Ciencias Administrativas Teoría y Praxis
Núm. 1 Año 20, enero - junio 2024, pp. 35-50
DOI: https://doi.org/10.46443/catyp.v20i1.363

Sustainable Development in Management Thinking: Past Contributions, Present Challenges and Future Directions

Desarrollo Sostenible: Contribuciones Pasadas, Desafíos Presentes y Futuros

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Resumen

El objetivo de este artículo es presentar los principales argumentos en torno al concepto de desarrollo sostenible empresarial y describir la influencia que éste ha tenido en las empresas y sus operaciones. Se explica la literatura relevante sobre el desarrollo sostenible, sus desafíos actuales y algunas de las direcciones futuras. La argumentación sugiere que antes de desarrollar campañas verdes en los negocios, todavía hay una serie de cuestiones sin resolver en torno al concepto de desarrollo sostenible. Así mismo, existe una necesidad particular de comprender la motivación real de las empresas para la sostenibilidad. Por ejemplo, a nivel de la industria, el comportamiento de una empresa es un tema complejo de controlar, ya sea a través de parámetros legales preestablecidos o mediante un enfoque voluntario. El interés en las prácticas sostenibles ha creado implicaciones importantes para los gerentes de casi todas las industrias que buscan comprender mejor los argumentos en torno al concepto de desarrollo sostenible y el compromiso que las empresas deben asumir para abordar estos desafíos ambientales. Este artículo contribuye a resaltar los desafíos actuales en torno al concepto de desarrollo sostenible describiendo algunos de los desafíos futuros que enfrentará para brindar una mejor aplicación para las empresas.

Palabras clave: *Desarrollo sostenible, visión basada en los recursos naturales, gestión de la cadena de suministro verde, autorregulación de la industria.*

Abstract

The aim of this paper is to present the main arguments around the concept of sustainable development as a business perspective and the influence that this concept has brought to firms and their operations. It explains relevant literature on sustainable development describing its foundations, their current challenges and some of the future directions along which the concept can achieve its intended purpose. The arguments suggest that before calling for a massive green campaign in business, there are unresolved issues around

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Artículo Recibido: 15 de diciembre de 2022
Artículo Aceptado: 22 de marzo de 2023

the concept of sustainable development, there is a particular need to understand the real motivation of firms for sustainable. For example, at the industry level, a firm's behavior is a complex issue to control – either through pre-established legal parameters or through a voluntary approach. The interest in sustainable practices has created important implications for managers in almost every industry looking to better understand the arguments around the concept of sustainable development and the commitment that firms should make to address these environmental challenges. Research centered only on economic benefits or only on environmental issues can lead to an incomplete vision of the opportunities for firms that both approaches can generate if they are correctly combined.

Keywords: *Sustainable Development, Natural Resource-Based View, Green Supply Chain Management, Industry Self Regulation*

Códigos JEL: M1, L1, L21

Introduction

One of the primary challenges that the current economic system encounters is the negative impact of business activities on the environment. This impact is primarily observed because businesses are increasingly perceived as being the main cause of social and environmental problems (Gupta, 1995; Kolk, 2015; Porter & Kramer, 2011; Sodhi, 2015). Society has raised questions in terms of what firms are doing to manage their business operations in a way that is sustainable over the long term (Gladwin, Kennelly, & Krause, 1995; Hoffman, 2000; Montiel, 2008). This interest in sustainable practices has created important implications for managers in almost every industry looking to better understand the arguments around the concept of sustainable development and the commitment that firms should make to address these environmental challenges.

However, many unresolved issues around the concept of sustainable development must be developed before calling for a massive green campaign in business. For example, at the industry level, a firm's behavior is a complex issue to control – either through pre-established legal parameters and specific sanctions or through a voluntary approach. At the business level, contextual characteristics of firms can result on the inability to transfer best practices from one business to another. More importantly, there is a particular need to understand the real motivation of firms for sustainable practices. Research centered only on economic benefits or only on environmental issues can lead to an incomplete vision of the opportunities for firms that both approaches can generate if they are correctly combined.

In recent decades, there has been a discussion on the role of the current economic system and the adoption of a more humanistic approach to the challenges for sustainable development. For example, Pirson and Lawrence (2009) argue that the classic economic model has been demonstrated to be incomplete in delivering long-term results, especially in regard to social and environmental problems. These researchers' assumption is based on the argument that this model mainly considers maximizing utility and goal-oriented objectives to undertake business activities. As a result, Pirson and Lawrence propose that a renewed economic paradigm must emerge that incorporates humanistic objectives, such as those oriented toward the creation of caring relationships with other individuals and to comprehending the natural world that is contextual to any economic development.

Similarly, Porter and Kramer, (2011) have also suggested that a change in the current economic system is needed. These researchers consider that current capitalism fails to offer more extensive benefits for both businesses and society. Furthermore, the researchers stressed the importance of capitalism as a platform

for generating wealth to satisfy human needs. A shared value approach, as they suggest, can be a response to the narrow view of capitalism, serving as a new source of innovation that embraces not only profit but also social and environmental issues, thereby leading to sustainable development.

Regardless of whether the answer lies in completely changing the current economic system or using it to create economic, social and environmental benefits, the concept of sustainable development is an attempt to improve a firm's operations by creating awareness on the impact that business activities have on the environment and producing competitive advantages for firms that invest in green operations. Accordingly, the aim of this paper is to present some of the main arguments around sustainable development on two different levels, i.e., business and industry, and the impact that this concept has brought to firms and their operations.

The first section of this paper presents important concepts on sustainable development and the impact that the concept has had on theory and practice. The second section focuses on the debate concerning the correct implementation of sustainable practices in business both at the industry and business level. Finally, the third section presents suggestions for future research in which the concept can evolve in management thinking.

Concept of Sustainable Development: Past contributions

Even though the management literature contains several definitions for the concept of sustainable development (Sauvé, Bernard, & Sloan, 2016) for the purposes of this paper, we will follow the definition by the World Commission on Economic Development (WCED). This definition states that it is "development that meets the needs of the present without compromising the ability of the future generations to meet their own needs" (WCED, 1987 p.43). This concept embraces the general idea that economic advancement should not be related to short-term objectives that endanger resources over the long term. Although this idea is helpful, it does not provide answers as to the areas in which economic development should be focused. To this end, Gladwing et al, (1995) suggest that sustainable development has five main components, namely, (a) inclusiveness, (b) connectivity, (c) equity, (d) prudence, and (e) security

First, inclusiveness is related to a broader vision of the world, including in both humans and nature. This vision presents a larger view of how ecological efficiency and social sufficiency can be achieved. The second component, connectivity, relates to the notion of interconnection in attending the world's problems. Nations are obliged to set both social and economic goals concerning education, employment, health and redistribution of resources to attain sustainable development. Central to equity, the third component, is the concept of fair distribution of resources and property rights. However, the problem with this concept lies in determining what exactly "fair" means, leaving a subjective term open to debate. The fourth component, prudence, expresses the idea of an economic, social and environmental conscience where all human activities must take into account the impact generated in the short and long term. Finally, security refers to a wide spectrum of activities, ranging from securing resources for future generations to human rights and democracy.

In terms of managerial impact, the concept of sustainable development presents a challenge for present and future managers due to an incomplete capacity of firms to associate economic development with natural resources (Gladwing, et al. 1995; Pirson & Lawrence, 2009). Consequently, different approaches from both academia and businesses have emerged that seek to bring these two elements together. For example, Gladwing et al. (1995) propose that is through sustainable development that human progress can be achieved in the long term by the alignment of the classical economic model (technocentric) and the environment (ecocentric). According to Galadwing et al., the idea of progress through free markets,

efficiency, and resource exploitation, which is associated with a techonocentric perspective, is more embedded in current business thinking. Conversely, the ecocentric view has been visualized as an opposite perspective, since it considers organic growth, redistribution, and ecological integrity as the main drivers of human behavior. Gladwing et al conclude presenting the sustaincentric approach as an emerging force to overcome current approaches and offers a more holistic view to business that could possibly lead firms into behavior where natural resources are considered.

Alternatively, a growing approach in the business literature to address the application of the concept of sustainable development has been the incorporation of environmental activities into business strategy (Hart, 1995; Hoffman, 2000; Kolk 2015; Porter & Kramer, 2011, Husted & Allen, 2009). The main argument in this approach is that environmental objectives can be considered like any other economic objective in firms. However, Hoffman (2000) argues that for a true application of the concept, a business strategic approach at the individual level alone will not suffice. This researcher suggests that real change is needed in the entire market system if full integration is to be expected from firms. Hoffman states that the concept of sustainable development currently used by firms is incapable of achieving full integration of environmental concerns into business strategic thinking, which he suggests is the result of three factors: (a) variations in the sustainability concept that generates ambiguity and causes firms to look into existing business practices, adapting them in order to react to social demands; (b) sustainable development has permeated the business jargon although has not been completely adopted in business practice; and (c) at its core, sustainable development requires a deeper commitment that goes beyond the limits of the existing market economy, especially in terms of defining its priorities.

Based specially on the third factor, it can be concluded that one reason affecting an apparent real application of sustainable development at the strategic level is related to the market orientation to profits. However, this is, ironically, this same orientation that serves as a driver for some sustainability practices (Bansal & Clelland, 2004; Hart, 1995; Hoffman, 2000). For example, in their study of firms listed on the stock market and its performance in environmental activities, Bansal and Clelland (2004) found that firms earn environmental legitimacy when their environmental performance meets stakeholders' expectations around this subject. The concept of environmental legitimacy is defined as "a generalized perception or assumption that a firm´s corporate environmental performance is desirable proper or appropriate" (Bansal & Clelland, 2004, p. 94). The authors conclude that this legitimacy is important for investors when public information is available to make investment decisions. It is also important for public firms because environmental legitimacy leads to better financial performance in long-term share prices, particularly diminishing specific risk to the business resulting from the variability of long-term share prices.

The arguments in this section present some of the ideas on the increasing importance of the concept of sustainable development in current management thinking. These ideas explain the existence of a continuous debate around this subject and the influence it has had on managers regardless of their industry. In the next section, I will present some of the major impacts that this concept has had on management theory and practice.

Sustainable Development and Its Impact on Businesses Operations

The importance of defining what sustainable development entails, understanding how it can be placed into practice more effectively, and analyzing the context in which it operates is important for management theory in order to conceptualize its complexity, unresolved issues and future direction as a way of promoting a better application of the concept. Therefore, in this section, I present some of the influences that the concept has generated on management theory and practice.

It is important to first establish the impact that sustainability has had on management theory. One of the outcomes of this influence has been the incorporation of natural conditions in the definition of business resources and the impact that these can have in business activities (De Stefano, Montes-Sancho & Busch, 2016; Hart, 1995; Yunus & Michalisin, 2016). In his work "A Natural Resourced Base View of the Firm," Hart (1995) suggests that both, internal capabilities and external environmental factors are crucial to achieving a sustained competitive advantage. He distinguishes two important concepts in strategy. The first is that competitive advantage is achieved when it comes from the alignment of internal capabilities and external context (Andrews, 1971; Mårtensson, & Westerberg, 2016; Peteraf, 1993); the second is that these capabilities should present certain characteristics, such as a difficulty in recreation by others, in order to develop a sustainable competitive advantage (Barney, 1991; Wernerfelt 1984).

The latter approach is known as the Resourced Based View of the Firm (RBV), which has been widely discussed in management over the last three decades. The basic argument in the RBV is that internal resources are sources of competitive advantage. This resources that firms possess are prerequisites to exploiting external/market opportunities, serving as a platform for business operations. However, Hart (1995) detects an important omission in this theory in terms of the natural environment. This is derived from a limited view of the external context, which has traditionally focused on political, economic, social, and technological factors, excluding the natural environment as a source of competitive advantage. As a result, Hart argues that strategic decisions around a firm's capabilities are shaped by constraints but also by opportunities presented in the natural environment.

The emergence of the NRBV of the firm presents an opportunity to align business operations and the capabilities intrinsic to them with the natural environment. This also creates important opportunities for the concept of sustainable development. According to the NRBV, there are three strategic capabilities that should be present in business operations in order to improve its impact on the environment: pollution prevention, product stewardship and sustainable development (Hart, 1995). Next, I will introduce these capabilities.

Pollution prevention. This refers to the control of current emissions and the prevention of future ones. The concept of pollution prevention presents important opportunities for competitive advantage, especially in terms of cost savings that translate into a cost advantage. However, there is a need to redefine current operational capabilities and create new ones to obtain real results.

Product stewardship. This presents an opportunity for product/services/process redesign aiming to achieve low life cycles, use of biodegradable and reusable materials and renewable sources of energy. It involves the commitment to investment in physical and technological resources to create in many cases a new material/process from the standard in the industry.

Sustainable development. This emphasizes the relationship between production and consumption and the macro-perspective that firms, particularly multinationals, should have in their operations worldwide. This view plays an important role in designing, producing, and delivering product and services in both developed and developing countries. Sustainable development should consider the responsibility of attending all markets sustainably.

As the NRBV states, business should create capabilities oriented to generating strategies that meet the requirements and exploit the opportunities that the natural environment entails. However, while the strategic side of sustainable development could be attributable largely to the top management and the decision-making process within the firm, logically, the practical side of the concept lies at the operational level. It is in this area where the impact of sustainable development is easier to identify (Preuss, 2005).

Hence, at the operational level, Supply Chain Management (SCM) represents a business field that is increasing in importance for achieving both economic and environmental objectives (Darnall, Jolley, & Handfield, 2008; Preuss, 2008; Yunus & Michalisin, 2016). SCM is defined as the activities related to the flow and transformation of products or services from raw materials to end users, including the information and relationships along the chain (Preuss, 2005). This concept has also evolved to consider environmental issues along the supply chain, creating the concept of Green Supply Chain Management (GSCM), which consists in ensuring that the activities of suppliers and customers along the value chain reduce their environmental impact (Darnall et al., 2008).

Additionally, Preuss (2005) presents the GSCM components that are essential to the concept and serve as guidelines for managers in its application. These components are (a) Purchase of products, establishing environmental requirements for suppliers; (b) Manufacturing process, creating green policies, certifying processes and waste disposal; (c) Environmental initiatives, selecting suppliers with environmental criteria; (d) Internal firm initiatives, establishing Environmental Management Systems (EMS) or recycling; and (e) Downstream logistics, which are activities oriented to recover products after they disposed of by the consumer. Empirical evidence on GSCM and EMS will be provided in the next section when we analyze environmental practices at the business level.

Conceptually, this section contains several definitions that are summarized in Table 1. “The Green Dictionary” is a guide for readers looking to gain better comprehension.

Table 1

The Green Dictionary

	Concept	**Elements**
Ecocentric Approach	A natured center system of values with no division between human and nonhuman nature	
Environmental Legitimacy	A generalized perception or assumption that a firm´s corporate environmental performance is desirable proper or appropriate	
Green Supply Chain Management	Ensuring that the activities of suppliers and customers along the value chain reduce their environmental impact	Purchase products, Manufacturing process, Environmental initiatives, Internal firm initiatives, Downstream logistics
Natural Resource Based View	The notion that strategy and competitive advantage are rooted in capabilities that facilitate environmentally sustainable economic activity	Pollution Prevention, Product stewardship, Sustainable development
Shared Value	Policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which operates	

Sustainable Development	Development that meet the needs of the present without compromising the ability of the future generations to meet their own needs	Inclusiveness, connectivity, equity, prudence and security.
Sustaincentric approach	An emergent value system that aims for a higher and deeper integration of the technocentric and ecocentric approaches	
Technocentric approach	A value system that is centered on technology and its ability to affect and control the environment	

Source: Own elaboration

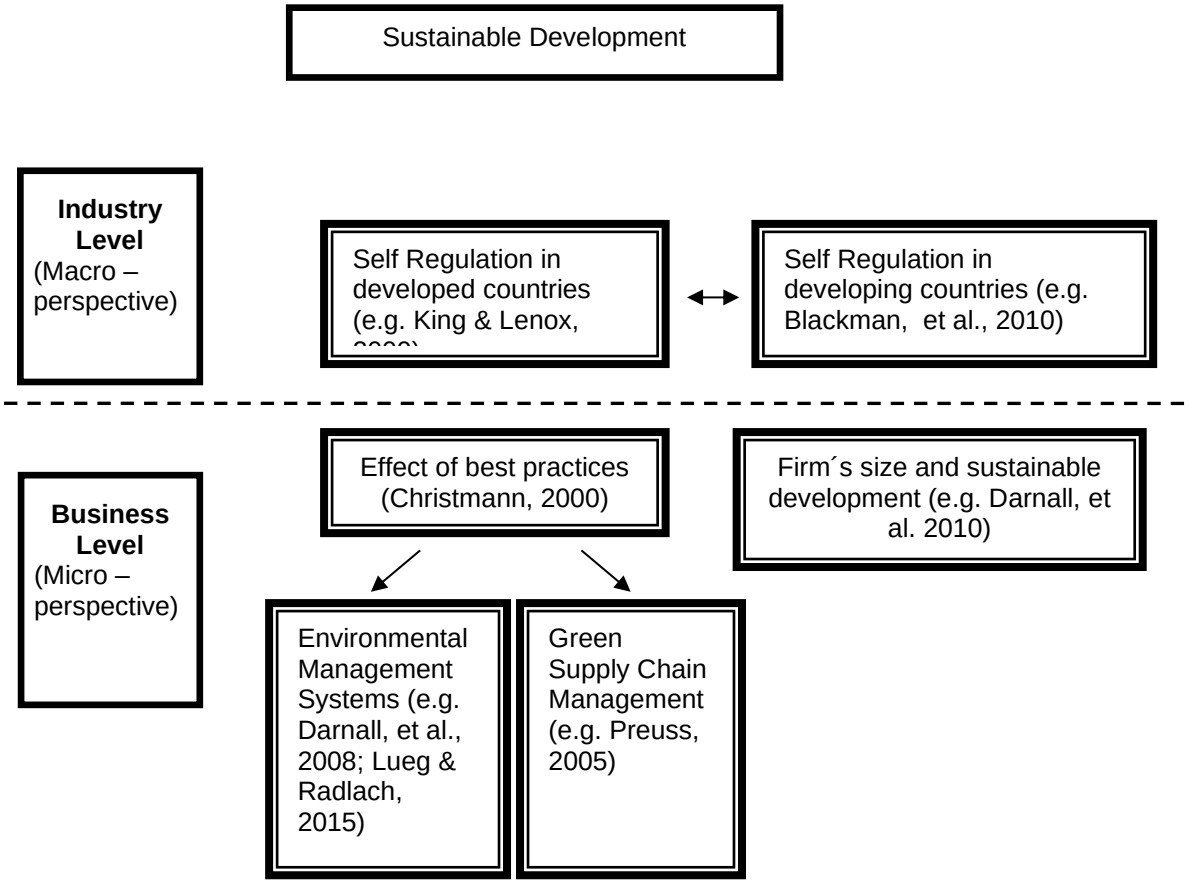
To conclude, this section presents some of the repercussions that the concept of sustainable development has brought both in management theory and business operations. The next section presents various empirical evidence in the discussion of how environmental ideas can be put into to practice effectively.

Debate around Sustainable Development: Present challenges

Despite the influences that the concept of sustainable development has generated in business practices, society and governments, both in developing and developed countries, several concerns have emerged around the real impact of business operations and the use and control of natural resources (Blackman, Lahiri, Pizer, Rivera & Muñoz, 2010). As a result, part of the agenda in management theory has been to determinate the most effective way to achieve a correct implementation for the concept of sustainable development (Gladwing et al., 1995; Hoffman, 2000; Melnyk, Sroufe, & Calantone, 2010; Minbashrazgah & Shabani, 2019).

This cause-effect relationship between present and future actions can be identified in environmental management actions at a business level, mainly in its operations. However, it can also be studied at the industry level, considering all its members and their interactions. Consequently, this section is divided in two parts. First, the concept of sustainable development is analyzed from the industry-level and second, from a business-level perspective. This structure is presented in Figure 1.

Figure 1
Two perspectives for sustainable development: industry-level and business-level



Source: Own elaboration

Sustainable Development at the Industry Level

Since firms integrating a particular industry share some commonalities, it can be argued that such common platforms can create opportunities for regulation to enhance the environmental performance of its members. This “macro” perspective of firms has been traditionally used by governments to create specific sets of rules oriented toward controlling environmental behavior (Blackman, et al., 2010). However, this coercive approach is often regarded as inefficient since different strategies can be built to overturn it (Cairncross, 1993).

An alternative approach for coping with these problems has been Industry Self-Regulation (ISR) (Blackman el al., 2010; King & Lenox, 2000). ISR is defined as self-organized efforts to collectively act without direct intervention by the government (King & Lenox, 2000). This collective approach is generally achieved by the creation of an institution within the industry that acts as an organization to supervise a firm´s environmental performance. While the traditional regulatory strategies rely on sanctions, self-regulation consists in creating incentives for pollution control (Blackman, et al., 2010). Different stakeholders,

especially governments, have increasingly encouraged adoption of this structure as an alternative way to improve business practices.

Despite the initial appeal for these self-regulated attempts by firms to become better citizens, environmentally speaking, there is still a discussion about whether ISR is efficient in accomplishing its objectives. For example, Grief (1997) suggests that any viable action to regulate a firm´s behavior must have explicit sanctions for the participants in the industry in order to control their environmental performance; otherwise, it will create opportunistic behavior for members to camouflage their actions. Conversely, proponents in favor of self-regulation claim that pre-established sanctions are not necessarily a requirement for ISR to work since the internal structure of the supervisory body can control by coercion, established norms, and environmental best practices (Nash & Ehrenfeld, 1997).

Although few studies exist in relation to ISR, King and Lenox (2000) present the case of the chemical industry in the United States. The institution created to promote and supervise environmental performance in the industry was the Chemical Manufacturing Association through the Responsible Care (RC) program. By analyzing 1,500 firms, of which 160 where members of RC (accounting for a third of the total production of the industry), King and Lenox found no evidence that RC positively influences the rate of environmental improvement among its members. Moreover, the improvement among members was slower than the improvement of nonmembers. In contrast, a positive relationship was found in terms of reputation, where firms with well-known brands participate more often. This last positive correlation may explain how reputation influences companies in their attempts to control the perception of stakeholders by being perceived as environmentally friendly. This raises questions regarding the real motivation behind the RC member´s actions.

In contrast, self-regulation has not been exclusively studied in developed countries. For example, Blackman et al., (2010) analyzed the behavior of firms in voluntary regulatory programs in Mexico. In their study, Blackman, et al. argues that different studies of self-regulation in developing countries frequently label it as ineffective since it mainly attracts clean participants. They also suggest that practices around ISR from developed countries are not applicable to the specific context in developing countries.

One of the main ideas drawn from this section is that self-regulation is distant from a unique solution to resolve environmental problems at the industry level. This argument does not intend to discard those firms that can self-regulate their conduct; instead, it simply highlights the importance for society and governments of correctly investing resources into initiatives where a positive contribution can be made. Additionally, self-regulation should consider the context of where it operates to fully understand and predict a firm’s behavior. The risks could be high if a strategy is blindly followed without knowing its real impact on environmental performance.

In the next section, we will present different results from empirical studies to understand the implications for sustainable development at the business level.

Sustainable Development at Business Level

In this “micro” perspective, a firm’s operations are central to determining the degree of commitment to the concept of sustainable development since they account for a large proportion of the impact on the environment. A traditional approach in the management literature is the existence of a trade-off between a firm’s competitive position and environmental quality (Florida, 1996). This trade-off exists because any activity oriented to diminish the firm’s environmental footprint will create additional costs that constrain the firm’s competitive position.

As a result, this approach has generated the use of end of pipe technology to reduce emissions and wastes instead of a dipper approach to sustainable development. However, firms that do contribute to reducing their environmental impact are important to study since they tend to generate best practices that others will adopt the latter as innovative actions for sustainable development. According to Cairncross (1993) and Hart (1995), these environmental best practices can allow firms to improve their competitive position and simultaneously reduce the negative impact on the environment, reducing or even eliminating the traditional trade-off.

Identifying environmental best practices is related to the concept of complementary assets (CA) developed by Teece (1986). First, Teece defines complementary assets as those resources or capabilities that generate competitive advantage for firms and produce better financial performance. Process-focused best practices are defined as actions oriented toward improving production processes and reducing the cost originating in the input and waste disposal (Hart, 1995). Examples of such practices are redesigning production processes, substituting fewer polluting inputs, recycling byproducts and innovating processes that are less polluting (Florida, 1996).

Much of the debate around environmental best practices concerns their implementation and the influence of contextual factors in order to achieve competitive advantage (Christmann, 2000). Additionally, Florida (1996) states that many of the suggestions that it is possible to reduce both environmental control cost and emissions are not based on enough empirical evidence beyond isolated case studies. This has motivated some empirical studies to determine the degree of application of sustainable practices.

For example, Christmann (2000) uses the RBV and CA to identify three process-oriented best practices: (a) pollution prevention technologies, (b) innovation of proprietary pollution prevention technologies, and (c) early timing. Using a sample of 88 firms from the chemical industry, Christmann's findings were contrasting. Two out of three practices (pollution prevention technologies and early timing) showed no relationship to confirm that these environmental practices generate cost savings. However, in the case of innovation of proprietary pollution prevention technologies, a strong positive relationship was found. Additionally, positive relationships were found related to complementary assets, which do contribute to generating a cost advantage.

Also, De Stefano et al. (2016) uses a resource based perspective for environmental actions in the automobile firms. Their findings suggest that under regulatory uncertainty CO_2 reductions are created from clean technology innovations. They conclude that continuous innovation in products is necessary condition for long term competitive advantage.

These findings are important for firms that seek to implement environmental best practices. First, it is important to understand that imitating best practices from other firms to improve environmental performance will not necessarily result in successful strategies; a firm's context is important to establish cases in which these practices can truly produce appropriate results (Christmann, 2000). Another conclusion is in terms of the heterogeneity of capabilities in CA. A firm's best practices should match those capabilities that better complement each other to create real competitive advantage (Christmann, 2000).

Other results from environmental best practices also show opposing evidence for sustainable practices. For example, concentrating on Environmental Management Systems (EMS), Melnyk et al. (2002) finds positive results for formal EMS in reducing waste and pollution from operations and improving the firm's general performance. In addition, Darnall et al. (2008) evaluate the relationship between EMS and Supply Chain Management (SCM) founding that firms using EMS are more likely to transcend the boundaries of

their internal operations to control environmental practices along their supply chain, creating a multiplier effect for other participants.

However, Preuss (2005) questions the real evidence of SCM. He found evidence that green supply chain management (GSCM) is present in firms but mainly in large corporations competing in industries where a spotlight around environmental performance already exists. The noninvolvement of other participants in GSCM occurs because managers are skeptical of the real economic benefits of these practices (Preuss, 2005). Also, Lueg & Radlach (2015) questions EMS capabilities to address all aspects of sustainable development. In their literature review for management control systems, they argue that the alignment usually presented in the traditional performance indicators and firm's strategy is weaker for the case of sustainable development.

Another area of debate around sustainable development concerns a firm's size. Darnall, Henriques, and Sadorsky (2010) explored the effect of proactive environmental practices in small firms considering that this area has been overlooked by researchers who have mainly concentrated their efforts on large firms. Small firms present specific characteristics, such as flexibility, social exposure, a simplified decision-making process and greater propensity to innovate, all of which can be used to improve environmental practices.

In their study, Darnall et al., (2010) collected data on small firms from the manufacturing sector from countries that are members of the Organization for Economic Cooperation and Development (OCDE). They found that stakeholders generate pressure to improve the environmental performance of both large and small firms. However, it is in small firms where the effect is greater, generating a more intensive reaction for sustainable practices. Darnall et al. highlight that this has important implications for environmental management. For example, stakeholder pressures can be redirected to small firms instead of large ones to optimize the effect on sustainable practices.

The implications of the debate on sustainable development at the industry and business levels are rich in content. Despite opposite evidence suggesting that environmental best practices can be successfully applied, it is important that research on sustainable development focus on a wider view to determine the real implementation of green strategies. In the next section, I present areas for future research on sustainable development and the importance of the concept years to come.

Opportunities for Sustainable Development: Future directions

A recurrent challenge in management thinking in recent decades has been the creation of sustainable business operations while remaining competitive in the market. (Christmann, 2000; Hart, 1995; Hoffman, 2000). As explained in the introduction to this paper, some authors suggest that an appropriate approach to promoting changes in present management practices should be by changing the roots of much of the current economic and business paradigms. This change represents a challenge for future research on sustainable development since answers are continuously required and demanded by theorists, practitioners and academic institutions looking to fully understand and apply the concept of sustainable development. Similarly, in this section, I present some of the mayor areas in which research can direct its efforts in order to generate a true contribution to management theory and practice. I present four areas, namely, (a) Industry, (b) Business, (c) Technology, and (d) Entrepreneurship. Each of these sections presents areas of future research suggested by different authors that can serve as a guideline for future studies.

Industry

As a collective force, firms can voluntarily reduce their environmental footprint. As previously explained, self-regulation represents an alternative to governmental policy that coercively aims to regulate a firm´s behavior. However, and despite efforts in empirical research made on this subject, some questions regarding self-regulation remain unanswered.

King & Lenox (2000) provide an example of these unanswered questions by suggesting that studies on self-regulation should focus not only on initiatives generated within the industry but also from outside the industry, for example, with the creation of the new environmental management standard ISO 14000. They also suggest that self-regulation should be investigated in different industries by looking for the specific reason why they join such initiatives. In the same vein, Blackman et al. (2010) suggest that future research should aim to answer questions about the role of self-regulatory programs in developing countries that present weak environmental regulation by governments.

Interestingly, another area proposed for future research at the industry level concerns the influence that industry norms have over a firm´s practices (Melnyk, et al., 2010). Melnyk et al. explain that research in sustainable development should focus on studying the effect that industry has on sustainable practices, such as Environmental Management Systems (EMS) and the firm's performance at the operational level. They also suggest further developments in understanding industry characteristics that influence practices in business such as level of regulation, environmental experience, exposure of environmental problems and supply chain particularities.

Business

To increase evidence on the effectiveness of the sustainable development concept at this level, different authors have suggested complementary research ideas to contribute to this subject in the future. For example, Christmann (2000) suggests that a shift in research on sustainable development, which traditionally focuses on environmental strategies and ignores a firm´s characteristics and its context. She highlights that a firm´s resources and capabilities can have an important influence on how environmental strategies are shaped. Christmann also believes that future research should identify how environmental practices create resources and capabilities that results in competitive advantage, identifying major barriers and characteristics of best practices in other industries.

Additionally, Bansal (2005) states that studies on sustainable development traditionally take either an institutional (defined as the social context in which a firm operates) or a resource- based approach (defined as effective strategies that create resources and capabilities that generate competitive advantage). Accordingly, she suggests that future research should consider both approaches since both contribute to a correct understanding of sustainable development. She completes her ideas for future research by focusing on areas to help understand the application of the concept of sustainable development.

Additionally, at the business level, Darnall et al., (2008) consider it relevant for future research to study the effects of stakeholder pressure on managers of small and medium enterprises (SME). In addition, they view the dynamics between the SME context and the propensity to use environmental practices along with the variations presented among particular groups of stakeholders over sustainable practices as an interesting research topic.

Finally, considering SMEs and the dynamic evolution of sustainable development on business, Melnyk et al. (2010) suggest that new research should update environmental practices, especially concerning SMEs and the adoption of ISO14000 considering with particular interest its impact on SMEs.

Technology

The role of technology in sustainable development has been widely considered as an important factor (Elliot, 2006; Florida, 1996; Hart, 1995; Melnyk et al., 2010). In particular, Elliot (2006) identifies the role of technology on sustainable development from a wider perspective. In his view, technology has been presented in scientifically determining the effect of human behavior on the environment, e.g., climate change. Additionally, Elliot recognizes the challenge that sustainable development represents for business activities considering the degree of uncertainty that the concept still entails and the actions that are required, nonetheless.

In his work, Elliot (2006) identifies four clear areas where technology contributes to sustainable development: (a) supporting technical goals, (b) mediating communications, (c) facilitating human behavior, and d) monitoring and evaluating environmental impact. In his view, technology (considering information systems in particular) represents much of the solutions to environmental problems.

Consequently, he suggests that future research study the role of information technologies in sustainable development considering diverse areas such as stakeholder involvement, integrative business activities, organizational awareness in sustainable development, the impact and effectiveness of industrial alliances on innovation, and the role of individuals and groups in society.

Entrepreneurship

An alternative approach suggested to attain sustainable development has been entrepreneurship (Hall, Daneke & Lenox, 2010; Pirson & Lawrence, 2009). For example, Hall et al. (2010) state that entrepreneurship is an effective vehicle to achieve sustainable processes and products. However, they also state that there are still unresolved issues since the literature in this area has not been abundant. In addition, Pirson and Lawrence (2009) recognize the value of entrepreneurship from a social perspective. These social entrepreneurs are a new class of no-loss business “people driven to make a difference in the world and to give a better chance in life” (Pirson & Lawrence, 2009, p. 562).

Finally, Hall et al. (2010) suggest that studies should aim to determine the extension of entrepreneurship to promote sustainable development, the motivation factors and barriers to adopt the concept and differences between entrepreneurs oriented to sustainable programs versus traditional entrepreneurs.

As explained in these five areas, the concept of sustainable development presents great challenges for the next decades.

Conclusions

Over the last twenty years, management theory has been incorporating more environmental concerns in business practices, acknowledging the importance of sustainable development over the long term. With increasing pressure from society and overwhelming scientific evidence on the impact that human activities have on the environment, sustainability as a business perspective represents a challenge for current and future practitioners and academics in making strategic decisions and grasping new sources of competitive advantage.

To achieve this sustainability, firms require appropriate capabilities that generate and support sustainable business operations. It is in this area where the concept of sustainable development can be seen in action. Areas such as Green Supply Chain Management and Environmental Management Systems

can provide a wide range of opportunities where businesses should attempt to diminish their ecological footprint.

Future research will need to embark in the difficult task of reshaping the boundaries, both in theory and practice, of current management thinking in order to find answers in different areas of sustainable development. Business practices should aim to become more efficient, and much of this can be achieved with the support of technology. Finally, industries should become more self-aware regarding the impact that firms have on the environment, recognizing and supporting new entrepreneurial models.

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