Sustainability-oriented innovations: Can mindfulness make a difference?

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ARTICLE INFO

ABSTRACT

The concepts of sustainability and innovation represent a fundamental conflict of objectives. This fact may help explain why the management literature has been ambiguous in its approach to sustainability-oriented innovation. The main purpose of this article is to develop an analytical framework to further study the influence of mindfulness. Mindfulness can support the development of the cognitive abilities, attitudes and behaviors of individuals who work within organizations. It can help them identify and utilize creative solutions that can lead to sustainability-oriented innovation. This paper presents a theoretical study that has been designed to support future research in sustainability-oriented innovation in the organizational context. A systematic literature review provides empirical evidence that mindfulness training can promote changes in individual cognition mechanisms that favor creativity and ecological concerns. As an isolated training technique, mindfulness can be used as a tool to reduce the stress that is caused by efficiency-driven business models. To help influence management actions in favor of sustainability-oriented innovation, this paper offers a research agenda that combines the following five fields of study: sufficiency-driven business models, inclusive capitalism, sustainability-oriented innovation capability, mindfulness in organizations and interdisciplinary and qualitative mindfulness.

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1. Introduction

Market dynamics are different from environmental dynamics. This difference can help explain why businesses have been unable to ensure sustainable economic development (Bocken and Short, 2016), despite the rhetoric that has been professed in the claimed values and codes of ethics of many for-profit companies. The frustrating results with regard to sustainability objectives suggest that, without a systemic change, i.e., a radical innovation in socio-technical foundations, it will not be possible to solve the many problems that are caused by industrial capitalism (Gilding, 2011).

Although the harm that is caused by unsustainable economic rationality has become increasingly evident, there is no agreement regarding "how" to resolve this situation. As summarized in Table 1, the debates that surround the question of sustainability consist of four main perspectives.

This article explores whether sustainability-oriented innovation can help society follow the second path indicated above.

Merging innovation and sustainability objectives does not mean simply adding the concepts as they have typically been defined in their original fields. The combination of sustainability and innovation presents an intriguing conflict. As a business strategy, innovation targets market growth and increased consumption (Teece et al., 1997), which is contrary to the sustainability concept (Brundtland, 1987; Schäpke and Rauschmayer, 2014). This paradox may explain why critical studies on sustainability have disputed the business efficiency logic by raising the issue of sufficiency strategies (Gorge et al., 2015; Schäpke and Rauschmayer, 2014).

The terms eco-innovation, environmental innovation, sustainable innovation, innovation for sustainability and sustainability-oriented innovation have been used imprecisely in the scientific and gray literature, which reflects the absence of a robust conceptual base (Adams et al., 2015). The large majority of studies that are found under these designations include only the environmental dimension, mostly because firms can make economic sense of such

actions (Dyllick and Hockerts, 2002). However, this is not the case when the social dimension is discussed (Lamming et al., 1999). A recent review by Adams et al. (2015) indicates a rising interest in the management and organizational literature in exploring the convergence of sustainability and innovation concepts in business settings.

Here, we assume that sustainability-oriented innovation, which is a concept that is broader than eco-innovation inasmuch as it also encompasses the social dimension, is predominantly concerned with the interest in human civilization's continued existence. As such, it is a multi-leveled phenomenon that requires three major forces for its promotion: i) at the macro level: government policies and actions that are aimed at overcoming the immeasurable risks that are involved in radical innovations; ii) at the firm level: the development of new business models; and iii) at the individual level: changes in people's cognitive mechanisms, attitudes and behaviors. These three levels must interact to change the present sociotechnical paradigm for sustainable economic development. This article explores the interaction between the last two levels.

The benefits of mindfulness for an individual's cognitive ability, attitude and behavior are supported in the medical, psychological and organizational literature by several empirical studies (e.g., Baer et al., 2006; Barber and Deale, 2014; Greenberg et al., 2012; Shapiro et al., 2012). Recently, mindfulness has also gained high visibility in the non-scientific literature. A plethora of courses, books, sites and consultants promote the benefits of mindfulness for people's health and for companies' performance, including innovation. In attempts to jump on the mindfulness bandwagon, big businesses such as Google, General Mills and Aetna have adopted mindfulness programs (Macaro and Baggini, 2015).

Although the indirect implications can be assumed, to date, neither empirical nor theoretical studies that directly link mindfulness and sustainability-oriented innovation have appeared in the scientific literature, including management studies. Therefore, the main purpose of this article is to develop an analytical framework to further the study of the influence of mindfulness on the cognitive abilities, attitudes and behaviors of individuals within organizations to identify and utilize creative solutions that can lead to sustainability-oriented innovation.

2. Method

This paper is an exploratory study with a theoretical purpose (Miles et al., 2014). The ideas that are presented aim to enhance the comprehension of the sustainability-oriented innovation phenomenon and to serve as a basis for future empirical and theoretical work in management studies.

Since its inception as an independent field, the field of management studies has generated fragmented, diverse and ambiguous strategies for managers and policymakers (Whitley, 1984). It has also been acknowledged that many contemporary management

practices such as mindfulness have not been treated in the scholarly literature due to publication delays (Adams et al., 2015). Such limitations are particularly hazardous when one considers the growing pressures on organizations regarding sustainability challenges.

To increase the reliability and replicability of data collection and analysis in systematic literature reviews, Adams et al. (2015), based on Denyer and Tranfield (2009), suggest the following five steps: i) question formulation; ii) study location; iii) study selection and evaluation; iv) analysis and synthesis; and v) reporting the results. This section clarifies the first four steps.

This article extends the theory by attempting to explore the following question: How can mindfulness-meditation training affect the ability of an organization to promote sustainability-oriented innovations? Its singular contribution to the management literature has been a synthesis of two areas that have not previously been explicitly linked in academic works: sustainability-oriented innovation and mindfulness. Creativity is the starting point for connecting these areas.

The literature review for this study followed a structured process from searches in the various databases and websites of scientific relevance. Because the unit of analysis for this article is the effects of mindfulness on organizational capability to contribute to sustainable development, a broad and deep systematic review of sustainability-oriented innovation was beyond the scope of this study. However, three research strategies drove the article selection: i) using seminal articles to define traditional innovation; ii) clarifying the relationship between creativity and innovation; and iii) exploring the differences between sustainability-oriented innovation and traditional innovation concepts.

By combining the seminal articles by Nonaka and Takeuchi (1995) and Cohen and Levinthal (1990), we distinguish the cognitive and social dimension of the innovation phenomenon at the organizational level, which is a necessary point for the article's unit of analysis. A brief search of the Google Scholar database, which has been available since 2002, was a starting point that was suggested by Adams et al. (2015). The search indicated 1160 articles and books that contain one of the following expressions in their title: "eco-innovation"; "sustainable innovation"; and "sustainability-oriented innovation."

A large number of the articles focus on engineering processes and new products and services, which are not directly related to this paper's objective. We decided to work with 20 articles, and the criteria were to select them from highly reputable scientific journals and to mainly focus on concept and model definitions. Our research strongly benefited from the systematic review by Adams et al. (2015) in the following three ways:

i) It confirmed the lack of conceptual consensus regarding the sustainability-oriented innovations concept;

Table 1
Perspectives regarding sustainability found in the scientific literature.

Change intensity	Central argument	Reference
Paradigmatic shift	To eradicate the capitalist system in favor of a new utopia because the competitive market logic is incompatible with an epistemology that is guided by environmental knowledge.	Leff (2004)
Radical transformation	Reinvent capitalism, changing its fundamental logic of short-term profit maximization, consumption-driven strategies and, as an aggregate result, social exclusion and poverty.	Boons et al. (2013)
Reactive adaptation	Still under the present rules of capitalism, position the government and society, instead of for-profit firms, as the driving forces because social development is not the "business of business."	Lamming et al. (1999, p. 182)
Neoclassical solution	For-profit firms are better prepared to promote sustainability principles because they possess the resources and the managerial capability.	Porter and Kramer (2011)

Source: Developed by the authors.

Table 2
Resources of creativity.

Resources of creativity	Explanation	References
Intellectual abilities	The skill to view problems in new ways and to escape the bounds of conventional thinking and the analytic skill to recognize which of one's ideas are worth pursuing and which are not.	Guilford (1959); Runco and Acar (2012); Sternberg, 2006.
Knowledge	To know enough about a field to move it forward while avoiding a closed and entrenched perspective based on past experiences.	Amabile (1996); Kurtzberg and Amabile (2001).
Thinking styles	These skills include a cognitive style that is favorable to taking new perspectives on problems.	Guilford (1959); Runco and Acar (2012), Kurtzberg and Amabile (2001); O'Hara and Sternberg (2001).
Personality	The willingness to overcome obstacles, to take sensible risks, to tolerate ambiguity, and to be open to experience and self-efficacy.	Lubart and Sternberg (1995); Sternberg (2003); Tierney and Farmer (2002); Shalley et al. (2004).
Motivation	Intrinsic and external motivations. People rarely do truly creative work in an area unless they actually love what they are doing rather than the potential rewards	Amabile (1996); Csikszentmihalyi (1988); Kurtzberg and Amabile (2001); O'Hara and Sternberg (2001).
Environment	An environment that is supportive of and rewards creative ideas	Amabile et al. (1996); Lubart and Sternberg (1995); Shalley et al. (2004).

Source: Developed by the authors.

ii) It found that sustainability-oriented innovation is not equal to traditional innovation, and its adoption can require a change in a sociotechnical system; and

iii) It revealed that, at the organizational level, sustainability-oriented strategies will require new business models.

Inspired by the last finding and using cross-referencing techniques, we found articles that establish a relationship between sustainability-oriented innovation and the adoption of new business models at the system level (Boons and Lüdeke-Freund, 2013; Boons et al., 2013) and from a sufficiency-driven perspective (Bocken and Short, 2016).

Regarding mindfulness, in addition to the major management databases, additional research in PsychINFO, PLOS ONE, ScienceDirect and the database of the AMRA (American Mindfulness Research Association) was conducted. Mindfulness in this work follows the line of research that has been led by Kabat-Zinn (2003), who states that mindfulness is a trainable cognitive ability with specific scientifically tested protocols. The researched literature revealed relevant empirical works that directly link mindfulness to creativity (e.g., Colzato et al., 2012), ecological concerns and sustainable behavior (e.g., Barber and Deale, 2014; Barbaro and Pickett, 2016), and ethical decision making (Ruedy and Schweitzer, 2010; Shapiro et al., 2012). We made an additional effort by contacting four mindfulness researchers through Research Gate or by institutional email to further explore the interplay among mindfulness,

creativity and sustainable behavior.

The data extracted were analyzed using a matrix-based technique. The codes were defined *a priori* based on constructs that were obtained from the literature review, according to the coding procedures that were suggested by Miles et al. (2014). The coding procedure helped in the classification of creativity (Table 2) and mindfulness characteristics (Table 3). To integrate the common and complementary elements of theoretical perspectives in the conceptual model, we employed the triangulation of theories method (Denzin, 1978). Following the process that was presented in Adams et al. (2015), we inductively derived the proposed framework from the systematic literature review. To simulate the functioning of the framework, we made a collective effort to correlate Tables 2 and 3

3. Theoretical foundations

3.1. Innovation

According to the Oslo Manual from the Organization for Economic Cooperation and Development (OECD, 2005, p.46), innovation means "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations."

At the firm level, innovation results from a company's capability to convert knowledge into new products and services, new

Table 3
Characteristics of mindfulness.

Characteristics	Definition	References
Clarity of awareness	Bare attention and clear awareness of one's inner and outer worlds.	Analayo (2014); Brown and Ryan (2003); Gunaratana (2011); Thera (2014); Kabat-Zinn (2003).
Non-conceptual, nondiscriminatory awareness	Understanding that reality is non-conceptual. The mindful mode of processing stimuli occurs without categorizations, comparisons, or immediate evaluation and is not self-referenced.	Brown and Ryan (2003); Gunaratana (2011); Kabat-Zinn (2003).
Flexibility of awareness and attention	Similar to a zoom lens, it can move back from a larger perspective on what is occurring (clear awareness).	Analayo (2014); Goldstein (2013); Lutz et al. (2008).
Empirical stance toward reality	It seeks possession of full facts and the postponement of judgment on what is occurring, in addition to the alert participation in the ongoing process of living.	Goldstein (2013); Gunaratana (2011).
Present-oriented consciousness	The notion of presence and remembering to return to an awareness of what is currently occurring. Living in the present is conceptually distinct from living for the present.	Analayo (2014); Brown and Ryan (2003); Goldstein (2013); Gunaratana (2011); Thera (2014); Kabat-Zinn (2003).
Stability or continuity of attention and awareness	The ability to stay constantly aware of the present reality. Mindfulness is an inherent capacity of the human organism, but it is not developed in all humans.	Analayo (2014); Brown and Ryan (2003); Gunaratana (2011); Thera (2014).

Source: Developed by the authors.

production and organizational processes (Grant, 1996), and new business models (Teece, 2010). Capabilities reflect the knowledge that is embedded in an organization's routines through interactive learning processes and mechanisms (Nelson and Winter 1982). At the individual level, innovation depends on cognition and creativity; in other words, it depends on the human mind acting in specific organizational contexts (Amabile, 1998; Cohen and Levinthal, 1990).

Therefore, innovation can be interpreted as a social process of meaning creation (Cohen and Levinthal, 1990; Nonaka and Takeuchi, 1995), and as sociotechnical systems, firms learn by producing and selling products and services (Kim, 1998). Fig. 1 briefly explains how a Knowledge Spiral, which has been adopted in this study, functions:

Two forms of knowledge are accumulated in the learning process: explicit knowledge and tacit knowledge (Polanyi, 1966). The first form can be codified and transmitted in formal language. In contrast, tacit knowledge "is so deeply rooted in the human mind and body that it is difficult to codify and communicate and can be expressed only through action, commitment, and involvement in a specific context. Tacit knowledge can be acquired only through experience, such as observation, imitation, and practice" (Kim, 1998, pp. 508–509).

According to Nonaka and Takeuchi (1995, p. 76), "original ideas emanate from autonomous individuals, diffuse within the team, and then become organizational ideas." Four modes of knowledge conversion explain this process: **socialization** (tacit to tacit): when one person shares the tacit knowledge that he or she possesses with another person through social interaction; **codification** (tacit to explicit): when the knowledge that is accumulated achieves a stage when its internal foundations can be codified; **combination** (explicit to explicit): a piece of codified knowledge can be improved with the accession of new pieces of codified knowledge; and **internalization** (explicit to tacit): when the codified knowledge helps people create new meanings and new associations that improve the tacit knowledge that they possess.

3.2. Sustainability-oriented innovation

Since the mid-1990s, researchers who are engaged in the environmental sustainability and management fields of study have refined the Product Service System (PPS) concept. PPS states that firms must design systems that combine physical products and services to i) create customer utility, ii) generate value, and iii) decrease environmental impacts (Mont, 2002; Lindahl et al., 2014; Tukker, 2013). In theory, PPS business models, especially the Result Oriented Services type, can help create a lease economy, promote
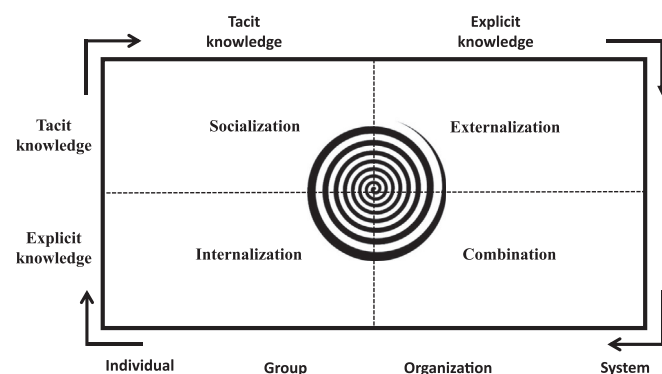
life cycle approaches and dematerialize an economy. Empirical research conducted by Lindahl et al. (2014) confirms that the development of innovative technologies, when supported by flexible contracts, influences the success of PPS models.

In terms of business models, the eco-innovation literature has presented two major approaches: i) one approach that is close to the conventional efficiency-driven business model (Hansen et al., 2009) and ii) another approach that is sufficiency-driven (Bocken and Short, 2016). In line with the first approach, eco-innovation can be regarded as a subclass of innovation that subordinates sustainability objectives to economic objectives (Huppes et al., 2008). As highlighted by Boons et al. (2013), such an approach implicitly assumes that eco-innovation embodies many of the complexities that have already been addressed in the innovation literature and that can be examined by the same logic.

Based on this paper's perspective, efficiency is primarily concerned with resource and energy use maximization. Because the idea of doing more with less is in line with economic rationality, not all efficiency-driven projects can bring sustainable results, especially when rebound effects occur. Effectiveness, on the other hand, implies sustainability strategies that require long-term solutions to the myriad problems that are generated by industrial capitalism. In this sense, it can be argued that effectiveness-driven strategies may require a fundamental shift in the manner of conducting business that overcomes individual and organizational self-interest motivations (Young and Tilley, 2006). The sufficiency concept (Gorge et al., 2015) that is adopted in this article adds to effectiveness and proposes the following:

> "[a] focus on influencing consumption behavior, which involves, for example, a fundamental shift in promotion and sales tactics, e.g., no aggressive or manipulative 'over-selling,' eschewing fast fashion trends, providing consumer education and 'choice editing' to reduce access to sustainability undesirable products, and product design changes to enhance durability, reparability and longevity" (Bocken and Short (2016, p.43).

Indeed, it has become increasingly clear that efficiency-driven sustainable models, such as the Triple Bottom Line (Elkington, 1994) and the 3R principle (reuse, reduce and recycle), or even supply-side sustainability initiatives cannot promote the systemic changes that are necessary to support sustainable development (Bocken and Short, 2016). The disappointing results that have been obtained from these models suggest that the additional complexity that is afforded by the introduction of environmental and social dynamics into innovation objectives can make sustainability-oriented innovations different from economic-oriented innovation both in scope and in the forces that drive their dynamics (Adams et al., 2015). To face this challenge, studies have attempted to connect the sustainable innovation, new business model and firm strategy fields (Boons et al., 2013).

Hitherto, scientific studies of how, in the context of an inclusive capitalist model, firm strategies can contribute to the transition to a sustainable world have functioned at a conceptual or "inspirational" level, and the field requires more attention from academics and policymakers (Adams et al., 2015, p.15). Indeed, there are doubts that market-based solutions, even if they are developed under an inclusive capitalism, are realistic or desired alternatives (Aghion et al., 2009; Arora and Romijn, 2012; Leff, 2004). As noted by Boons et al. (2013), to move forward, the discussion of new business models may need to be connected to the degrowth debate (Schneider et al., 2010) or to bottom-of-the-pyramid studies (Ansari et al., 2012).

From a systemic perspective, sustainability-oriented innovations must overcome an enormous amount of sunk costs that

Fig. 1. Knowledge spiral.
Source: Adapted from Nonaka and Takeuchi (1995).

are related to fossil industrial production and consumption systems (Boons et al., 2013). As stated by Mazzucato (2013), a change of that magnitude requires not only altruistic motivation from consumers and business leaders (Schäpke and Rauschmayer, 2014) but also the support of demand- and supply-side state policies that influence the structure and function of the markets and firm investment decisions.

Such policies would need to promote a green innovation ecosystem in which the government, universities, firms and NGOs act in a symbiotic public-private partnership (Mazzucato, 2013). Such a change would certainly require a sociotechnical transition that could not be promoted by one or only a few firms acting in isolation. This type of shift could pose a major threat to entrenched firms that operate under industrial sociotechnical logic (Geels, 2005) if opportunities for new organizational forms, such as the Benefit Corporation or "B Corps," are given a chance to develop (Adams et al., 2015).

3.3. Creativity

Creativity is viewed as one of the key factors that drives a society's development (Berman and Korsten, 2010; Hennessey and Amabile, 2010). Lubart (2001) defines creativity as the ability to create something that is new and socially valued or as the creation of an original and feasible solution to a new, complex and partially defined problem.

As highlighted above in the discussion about innovation, creativity is also a complex and multi-level phenomenon (Anderson et al., 2014). In a broader sense, it is possible to state that innovation is not limited to creativity because it involves all of the activities and processes that are required to convert a creative idea into something that is marketable. Such innovation involves R&D (research and development) as well as marketing and operations (Trott, 2008). However, creativity is not equivalent to innovation because it can lead to other manifestations such as the arts and gastronomy, which cannot be reduced to market-driven activities (Lane and Lop, 2015).

In this study, by acknowledging the fact that creativity and innovation are parts of the same process (Anderson et al., 2014), we regard creativity as one of the factors that motivates an individual's innovative behavior (Yuan and Woodman, 2010), and consequently, it is understood to be an element of the innovative process in organizations (Amabile et al., 1996).

Amabile (1998, 1996) proposes a model that is composed of the following three personal components: expertise, creative thinking and motivation. Expertise refers to technical proficiency in an area of work. This component "… can be viewed as the set of cognitive pathways that may be followed for solving a given problem or doing a given task" (1996, p.5).

Sternberg (2006) states that creativity requires a confluence of the following six distinct, but interrelated, resources: intellectual abilities, knowledge, thinking styles, personality, motivation, and environment. Table 2 shows these resources and presents some related studies:

With the purpose of investigating how to promote creative potential, Scott et al. (2004), influenced by Guilford's studies (1959), emphasize that training in creativity comprises two types of thinking: i) divergent thinking, or the ability to generate multiple alternative solutions in contrast to the right solution, and ii) convergent thinking, with which individuals gradually narrow their options to a stage at which a single correct answer is obtained. Although divergent thinking should not be viewed as being synonymous with creativity, it offers a reliable indicator of potential creative solutions to problems (Runco, 2007; Runco and Acar, 2012).

3.4. Mindfulness

Mindfulness is one of the central teachings of Buddhist psychology (Kabat-Zinn, 2003). In the Buddhist tradition, mindfulness has a psycho-spiritual purpose that serves to identify and transform the root causes of suffering (Analayo, 2014), and it is associated with a concern for the welfare of all sentient beings and virtuous behavior (Bodhi, 2011). In the medical and psychological fields, the effects of meditation and the development of mindfulness suggest that a positive influence is related to several concepts, such as well-being (Brown and Ryan, 2003); self-awareness, self-regulation and self-transcendence (Vago and Silbersweig, 2012); creativity (e.g., Ostafin and Kassman, 2012); attention regulation (Kozasa et al., 2012); compassion (Lim et al., 2015); ethics (e.g., Ruedy and Schweitzer, 2010); and ecological concern (e.g., Ericson et al., 2014).

Choi and Leroy (2015) note that mindfulness research is still in its infancy within organizational scholarship. However, the benefits of mindfulness have received increasing support from empirical research, mainly from the steady increase in inter-organizational practitioners who use mindfulness to address workplace challenges.

Brown and Ryan (2003) define mindfulness as receptive attention to, and awareness of, events and present experience. Kabat-Zinn (2003, p.145) defines it as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment." This definition includes three components, i.e., intention, attention and attitude (Shapiro et al., 2006), and most of the definitions and conceptualizations in Western science are based on it.

Table 3 shows a summary of the characteristics of mindfulness, based on the review by Brown et al. (2007).

Studies that empirically relate mindfulness and creativity (for reviews, see Capurso et al., 2013; Kudesia, 2015) have found promising associations (Colzato et al., 2012; Moore and Malinowski, 2009; Ostafin and Kassman, 2012). Mindfulness initially involves awareness, and it is not limited by concepts, ideas, or memories; it is merely the observation of phenomena at the present moment, as though they were occurring for the first time (Gunaratana, 2011). Thus, as noted by Ostafin and Kassman (2012), it is reasonable to think that one of the effects of mindfulness practice is to limit the automatic access to verbal-conceptual content from experience that biases thinking and behavior and that blocks creative potential.

Regarding ethics, two experiments that were presented by Ruedy and Schweitzer (2010) demonstrate important connections between mindfulness and ethical decision making. Additionally, Shapiro et al. (2012) report that mindfulness training is associated with an increase in moral reasoning, which suggests that mindfulness may in fact make us more ethical.

Evidence also suggests that one's level of mindfulness has an independent and significant relationship with sustainable behavior and personal well-being (Brinkerhoff and Jacob, 1999; Jacob and Brinkerhoff, 1997, 1999). The review by Brown et al. (2007) indicates that one of the characteristics of mindfulness is being fully aware of the present moment, which should be viewed as the opposite of being directed toward living inconsequentially. In this regard, a mindful state would be inversely related to hedonism and the lack of consideration of future consequences (Brown and Vansteenkiste, 2006). Mindfulness also provides individuals with more engagement, interest and concern for life (Baer et al., 2006) and empathy for others (Beitel et al., 2005; Gunaratana, 2011).

Brown and Kasser (2005) present additional evidence for the correlation between the level of mindfulness, ecological concern and personal well-being. These authors report the following (p.360): "These analyses support our propositions that happy

people live in more ecologically responsible ways because (…) they are more mindful of their inner experience and behavior." Jacob et al. (2009) analyze the fostering of mindfulness by means of formal meditation and its relationship with sustainable behavior and personal well-being. The results show that the practice of mindfulness meditation serves as a link between sustainable behavior and personal well-being.

Amel et al. (2009) find that acting with awareness, which is a central dimension of mindfulness, is positively correlated with self-reported sustainable behavior. This evidence is consistent with the idea that, until sustainable decisions become a societal imperative, their enactment may depend on the focused consideration of options. Ericson et al. (2014) offer the finding that mindfulness promotes more well-being, empathy, compassion and awareness of values and that, consequently, it may promote sustainable behavior. These authors suggest that promoting the practice of mindfulness in schools and organizations may be a key to a more sustainable society.

Following this line of thought, Barber and Deale (2014) state that highly mindful individuals are more concerned for others and society as a whole and search for products and services that have high emotional and environmental benefits. More recently, Barbaro and Pickett (2016) have found that mindfulness is significantly associated with pro-environmental behavior and that connectedness to nature indirectly affects the relationship between mindfulness and pro-environmental behavior.

4. Proposal for conceptual articulation: mindfulness-based sustainable-innovation model (MBSI)

Fig. 2 shows the proposal of conceptual articulation to put in practice the relationship between mindfulness, creativity and sustainability-oriented innovation. The elements of the model are presented below, and a discussion of how they hypothetically function is briefly presented.

First, the model assumes that organizations are inserted into a social context in which the pressures to adopt sustainability principles in business models are growing and irreversible.

From the outside-in direction, the MBSI model assumes that to overcome the enormous sunk costs that are involved in the fossil energy structure, government policies regarding both demand and supply will not only be necessary but also be firmly enforced to convince both firms and consumers to support sustainability-oriented innovation strategies (Mazzucato, 2013). Additionally, the worsening of the ecological and social consequences of efficiency-driven business models will pressure the dominant sociotechnical paradigm, forcing incumbent firms, in order to survive, to replace efficiency-driven strategies with a life cycle perspective in which the economic, environmental and social consequences of their business decisions, from raw materials to disposal, are considered. As noted by Adams et al. (2015), new types of organizations that use strategies that explicitly consider the social and environmental impacts of their actions can emerge, offering an alternative for conscious consumers.

From an inside-out direction, the Spiral of Knowledge, which is explained in Fig. 1, facilitates the view that the systematic practice of mindfulness affects the cognitive ability of individuals, allowing them to view, decode and interact with the world around them. Furthermore, as stated by Ericson et al. (2014), this view can help individuals act more consciously and review their compulsive consumer habits. In line with the studies by Sternberg (2006) and Nonaka and Takeuchi (1995), the MBSI model assumes the presence of an organizational culture that promotes individual autonomy and supports the emergence of creative and ecological concerns. As the spiral impels its effects, the creativity of individuals will ultimately reach the organizational level and, depending on the presence of a systemic perspective in the business model, the entire chain of production. Inspirational leadership capabilities are necessary to drive changes in the corporate culture that will favor sustainability principles (Adams et al., 2015).

For these creative ideas to be converted into sustainability-oriented innovation, firms will need to adopt sufficiency-driven business models and make fundamental changes in product development, production processes and promotion and sales tactics to encourage product design changes that enhance durability, reparability and longevity (Bocken and Short, 2016).

Table 4 shows a conceptual articulation, though not exhaustive, among mindfulness constructs, as summarized in the study by

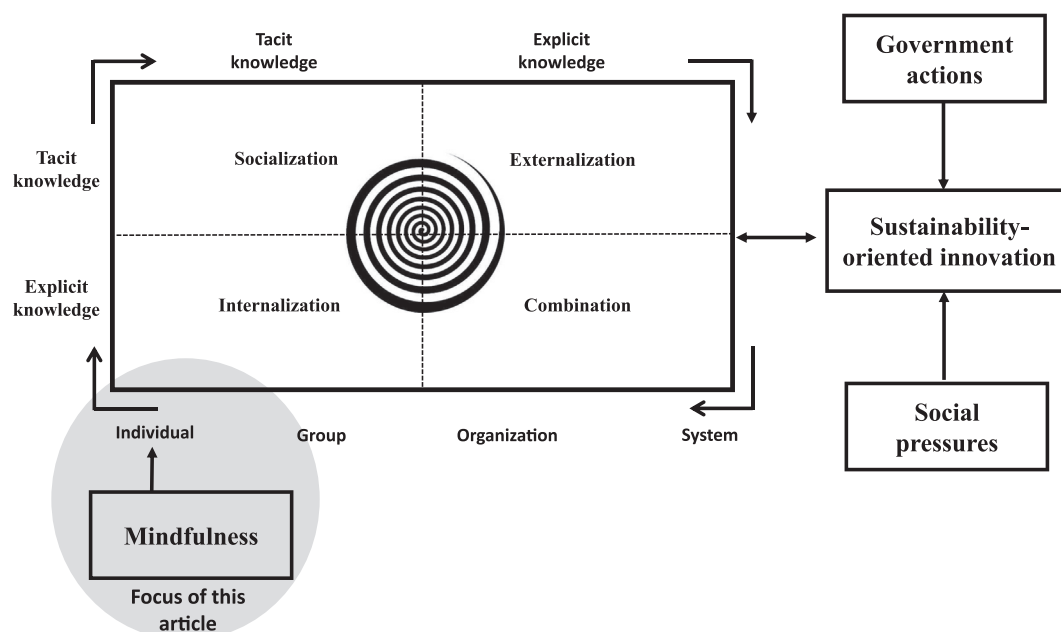**Fig. 2.** Mindfulness-based sustainability-oriented innovation model (MBSI).
Source: Developed by the authors.

Table 4
Characteristics of mindfulness, their implications and the relationship with creativity and sustainability.

Characteristics	Implications	Outcome
Clarity of awareness	(+) Unbiased receptivity (+) Acceptance toward experience	(+) Questioning of premises and insight into reality (Ostafin and Kassman, 2012; Ren et al., 2011; Horan, 2009). (+) Production of divergent thinking (Colzato et al., 2012). (+) Personality: greater trait openness, acceptance (Kabat-Zinn, 1994; Moore and Malinowski, 2009).
Non-conceptual, nondiscriminatory awareness	(+) Conceptual thoughts engaged and disengaged more resolutely (+) Metacognition	(+) Cognitive flexibility: exploring new cognitive paths voluntarily (Kudesia et al. (2015); Horan, 2009; Moore and Malinowski, 2009; Ostafin and Kassman, 2012; Ren et al., 2011). (−) Cognitive rigidity: attachment to ideas and thoughts, helping move away from ideas with very little effectiveness (Greenberg et al., 2012).
Flexibility of awareness and attention	(+) Voluntary and fluid regulation of attention and awareness	(+) The ability to regulate attention to larger or detailed perspectives of a situation (Sternberg, 2006). (+) Beneficial for managing the creative process over time (Kudesia, 2015).
Empirical stance toward reality and present-oriented consciousness	(+) Engagement regarding the observed experience (−) Hedonism and a lack of consideration of future consequences (+) Empathy	(+) Ecological concern and sustainable behavior (Amel et al., 2009; Barbaro and Pickett, 2016; Barber and Deale, 2014; Brinkerhoff and Jacob, 1999; Ericson et al., 2014; Jacob et al., 2009; Brown and Kasser, 2005). (+) Personality: persistence in performing tasks despite failure (Evans et al., 2009). (+) Empathy helps in viewing things from the other person's perspective and helps in the creative process (Beitel et al., 2005; Sternberg, 2006). (+) Ethical decision making (Ruedy and Schweitzer, 2010; Shapiro et al., 2012)
Stability or continuity of attention and awareness	(+) Keeping attention and awareness longer in the present moment. (−) Conceptual thoughts rooted in past experiences.	(+) Attentional performance (Kozasa et al., 2012) (−) Viewing new problems through the experiences of the past (Ostafin and Kassman, 2012; Greenberg et al., 2012; Horan, 2009).

Source: Developed by the authors.

Brown et al. (2007), and the possible influence of mindfulness on creativity, ecological concerns and sustainable behavior.

Because it enables a person's capacity to adopt a beginner's mindset toward an experience and to voluntarily regulate the use of conceptual thinking (Gunaratana, 2011), mindfulness has a positive impact on intellectual ability and thinking styles (Sternberg, 2006). Through the non-judgmental acceptance of the present experience and the regulation of the discursive thinking and metacognition that can be gained from a heightened state of mindfulness, individuals develop higher levels of cognitive flexibility (Moore and Malinowski, 2009). This state can reduce the resistance to change in beliefs, attitudes and behaviors in the following ways: i) less cognitive rigidity (Greenberg et al., 2012); ii) more divergent thinking (Colzato et al., 2012); iii) the occurrence of insights (Ostafin and Kassman, 2012); and iv) better attentional performance (Kozasa et al., 2012).

All of these factors have a close relationship with the creative resources that are summarized by Sternberg (2006) regarding intellectual abilities and thinking styles, as described in Fig. 2. Individuals with better development of mindfulness, personality and motivation — creative resources that are also described by Sternberg (2006) — have favorable traits for the development of creative solutions that are in line with sustainability. The Empirical Stance Toward Reality and Present-oriented Consciousness (ESTRPC) lead to a more active attitude toward life and, because mindfulness is inversely related to hedonism (Brown and Vansteenkiste, 2006), to greater ecological concern and social engagement (Amel et al., 2009; Barbaro and Pickett, 2016; Barber and Deale, 2014), in addition to ethical decision making (Ruedy and Schweitzer, 2010; Shapiro et al., 2012). Furthermore, ESTRPC can lead to greater persistence in the face of failure as well as openness and acceptance (Bishop et al., 2004), which are crucial attitudes in organizational cultures that favor creativity and innovation (Nonaka and Takeuchi, 1995).

5. Contributions and conclusion

Based on the framework that we have derived from the literature review based on concepts that are anchored in robust clinical and psychological research, it is plausible to infer that the use of mindfulness training can favor creativity and ecological concerns. On the other hand, mindfulness can also be used for the sole purpose of managing the stress that is caused by neurotic, destructive and meaningless behavior and the type of short-term focus that has been observed in many contemporary organizations.

The conditions of and limits to the capacity of mindfulness to produce sound sustainability-oriented innovation are strongly related to the motivations of the training, in addition to the organizational culture and core values. In our view, the implicit rationale of the industrial economy conflicts with an increased state of mindfulness, which leverages creative potential, ecological concern, ethical behavior and empathy for others. In fact, the praxis borne by these words clashes with the mindset and values of organizations whose business models mainly focus on cost reduction and productivity improvement.

The critical article by Purser and Milillo (2015) notes that a Buddhist-inspired understanding of mindfulness has contemporary relevance for progressive social movements aimed at alleviating poverty. An ethically informed practice of mindfulness has the potential to call into question economic materialism, which relies on the valuation of acquisitive materialism and unbridled consumption. Coherent with its Buddhist origins, mindfulness may be practiced to transform the human mind and to increase ethical behavior (Bodhi, 2011).

Most of the validated protocols of mindfulness that have been used in the fields of medicine and psychology are ethically neutral. However, evidence based on the previous empirical studies that are listed in this paper supports the assumption that mindfulness can have positive attitudinal and behavioral consequences beyond well-being and attentional regulation, expanding its benefits to others and to society. As Purser and Milillo (2015) suggest, "future theory development is needed to reframe corporate mindfulness as a socially engage practice, more expansive and inclusive scope, so that the causes and conditions of institutionalized greed, ill will and delusion can be addressed" (p. 16). Therefore, we ask the following question: What would happen if the mindfulness training that is used by corporations formally addressed ethical issues and social questions?

The current work adds to the intersection between the literature of sustainability and innovation by exploring the hypothesis of the influence of mindfulness on the cognitive ability, attitudes and behavior of individuals within organizations to produce creative solutions that can lead to sustainability-oriented innovation. We believe that the analytical model that is presented here can serve as a basis for further empirical and theoretical studies and, hopefully, for practitioners to engage in formal mindfulness training or even informal practice.

We acknowledge that mindfulness cannot be promoted as a magical intervention. Reducing general consumption, improving social inclusion and promoting the economic development of the poor regions of the planet will not merely depend on a change in the cognition, attitudes and behavior of individuals in organizations. Sustainable economic development depends on political decisions that are highly reliant on sociotechnical elements that privilege the values, beliefs and credos that take into account human societies and their relationship with the environment. Therefore, mindfulness can only fully contribute to sustainability-oriented innovation if all of the variables of the model that is presented here — MBSI — act in consonance. Such a transition demands leadership capabilities, and according to Adams et al. (2015), such a transition, which could help redesign public and private organizations according to sustainability principles, has yet to be empirically tested.

Therefore, a central question to be examined by management studies is whether a more ethically informed view of mindfulness could serve as an opportunity to enhance awareness of the corporate impact — of products, processes, production and the relationship models of its several stakeholders — on society and to identify the causes and consequences of unsustainable business models.

This article contributes to the management literature and practice in the following three ways. First, it provides a conceptual base to link mindfulness practices to sustainability-oriented innovation strategies. Such linking elements are provided by incorporating a cognitive cross-perspective and by including a sufficiency-driven business model concept. Second, the conditions and limits under which mindfulness can produce sound sustainability-oriented innovation are discussed, which can help counteract the emergence of new management fads. Third, the article presents a research agenda for sustainability-oriented innovation that is aimed at deepening the interconnections among the concepts, constructs and metrics of the MBSI model. The main components of this agenda are as follows:

5.1. Sufficiency-driven business models

Sustainability-oriented innovation research can benefit from the introduction of constructs and variables that enable the operationalization of deep ecology principles, as defined by Naess (1973) and Capra (1997). The implication is a paradigm shift that cannot be captured by instrumental visions such as efficiency-driven sustainable models. We advocate the creation of new perspectives on how organizations and governments perceive their roles in a sustainable world. Future studies can examine whether sustainability-oriented innovation based on deep ecology principles can be a differentiation strategy for companies in the new millennium.

5.2. Inclusive capitalism model

Upon review of the debates on the paradox between moral and economic justification for social investments, which is associated with the debates on social corporate responsibility, there is still a need to deepen the role of private corporations in the reduction of poverty and the social inequities that are promoted by economic rationality (Hahn, 2009). Therefore, exploratory research in MBSI will benefit from research fields that listen to "the voices of the poor," such as the bottom-of-the-pyramid approach (Ansari et al., 2012) and new forms of capitalism in the third millennium (Hart, 2007). A valuable question would be to examine how mindfulness training can help overcome modern forms of slavery, oppressive work environments and the degradation of social and affective connections.

5.3. Leadership role in sustainability-oriented innovation capability

Leaders play a central role in the corporate culture and corporate strategies. There has been a gap in the empirical research concerning the impact of mindfulness training on the attitudes and behavior of organizational leaders in favor of a sustainable development in corporations; this issue should be examined.

5.4. Mindfulness in organizations

Further study on the development of mindfulness is necessary to capture its antecedents and consequences, with an emphasis on the impact of mindfulness training on the organizational, group and individual levels in terms of sustainability and corporate ethics in general.

5.5. Interdisciplinary and qualitative mindfulness research

As suggested by Choi and Leroy (2015), it is necessary to expand the breadth of the existing methods to incorporate experiential sampling methods and qualitative research approaches to study mindfulness and its effects on organizations. This method can provide us with a deeper understanding of the psychosociological processes that underlie sustainability-oriented innovation in organizations and other behavioral targets.

To conclude, as stated by Adams et al. (2015), the aim of the sustainability principle is a journey, though there is no guarantee that the goal will be achieved. Whether the management literature that addresses practical actions can contribute to the promotion of innovation to face sustainability challenges remains an open question. We believe that mindfulness theory can provide new avenues for sustainability research in the corporate arena. This worthwhile endeavor can benefit us as humans, academics and practitioners in making an important and necessary step toward a successful journey to sustainability.

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