anticipating uncontrollable factors and mitigating their dangerous effect may be to rely on subjectivity (Power 2009).

Using objective performance measures can lead to the myopic decision to analyze only what is in the numbers and only what was predictable when those objective metrics for performance settled down, which implies the risk of overlooking the relevance of some factors that clearly impact on actual performance. Hence, subjectivity could should affect estimates, while forecasting and budgeting, at the time of control, may have consequential repercussions for the incentive system of the organization (Palermo & Van der Stede 2011).

Subjectivity in performance evaluations unfortunately impose various criticalities. First, subjectivity is expensive, in terms of the time and resources required to assess the evaluation and to investigate the causes of any inefficiency in performance



(DeNichilo 2021b). Moreover, subjectivity creates ambiguity regarding its causes and the fairness of the procedure adopted in the evaluation, as the evaluation itself may be characterized by a series of biases (Power 2007).

## 5. Discussion and conclusion

Several themes emerged throughout the analysis, the first is around terminology and its impreciseness and multiple usages of terms (Torkington Stanford & Guiver 2020). Of most concern is the concept of sustainability, which is seen as a connected, interchangeable, and over-arching concept and, in many ways, has hindered the development of environmental management accounting (Freeman 2001). The concept of ecological accounting has not been used to any note in the period since 2000. Environmental management accounting is more of a favored term and is positioned as separate from sustainability, this may be a clearer way forward (Adams 2020). The use of environmental and accounting can provide a clearer path along which environmental concerns and accounting can be developed. Alongside mainstream accounting research that has become more aware of stakeholders of the firm, more entities need including in the environmental accounting debates (Adelman 2017). The environment cannot speak for itself and operating in an anthropomorphic environment, the concerns and impacts on the voiceless entity will be marginalized (Berke & Conroy 2000). The environmental entity must be central to any debate on ecological development. This means starting with the impact on the environment and working backwards to the organization changing the emphasis allows a clearer ecological standard to be established and not seen as a nice add on (DeNichilo 2021a).

The traditional accounting discipline was settle with the aims of disclosing information on the organization, moving certainty and reliability about business contracts towards the business community. The postmodern view of management accounting discipline clarifies that the certainty of contracts in the business community is hardly believable. The best way to maintain environmental uncertainty is to smooth over the information and the requisites for the accounting of failure. Accordingly, discussions on the organizational performance should move from statements of what happened towards projections on what will happen, supporting the reliability of traditional management accounting systems with a forward-looking strategy of “as-if” planning, thus evolving risks into opportunities.

Finally organizational should equilibrate the instruments adopted to control uncontrollable situational factors and adequately combine objective and subjective instruments for management accounting. Excessive reliance on objective performance metrics leads to business as usual, while new opportunities are missed out on. While, in business life nowadays, there is no room for demonizing objective metrics and relying on a purely subjective approach to evaluations, which would likely be affected by hidden pitfalls and side effects, there is a general call to avoid myopic evaluations and look at performance dynamically, with a continuous approach to management accountants’ role as risk mitigators, while considering risks and financial distress as facilitators for turnaround activity, which is positively centered on innovation.

Further development of these accounting approaches, with an awareness of the factors impacting on the development of ecological accounting, will help shape the development of ecological management accounting into the near future.

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