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Sustainability management evolution: literature review and consolidative model

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Abstract:
Companies, as key actors in society, have been pressured to change the way they do business to integrate sustainability into their daily practices and to disclose their impacts and contributions to sustainable development. In this context, a new organizational competence – sustainability management – related to the way how companies manage and integrate sustainability issues in their core business, becomes relevant. Therefore, to understand how this competence is built or evolve over time is of major importance for their applicability. Sustainability or environmental management evolution is not new, however the extant literature points out that it is still incipient, it does not explain clearly how companies change their environmental stance over time or provide detailed definition or characteristics of each stage. In this context, this paper aims to understand the current state of sustainability management evolution models updating Kolk and Mauser (2002) work; and to present a consolidative evolution model for sustainability management derived from the complementarity of the identified models. We conclude that this is not indeed a consolidated discussion as there is not consensus regarding the type of evolution, the pathway to be followed and the very construct of sustainability.

Keywords:
Sustainability Management; Maturity Model; Evolution; Corporate Sustainability

1. Introduction

Since the last decade, notably, companies as key actors in society have been pressured to change the way they do business to integrate sustainable development principles in their daily practices and to disclose their impacts and contributions to sustainable development (Kolk & Tulder, 2010; Smith & Sharicz, n.d.). As a response, leading companies started to implement actions, and to measure and disclosure their contributions to sustainable development. These companies viewed significant emerging opportunities in this new reality and initiated a proactive move towards the integration of sustainability as a source of competitive advantage, which requires that sustainability be internalized and integrated into all organizational aspects, in the way of doing business (Esty & Winston, 2009; Hart, 2006; C. Laszlo & Zhexembayeva, 2011).

In this context, emerges the relevance of a new organizational competence – sustainability management – related to the way how companies manage and integrate sustainability issues in their core business. In this sense, to understand how this competence is built or evolve over time and which are its main components, is also of major importance. The study of management competence evolution is not new and is very popular, especially the so called maturity models. These models have been employed as tools of education, diagnostic and improvement of several organizational subjects. According to Saco (2008), there are more than 100 models available in various areas such as quality management, project management, knowledge management, etc. Understanding the different maturity levels can help companies to identify where they stand in terms of the evaluated aspect and clarify the steps they should follow to reach better results (Ormazabal & Sarriegi, 2012).

The study of evolutionary change is also relevant to sustainability management and has been discussed for a while. Kolk and Mauser (2002) identified more than fifty models presented before 2000, focused mainly on the evolution of the environmental dimension of sustainability. Despite this relative popularity, the understanding of how companies evolve in sustainability or environmental management is still incipient (Lee & Rhee, 2007; Ormazabal & Sarriegi, 2014). Most models do not explain clearly how companies change their environmental stance over time or provide detailed definition or characteristics of each stage (Lee & Rhee, 2007; Ormazabal & Sarriegi, 2014). Additionally, the wide variety of models highlights a lack of consensus in the extant literature regarding the way sustainability management evolve, their main stages and characteristics.

In this context, the aim of this paper is two-fold: to understand the current state of sustainability management evolution models updating Kolk and Mauser (2002) work; and to present an evolution model for sustainability management derived from the complementarity of the identified models.

The paper is structured as follows. Firstly, some fundamental concepts are discussed briefly in section two and the material and methods employed to carry the research out is section 3. Then, in Section 4 present and discuss the results of the research. Finally, in the last section, we draw the conclusions.

2. Sustainability and Sustainability Management Evolution

The most accepted concept of sustainable development (Baxter et al., 2009) was coined by the Brundtland Report (WECD, 1987, p.8) which claims for a development that “meets the needs of the present without compromising the ability of future generations to meet their own needs”. The main contribution of this pioneer concept lies in the fact that it highlighted that human well-being depends on the health of the environment, in other words, society, economy and environment are inextricably connected. They are three nested and interdependent spheres where the largest is the environment that provides ecosystem services and natural resources, the middle is society and the smallest is the economy (Baxter et al.,

2009). Therefore, sustainable development encompasses three main dimensions: social, environmental and economic. The environmental dimension encompasses the ecosystem wellbeing, which is a "condition in which the ecosystem maintains diversity and quality, its capacity to support all life, and its potential to adapt to change to provide future options" (Prescott-Allen, 2001, p. 7). The social dimension deals with human wellbeing, how to attend human needs and to increase the opportunities of development equally for all (CSD, 2002). In other words, it is about equity and quality of life. Finally, the economic dimension focuses on the wealth creation.

In the organizational context, sustainable development is known as corporate sustainability and no widely accepted definition exists (Roca and Searcy, 2012). The triple bottom line (TBL) concept (Elkington, 1999), which defines sustainability as the equilibrium among environmental protection (planet), economic return (profit) and social development (people), is often employed in this context (Hansen et al., 2009). For Dyllick and Hockerts (2002), it means meeting the needs of company's stakeholders without compromising the ability to meet stakeholders' future needs. Stakeholders are groups affected or that affect an organization e employees, society, customers, suppliers and government (Freemann, 1984) which have a critical impact on organization's long term sustainability (Elkington,1999) as they provide its license to operate. Finally, Delai & Takahashi (2005), after analysing several corporate sustainability concepts, conclude that despite some semantic differences, they turn out to be a translation of the Brundtland concept to the organizational context.

The end result of the integration of sustainable development or sustainability in the company context is the so called "sustainable company" (Hart, 2012). This is a type of organization that operates creating, simultaneously, sustainable value for both shareholders and stakeholders (Dunphy, Griffiths, & Benn, 2007; Hart, 2006; C. Laszlo & Zhexembayeva, 2011). A major change to achieve it is the integration of sustainability in the core business (Dunphy et al., 2007; Hart, 2006; C. Laszlo & Zhexembayeva, 2011). This means that all activities have to embed sustainability concepts, thus, be changed. In other words, it is necessary to develop a new organizational competence - sustainability management – that is the systemic management of sustainability integrated to organizational management systems at strategic and operational levels.

How this competence is constructed or developed over time is the main focus of the evolution models. There are two main types of models focused on sustainability development: continuum and typologies. Continuum models are linear and normative classification schemes that identify a development in time based on the premise that the performance grows along the stages (Kolk & Mauser, 2002). They understand that there is only one linear pathway that all companies follow to the higher levels of the scheme. Thus, they employ the same logic that traditional quality and process maturity models, such as The Capability Maturity Model (CMM). According to this logic, a company can be placed in one stage at time since, theoretically, the stages are mutually exclusive and exhaustive defined based on a sequential set of rules. Despite their popularity, they have been criticized for not representing reality and for being difficult to apply. Typologies, on the other hand, consist of a set of interrelated ideal types (Kolk & Mauser, 2002). They do not provide improvement path and assume linearity but classify companies on different positions according to a combination of attributes. The underpinning logic is that each position of the matrix determines a certain type of outcome or performance (Doty and Glick, 1994). Therefore, they assume that the pathway followed by companies is non-linear depending on their specific circumstances.

3. Material and Methods

This study is a qualitative exploratory research that aimed to understand the current state of sustainability management evolution models, updating Kolk and Mauser (2002) work,

and to present a maturity model for sustainability management derived from the complementarity of the identified models. It was developed in two stages: literature review and model development.

The systematic literature review aimed to understand the current state of sustainability management evolution models and it was developed based on Cooper (2010). To do so, we carried out search in the academic databases Scopus and Science Direct during the first quarter of 2014. Since it was found a previous review carried out by Kolk and Mauser (2002) covering models published until 2000, our search time frame was adjusted to include papers from 2000 in order to complement these authors. We have performed search in the title and/or keyword and /or abstract employing the following strings: sustainability OR environm* OR social OR responsib* or citizenship AND maturity OR model OR evolution OR capability OR stage OR path OR levels. As a result, it was found 33 models whose data was extracted and aggregated to Kolk and Mauser (2000)'s models in an excel spreadsheet, summing up 88 models in total, which are presented in Table 1.

Then, an evolutive model for sustainability management was developed based on the complementarity of 23 models published after 2000 that focused on assessing the three dimension of sustainability.

4. Results and Discussion

This section presents and discusses the results of the literature review in five parts. Firstly, it is presented the general characteristics of the models identified and their development in time. Then, we focus on the concepts assessed, empirical basis and nature of the models. Finally, it is presented an analysis of the stages pointed out by the studied models followed by a summary of the stages and their characteristics developed from the analysis of the identified models.

- General characteristics

According to Table 1 and Fig. 1, several authors have attempted to categorize businesses responses to sustainability issues, more exactly 86 according to our review described in Table 1 (from 2000) along with (Kolk & Mauser, 2002) and (Maon, Lindgreen, & Swaen, 2010) works. The classification discussion started very calmly in the end 60's focusing on social aspects, when Walton (1967) presented the first classification scheme - a six-stage model of corporate attention to social responsibility issues. The discussion remained calm for over 20 years, as only three models were published in this period, concentrated on the social dimension of sustainability. It was only in 1987 that the first model focusing on environmental aspects was presented by Petulla (1987) (Kolk & Mauser, 2002) describing the increasing importance of environmental concerns for businesses. However, it was in the mid 90's that the discussion gained momentum when several models were published discussing corporate responses to environmental issues, and it has been consolidating since the 00's when its scope enlarged to consider sustainability aspects. Despite the fact that the intensity of development has been reduced recently, it is steady around 2 models per year with an increase in the last 5 years to 3 models per year. Therefore, it can be said that there was some degree of consolidation in the field, however, not a consensus as the discussion has increased again in the last five years.

Another interesting aspect found regards the subject focused by the models and its evolution. Around 66% of the classification models identified concentrated on environmental aspects, most of them dating back the 90's when there was an intense development leading to the publication of 24 models in only two years - 1995 and 1996 (42%) - out of 48 presented in this decade. The 2000's saw only 7 models with this emphasis or 21% of all published in this period. On the other hand, sustainability focused classification schemes appeared and were the center of 2000's publications representing around 64% of all models from this period.

Table 1 – An overview of the models identified

	General Characteristics				Criteria				
Author	**Dim**	**Title of the model**	**N**	**Description of stages / positions**	**N**	**Dimensions**	**Nature**	**Type**	**(y**
Porter & Linde (1995)	E	Environmental strategies	3	1 Pollution control, 2 Pollution prevention 3 Resources productivity	n/a	n/a	Ext	Typology	Ye
Hedstrom, Poltorzycki, & Stroh (1998)	S	Sustainable development strategies	5	1 Introverts, 2 Extroverts 3 Bottom-liners, 4 Top-liners 5 Transformers	n/a	n/a		Typology	Ye
Stead & SteadE (2000)	E	Eco-strategies	4	1 End-of-pipe, 2 Pollution Prevention, 3 Product stewardship, 4 Sustainability	n/a	n/a		Typology	
Hoffman (2000)	S	Integration strategies	3	1 Traditional (reactive), 2 Emergent, 3 Sustainable	n/a	n/a		Continuum	
Winn & Angell (2000)	E	Types of greening	5	1 Deliberate Reactive Greening, 2 Unrealized Greening, 3 Emergent Active Greening, 4 Deliberate Proactive Greening	n/a	n/a	Int / Ext	Typology (ideal types)	Ye
Elkington (2001)	S	Sustainability archetypes	4	Locusts, Caterpillars Honeybees, Butterflies	n/a	n/a	n/a	Typology	
Bieker (2003)	S	Sustainability strategies	5	0 Safe (requisite to the others) 1 Credible, 2 Efficient 3 Innovative, 4 Transformative	n/a	n/a		Typology	Ye
Marrewijk & Were (2003)	S	Levels of corporate sustainability	6	1 Pre-corporate sustainability 2 Compliance-driven, 3 Profit-driven, 4 Caring, 5 Synergistic 6 Holistic	n/a	n/a	Int / Ext	Continuum	No
Buysse & Verbeke (2003)	E	Environmental strategy profiles	3	1 Reactive, 2 Pollution Prevention, 3 Environmental Leadership	5	1 Conventional green competencies, 2 Employee skills, 3 Organizational competencies, 4 Management systems procedures, 5 Strategic planning process	Int	Typology	
Chris Laszlo (2003, 2008)	S	The six levels of strategic focus (levels of value creation)	6	1 Risk, 2 Process, 3 Product 4 Market, 5 Brand/ Culture, 6 Business context	n/a	n/a	Int	Typology	N/
Zadek (2004)	CSR	The path to corporate responsibility	5	1 Defensive, 2 Compliant, 3 Managerial, 4 Strategic 5 Civil	n/a	n/a	n/a	Continuum	No

British Standard (2006)	S	Sustainable development matrix	4	From minimum involvement to full engagement	4 (13 x4)	1 Inclusivity (stakeholder engagement and issues identification), 2 Integrity (drivers, leadership, vision and governance, managing risk), 3 Stewardship (culture, capabilities, key management issues, environmental assessment), 4 Transparency (review, reporting and building confidence)	Int / Ext	Continuum	No
Mirvis & Googins (2006)	CSR	Stages of corporate citizenship	5	1 Elementary, 2 Engaged 3 Innovate, 4 Integrated 5 Transforming	7	1 Citizenship concept, 2 Strategic intent, 3 Leadership 4 Structure, 5 Issues management, 6 Stakeholders relationships, 7 Transparency	Int / Ext	Continuum	No
Jabbour & Santos (2006)	E	Evolution of Environmental Management	3	1 Functional specialization, 2 Internal integration, 3 External integration	n/a	n/a	Int	Continuum	No
Robinson, Anumba, & Carrillo (2006)	S	Knowledge management maturity model for corporate sustainability	5	1 Start-up, 2 Take-off 3 Expansion, 4 Progressive 5 Sustainability	n/a	n/a		Continuum	No
Lee & Rhee (2007)	E	Environmental Strategies	4	1 Reactive, 2 Focused (internally), 3 Opportunistic (externally), 4 Proactive		n/a	Int / Ext	Typology	Ye
Soto Delgado (2007)	S	Sustainable development Corporate Strategies	4	1 Reactive, 2 Functional 3 Integrated, 4 Proactive	5	1 Organizational aim, 2 Relationship, 3 Disclosure 4 Leadership, 5 Social and environmental planning process	Int / Ext	Continuum	No
Dunphy et al.(2007)	S	Waves of sustainability	6	1 Rejection, 2 Non-responsiveness, 3 Compliance 4 Efficiency, 5 Strategic Proactivity, 6 The sustaining organization	n/a	n/a	n/a	Continuum / ideal type	Ye lea ph reg
Cagnin et al (2008)	S	Business sustainability maturity model	5	1 Ad hoc, 2 Planned in isolation, 3 Managed with integration, 4 Excellence at corporate level, 5 High performance sustainability net	7	1 Strategy, 2 Partnership 3 Motivation, 4 Competences 5 Communication, 6 Technology 7 Operations	Int / Ext	Continuum (CMM based)	No
Deloitte (2008)	S	Sustainability Maturity Model	4	1 Follower, 2 Mature 3 Leader, 4 Innovator	5	1 Supply Chain, 2 Workplace 3 Workforce, 4 Products, sales & services, 5 Strategy & governance	Int / Ext	Continuum	No

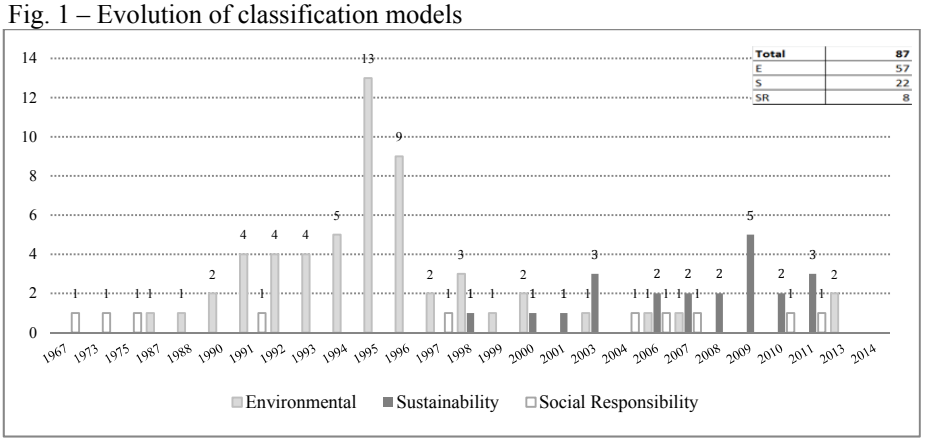
Organisation for Economic Co-operation and Development, (2009)	S	Sustainable manufacturing evolution	6	1 Pollution prevention, 2 Cleaner production, 3 Efficiency, 4 Life cycle thinking, 5 Closed loop 6 Industrial ecology	n/a	n/a	Int	Continuum	No
AMR Research (2009)	S	Sustainability maturity	3	1 Sustainability not in focus (compliance), 2 Tactical sustainability, 3 Strategic sustainability, 4 Authentic leadership	n/a	n/a	n/a	Continuum	n/
Archstone (2009)	S	Corporate sustainability maturity model	5	1 Inactive, 2 Reactive 3 Proactive, 4 Developed 5 Integrated	n/a	n/a	n/a	Continuum	
Atos Origin / SAP (2009)	S	Maturity Diagnostic Tool for Sustainability	5	1 Initial motivations (Compliance), 2 Process development (Corporate social responsibility), 3 Defined strategy (Process change) 4 Managed strategy (Continuous improvement) 5 Optimised strategy (Environmental excellence)	n/a	n/a	n/a	Continuum	
FairRidge (2009)	S	Sustainability Management Maturity Model	5	1 Recognize, 2 Initiate, 3 Pilot 4 Operationalize, 5 Transform	6	1 Strategy, 2 Organization 3 Process, 4 Measurement 5 People, 6 Marketing	Int	Continuum	No
Baumgartner & Ebner (2010)	S	Maturity level of sustainability aspects and sustainability strategies	4	*Maturity levels* 1 Poor, 2 Sufficient, 3 Satisfying, 4 Sophisticated *Strategies* 1 Introverted, 2 Conventional extroverted, 3Transformative extroverted, 4 Conservative 5 Conventional visionary 6 Systemic visionary	n/a	n/a	n/a	Typology	n/
Terra Infirma (2010)	S	Sustainability Maturity Model	5	1 No activity, 2 Lip service 3 Bundle of projects, 4 Management system, 5 Full integration	n/a	n/a	n/a	Continuum	
Maon et al.(2010)	CSR	Stages of CSR	7	1 Dismissing, 2 Self-protecting 3 Compliance-seeking, 4 Capability-seeking, 5 Caring 6 Strategizing, 7 Transforming	3	1 Knowledge and attitudinal dimensions (4) 2 Strategic dimensions (3) 3 Tactical and operational (4) dimensions	Int	Continuum	No

Willard (2009)	S	The 5-stage sustainability journey	5	1 Pre-Compliance, 2 Compliance, 3 Beyond compliance, 4 Integrated Strategy OR 5 Purpose / mission	n/a	n/a	n/a	Continuum	Pa (4
Planon (2011)	S	Sustainability maturity model	5	1 Ad hoc, 2 Experimental 3 Selectively deployed, 4 Formalized, 5 Institutionalized	4	1 Learning, 2 Financial, 3 Processes, 4 People	Int	Continuum (CMM based)	no
CSR Quest (2011)	CSR	CSR capability level	5	1 Defined, 2 Managed, 3 Integrated, 4 Controlled, 5 Optimised	8	1 CSR Risk Management, 2 Human and social capital management, 3 Social innovation and marketing, 4 Regulation Management, 5 CS performance management, 6 Implementation, 7 Stakeholder engagement, 8 CS strategic management	Int /Ext	Continuum (CMM based)	N
Proventive Solutions (2011)	S	Sustainability Maturity Model	4	1 Foundation: Sustainability Reports available 2 Rebuilding: Breakthrough innovative improvements 3 New value chains: Zero waste and no harm performance 4 Balanced systems: Stakeholder driven sustainability	n/a	n/a	n/a	Continuum	No
Ormazábal (2013)	E	Environmental Management Maturity Model	6	1 Legal Requirements, 2 Responsibility assignment and training, 3 Systematization, 4 Eco2, 5 Eco-Innovative products and services, 6 Leading Green Company	4	1 Agents, 2 Policies, 3 Indicators 4 Tools	Int	Continuum	No
Marchi, Maria, & Micelli, (2013)	E	Environmental Strategies	4	1 Beyond compliance leadership, 2 Eco-efficiency, 3 Eco-branding, 4 Environmental cost leadership	n/a	n/a	Int / ext	Typology	

Source: Kolk and Mauser (2002); Maon et al. (2010); The Authors

This reflects the evolution and increasing popularity of this concept from this period onwards. Finally, CSR models were less emphasized since only 10 (11% of all models) were identified throughout the whole period. Their discussion had a momentum in the late 60's and 70's and then came back only in the 2000's second half.

Fig. 1 – Evolution of classification models



Source: Kolk and Mauser (2002); Maon et al. (2010); The Authors

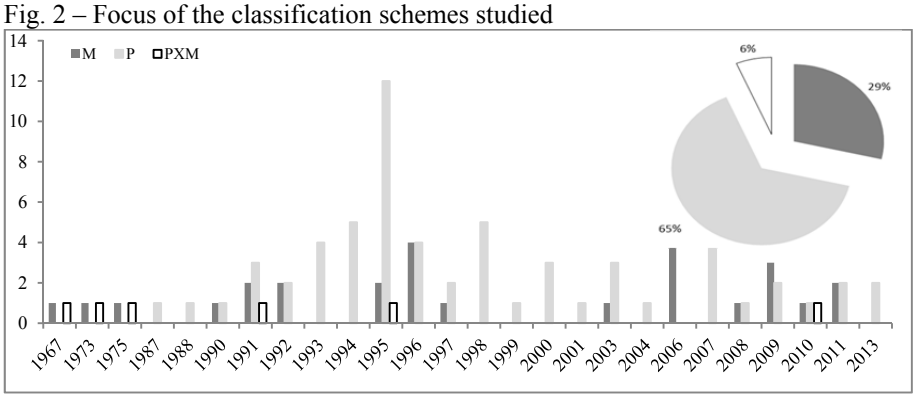
- Sustainability concept

Another aspect analysed was the concept underlying the classification models, which indicates the perception or paradigm employed by each model and how there are operationalized. An analysis of the models' titles (column 3 of Table 1) shows a wide range (26 different terms) of understandings regarding companies' evolution to sustainability and denoting a lack of consensus on how to evaluate or assess this phenomenon. While some analyze companies' strategies (30%), others talk about maturity, stages, levels and evolution (40%), or generations, paths, philosophy, etc. Moreover, it can be noted that sometimes they employ different terms to the same concept turning it difficult to compare or to choose them.

In the same vain, there is a wide range of concepts been employed as the same analysis of titles (column 3 of Table 1) highlights. For instance, regarding environmental aspects there are eight different terms being used sometimes with the sense: environmental problems and environmental challenges, or environmental management, policies and strategy. The same happen with social aspects: corporate social responsibility, corporate responsibility, corporate citizenship and social responsibility. Despite that, it is interesting to note a change in the concept over time. While the models before 2000 focused on the environmental dimension, more recent models emphasize the wider concept of sustainability.

Additionally, in order to generate some useful information regarding the way these concepts are operationalized or assessed, we analyzed classify their subject and focus in two main categories: posture (P) and management (M). This means that either a model evaluates companies' broad attitudes towards sustainability aspects (whether environmental, social or sustainability as a whole) or it focuses on assessing companies approaches and tools employed to manage sustainability, environmental or social aspects. Fig. 2 shows the results of this analysis. It can be clearly noted that the majority (65%) of the classification models analyzed focus on evaluating companies' postures, and that this was the prevailing approach over time. On the other hand, 29% attempt to evaluate how companies manage sustainability aspects and 6% both simultaneously.

Fig. 2 – Focus of the classification schemes studied



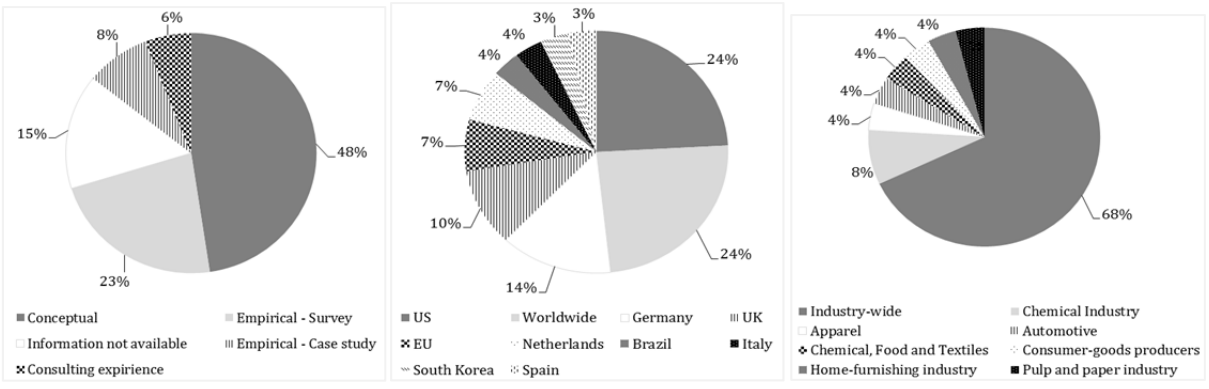
Source: Kolk and Mauser (2002); Maon et al. (2010); The Authors

- Empirical basis

Another very important aspect regards the data base from which the evolution model was developed, which highlights its credibility and applicability. According to part I of Fig. 3, almost half of the classification schemes identified are conceptual, while 38% result from qualitative (case study) or quantitative (survey) academic studies and 6% from the author's consulting experience. Therefore, it can be said that only 38% of the analysed models present more robust basis since they were developed from academic studies that follow scientific standards to ensure results' validity and liability and went through a peer reviewed process.

Additionally, it is vital to understand the range of empirical evidence in order to comprehend the amplitude of realities they were based on. In this vein, parts II and III of Fig. 3 reveal the range of countries and industries from which the empirical evidence of the studied models relate to. It can be said that the evidence employed represent the reality of developed countries since only 4% of the models were based on data from an upper-developed country – Brazil – although 24% claim that they have been created based on a worldwide base. More specifically, it can be said that the empirical evidence reflects mostly the reality of three countries - US, Germany and UK – that account for 48% of the classification schemes identified. On the other hand, it seems that the empirical evidence cover a wide range of industries since 68% claim been based on industry-wide evidence and the remaining from seven different industries.

Fig. 3 – Empirical basis of the classification models analyzed



(I) (II) (III)

Source: Kolk and Mauser (2002); Maon et al. (2010); The Authors

- Nature of the models

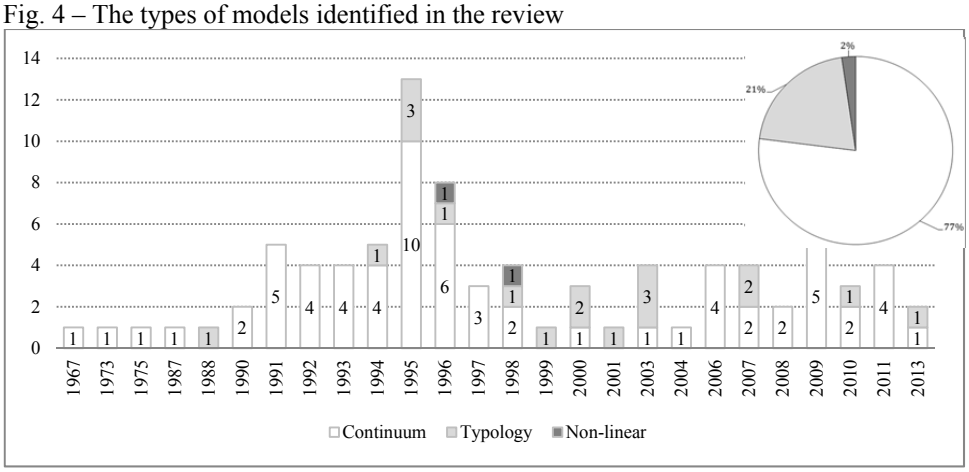
The nature of a model regards its dynamism and paradigm of change underpinning it, which can highly influence the model's applicability and operationalization (Kolk & Mauser, 2002). In this sense, three aspects are discussed: types of model, flexibility and evolution.

Regarding the type of models, there are two main categories of models: continuum and typology (Fig. 4). Continuum models are linear and normative classification schemes that identify a development in time based on the premise that performance grows along the stages (Kolk & Mauser, 2002). They claim that there is only one linear pathway that all companies follow to the higher levels of the scheme. Thus, they employ the same logic that traditional quality and process maturity models, such as The Capability Maturity Model (CMM). According to this logic, a company can be placed at one stage at time since, theoretically, the stages are mutually exclusive and exhaustive defined based on a sequential set of rules. Continuums have been criticized for not representing reality and for being difficult to apply.

Typologies, on the other hand, consist of a set of interrelated ideal types (Kolk & Mauser, 2002). They do not provide improvement path and assume linearity but classify companies on different positions according to a combination of attributes. The underpinning logic is that each position of the matrix determines a certain type of outcome or performance (Doty and Glick, 1994). Therefore, they assume that the pathway followed by companies is non-linear depending on their specific circumstances.

According to Fig. 4, the most popular and older type is the continuum representing 77% of all studied models. However, interesting to note a recent trend toward typologies since in the before-2000 period continuums represented 81% of all models identified and after 2000 this number decreased to 70%. Of course they are still very popular, but this change means that typologies are increasing which can be a response to the drawbacks of continuums.

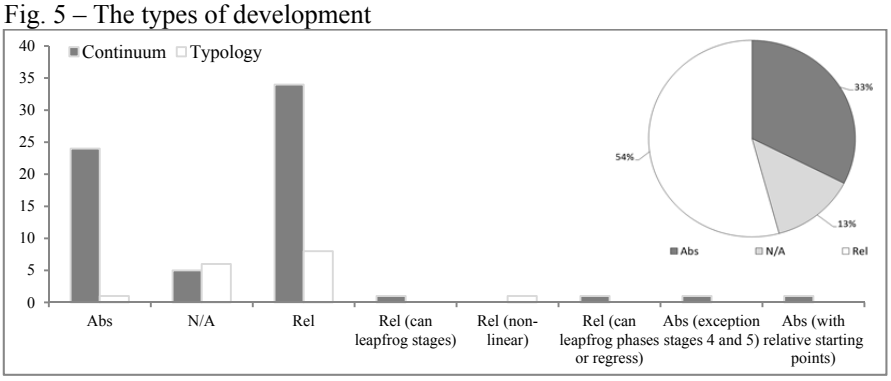
Fig. 4 – The types of models identified in the review



Source: Kolk and Mauser (2002); Maon et al. (2010); The Authors

Another important aspect of stage models is their assumption regarding companies' evolution over time. The types of evolution assumed by the models analysed varies as can be seen in Fig 5. Broadly, development can be understood as absolute (abs) or relative (rel) with some variations. An absolute development assumes that all companies follow the same linear path towards sustainability, while relative that every company has its own path built from the relationship between their idiosyncratic characteristics and their environment (Kolk & Mauser, 2002). Fig. 5 shows that most models studied (54%) considers that companies follows specific paths while 33% a standard one. Typologies typically follow a relative assumption and continuum an absolute. However, an intriguing observation is shown in Fig. 5 that most continuum models understand change as company specific, in other words, relative. This seems contradictory but can be a way to reduce the rigidity of this type of model.

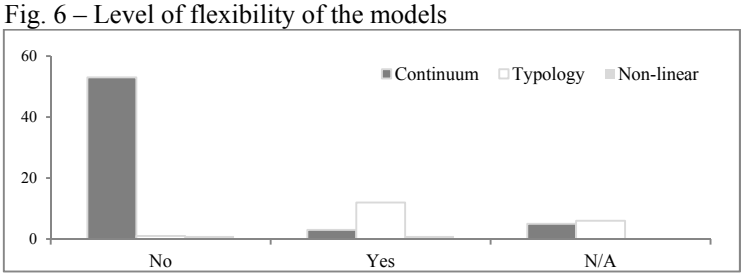
Fig. 5 – The types of development



Source: Kolk and Mauser (2002); Maon et al. (2010); The Authors

Finally, flexibility is the extent to which an organization is supposed to fit exclusively in one stage or not (Kolk & Mauser, 2002). According to Fig. 6, as expected, continuum linear models understand that a company can only be placed in one stage a time (95%) while almost all typologies considers that a company can indeed be represented in more than one classification. An interesting aspect in the continuum model's case is that 3 authors present them as flexible which is contradictory to its underpinning paradigm.

Fig. 6 – Level of flexibility of the models

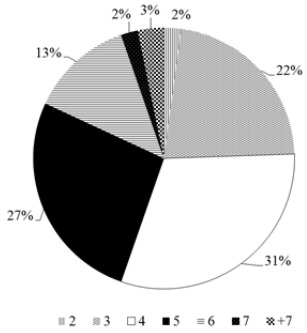


Source: Kolk and Mauser (2002); Maon et al. (2010); The Authors

- Stages and criteria

The rigour of a model can also be assessed by considering the criteria that were used to delineate the stages. According to Fig. 7, the number of classification categories is also an aspect that varies significantly among the models, which denotes the lack of consensus around the way companies evolve, the concept assessed and the different approaches employed. It can be seen that classes range from 2 to more than 7, though the majority (80%) lies between 3 and 5. As a consequence, the description of stages and positions also varies remarkably among the models as can be seen in Table 1.

Fig. 7 – Number of classification stages or categories employed by the models studied

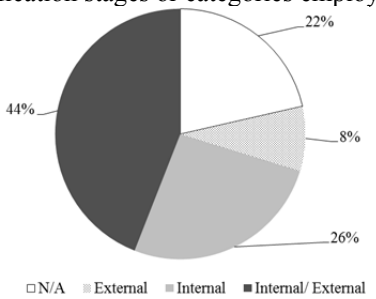


Source: Kolk and Mauser (2002); Maon et al. (2010); The Authors

Another important aspect is the criteria employed to define companies' classification which can be external or internal in nature. Internal criteria indicates that the model evaluates internal process of a company, while external that they are based on the company's business

environment (Kolk & Mauser, 2002). As shown in Fig. 8, the majority (44%) of models employs a combination of internal and external criteria while a significant part does not present this information at all. This is an aspect that impacts significantly on the validity and usability of a model since without this information it is not possible to asses a given situation.

Fig. 8 – Number of classification stages or categories employed by the models studied



Source: Kolk and Mauser (2002); Maon et al. (2010); The Authors

- Evolutionary stages according to the extant literature

As a final result of the literature review, it is presented the evolutionary stages (Table 2) developed from the analysis of the complementarity of the models presented in Table 1.

Table 2 - Evolutionary stages according to the extant literature

Posture	Stage	Characteristics
Rejection	1. Pre-Compliance	*Posture:* Rejection or complete ignorance of sustainability issues
Operational integrantion	2. Compliance	*Posture:* Compliance with environmental and social legislation to reduce risks *Main Characteristics:* ▪ Risk minimization with some initiatives to comply with regulations / stakeholders' ▪ Responsibility of Law and Public Relationship Departments
	3. Ecoeficiency	*Posture:* Cost reduction while minimizing the social and environmental impacts *Main Characteristics:* ▪ Operational and short term focus ▪ Cost reduction and reputation improvement ▪ Punctual and non-systematic modification of products and processes ▪ Main sustainability approach: ecoefficiency
Strategic integration	4. Strategic proactivity - efficiency	*Posture:* Sustainability performance employed to enhance the current competitive advantage (costs or differentiation) to maximize shareholder value *Main Characteristics:* ▪ Green products to enhance current competitive advantage – costs or differentiation ▪ Redesign and creation of green product (ecodesign) with price or quality trade offs ▪ Production paradigm: cradle to grave and life cycle approach ▪ Sustainability issues are integrated into core processes ▪ Environmental management systems ▪ Engagement with primary stakeholders
	5. Strategic proactivity - innovation	*Posture:* Sustainability is completely integrated into the core business and source of competitive advantage. Some ecoefficacy initiatives to maximize sustainable value *Main Characteristics:* ▪ Sustainability is source of competitive advantage through innovation ▪ Sustainability is completely integrated into the core business ▪ Engagement and collaboration with primary and secondary stakeholders ▪ Ecoefficiency concepts are applied to create and modify products and solutions with positive impacts (design for sustainability) ▪ Process, product, organizational and business model innovation ▪ Production paradigm: cradle to cradle
	6. Sustainable corporation	*Posture:* Company is completely integrated into its environment promoting positive impacts at all system levels *Main Characteristics:* ▪ The organization acts as reformer subsystem engaged in promoting sustainability in society as whole

5. Conclusion

This paper aimed to understand the current state of sustainability management evolution models updating Kolk and Mauser (2002) work; and to present an evolution model derived from the complementarity of the identified models. Based on the results presented above, some conclusions and directions for further research can be drawn.

First of all, it can be said that despite the environmental or sustainability evolution has been discussed for a while (since 1967 it was found 87 models), it is not a consolidated discussion as there is not a consensus regarding several aspects. The path companies can

follow to achieve sustainability is not an agreement as the diversity of stages presented by the studied models shows. Nor is the type of evolution, as part of models understands that each company follows its own non-linear path while the majority that there is only one linear path applied to all companies. The very construct of sustainability and its operationalization is still not homogeneous among the models as the diversity of titles suggests (strategies, maturity, stages, levels, philosophy, paths, environmental challenges, management, policies, etc).

Secondly, the models' reliability and applicability can be questioned as only one third was developed based on empirical data from academic studies, which are more reliable as they follow peer-reviewed processes. Additionally, it can be said that even the models based on empirical data reflects only partially the worldwide reality since they were developed from data from few developed countries, mostly US, Germany, UK and European Union.

Despite that, it was possible to develop an evolutionary model based on the complementarity of sustainability based models published after 2000. According to it, companies follow six main stages that are related to three main postures. Firstly, companies reject or ignore completely sustainability issues. Then, they move to a posture of operational integration, where, firstly, they focus to comply with environmental and social legislation to reduce risks and costs, and then, to ecoeficiency to reduce cost while minimizing the social and environmental impacts. From that, they move to a more advanced posture – strategic integration – where sustainability is integrated into strategy and operations in three stages. Strategic proactivity – efficiency, where sustainability enhances the current competitive advantage (costs or differentiation) to maximize shareholder value; strategic proactivity – innovation, where sustainability is completely integrated into the core business and source of competitive advantage; and sustainable corporation, where company is completely integrated into its environment promoting positive impacts at all system levels.

Finally, some directions for future research can be presented. Future research could analyse sustainability management evolution in several companies to identify the type of evolution and similarities among them. In addition, researches focusing non-developed countries would contribute in order to understand any idiosyncrasies. Some case studies or quantitative surveys could also be carried out to evaluate the model proposed in this paper.

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