INNOVATION AND SUSTAINABILITY: NEW MODELS AND PROPOSITIONS

INOVAÇÃO E SUSTENTABILIDADE: NOVOS MODELOS E PROPOSIÇÕES
INNOVACIÓN Y SOSTENIBILIDAD: NUEVOS MODELOS Y PROPOSICIONES

ABSTRACT
This theoretical paper has as main objective to analyze the relation between sustainability and innovation, taking as reference the institutional theory. Thus, the paper initially examines the issue of sustainable development, from a historical dimension of evolution of the topic. After that, we explored the theme of institutionalization of sustainable development, suggesting that the prominence of sustainable development can be explained by institutional theory, more specifically by the concept of symbolic efficiency of Meyer and Rowan (1991). The paper then analyzes the concept of sustainable innovative organizations. Finally, the relationship between sustainability and innovation is analyzed, highlighting the importance that the company innovates considering the three dimensions of sustainability - social, environmental and economic.

KEYWORDS: Innovation, sustainability, institutional theory, sustainable innovative organization, sustainable development, social and environmental management, eco-innovation.

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RESUMO Este trabalho, de cunho teórico, tem como principal objetivo analisar a relação entre sustentabilidade e inovação, tendo como referencial a teoria institucional. Para tanto, o artigo inicialmente analisa a questão do desenvolvimento sustentável, a partir de uma dimensão histórica da evolução do tema. A seguir, é explorada a temática da institucionalização do desenvolvimento sustentável, sugerindo-se que a proeminência do desenvolvimento sustentável pode ser explicado pela teoria institucional, mais especificamente pelo conceito de eficiência simbólica de Meyer e Rowan (1991). O artigo então discute o conceito de organizações inovadoras sustentáveis. Por fim, é abordada a relação entre sustentabilidade e inovação, destacando a importância de a empresa inovar considerando as três dimensões da sustentabilidade – social, ambiental e econômica.

PALAVRAS-CHAVE Inovação, sustentabilidade, teoria institucional, organização inovadora sustentável, desenvolvimento sustentável, gestão socioambiental, eco-inovação.

RESUMEN *Este trabajo de carácter teórico tiene como principal objetivo analizar la relación entre la sostenibilidad y la innovación, tomando como referencia la teoría institucional. Para ello, el artículo inicialmente analiza la cuestión del desarrollo sostenible, desde una dimensión histórica de la evolución del tema. A continuación, es explorada la temática de la institucionalización del desarrollo sostenible, lo que sugiere que la importancia del desarrollo sostenible puede ser explicada por la teoría institucional, más específicamente por el concepto de eficiencia simbólica de Meyer y Rowan (1991). Luego, el artículo discute el concepto de organizaciones innovadoras sostenibles. Por último, se aborda la relación entre sostenibilidad e innovación, destacando la importancia de que la empresa innove considerando las tres dimensiones de la sostenibilidad – social, ambiental y económica.*

PALABRAS CLAVE *Innovación, sostenibilidad, teoría institucional, organización innovadora sostenible, desarrollo sostenible, gestión socioambiental, ecoinnovación.*

INTRODUCTION

The sustainable development movement seems to be one of the most important social movements in the new century. Countless voluntary initiatives related to sustainable development were adhered to by companies in specific business sectors, such as banks, insurance companies, hotels, chemical plants, with the participation of some of the largest groups in those sectors. Large companies have created organizations as a way of showing their commitment to this movement, such as the WBCSD, the Ceres, and the Caux Round Table. Charts of principles and action guidelines, such as the Rotterdam Charter, the Millennium Development Goals, and the Global Compact, have been designed which were signed by thousands of companies. Indeed, no other social movement has gathered as many heads of state as it was seen, for example, in events in Rio de Janeiro and Johannesburg, in 1992 and 2007 respectively.

Its official beginning took place not much more than 20 years ago, with the launching in 1987 of the report of the World Commission on Environment and Development (WCED), known as the Brundtland Commission. The quality movement took longer to be launched; it began in the post-war period, but it was not until the 1980's that it actually began to thrive, for reasons internal to the business world – pressed by the need to adequate to a new competition standard that was already occurring on a large-scale basis. In contrast with the quality movement, companies' adherence to sustainable development is initially an outside-in process that emerged to counter the criticism and objections to the role of companies by countless government agencies and civil society organizations, which blamed the former for the social and environmental degradation processes that affected the whole planet. Only recently has the adhesion of companies started to be induced by business factors or, to put it differently, be part of this this movement has become a competitive factor, whether as a source of differentiation or a source of qualification, in order to remain in business.

A central aspect in adhering to a social movement is the need to replace old ways and practices with different ones that translate the principles, goals, and guidelines of the new movement. As a company commits to sustainable development, it must necessarily change its way of operating in order at least to reduce social and environmental adverse impacts. This requires a new way of facing innovation, which leads to the idea of sustainable innovation, i.e., a type of innovation that contributes to achieving sustainable development.

SUSTAINABLE DEVELOPMENT

The phrase "sustainable development", which first became popular at the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, has, in fact, a long trajectory. According to Riechmann and Buey (1994, p.104), since their beginning, industrial societies have prompted critical reactions to the destruction they caused, whether from dissident authors or social movements, which have continued until today and carry a rich past with civilizing criticism, yet remaining marginal until few decades ago in relation to productivism-centered currents.

This historical view has been generally underestimated in the texts of North-American and European authors, who like to present the 1970's as the starting point of the movement for sustainable development, besides underestimating the contribution of authors and institutions from the then so-called Third World. Vincent (1995, p.270), for example, affirms that the "ecological movement was developed in the public sphere, starting in the 1970's, based on the creation of political parties – the green parties – in European countries, but he recognizes that the origins of ecologist thinking date from much earlier, and to illustrate this fact, he quotes Ernst Haeckel, the scientist who coined the word ecology in 1866, then a neologism (VINCENT, 1995, p. 211). With the creation of these parties in the 1970's in Western developed countries, it was taken for a fact that the ecologist movement had that origin. Contributions of countries from other regions were solemnly ignored. They do not mention, for example, that the struggles of Chico Mendes already had a socio-environmental proposition that was proper to the concept of sustainable development. If more propositions did not arise in the region, that is not due to a lack of perception of socio-environmental problems and proposals, but rather to the dictatorial regime that thrived throughout Latin America.

Not all environmentalist currents merged into the movement for sustainable development. This shows in the fact that currents are so widely diverse that they comprehend several positions, many of which in unsolvable conflicts, starting with terms used. Vincent (1995) uses the word ecologism to designate the political ideology that stood out in the 1970's and resulted in the green parties. Dobson (1997) distinguishes ecologism and environmentalism in terms of degree and kind. According to him, the former is a political ideology and, as such, it must (1) provide an analytical description of society so as to guide its supporters in the political world, (2)

prescribe a particular form society, using beliefs about the human condition that sustain and reproduce the opinions about the society prescribed, and (3) provide a political action program to achieve such a society (DOBSON, 1997, p. 22-23). To Dobson, environmentalism can adapt to any ideology and, paradoxical as it may sound, the ideology that is least susceptible to environmentalism is ecologism, as the belief in ecocentrism is the aspect that distinguishes it from all other political ideologies. Therefore, we can think of hybridisms between liberalism, socialism, communism, fascism, etc. and the environmentalism, since none of those is ecocentric.

Many environmentalist currents have adhered to the movement for sustainable development, while many criticize it severely for various reasons. Ecocentric currents point out that the movement is anthropocentric to the marrow and does not represent a deep change, or a change in kind, to use Dobson's words, in the relationship of humans with other living beings and nature elements, but only a change in degree, thus characterizing a merely reformist approach. One of the major criticisms stems from the fact that this movement is impelled by large multinational companies, which had previously boycotted the so-called "eco-development" proposition. This proposition, according to Sachs (1986, p. 115-116), one of its creators, "posits a solidary view for the long term that comprehends the whole of humanity", and its emphasis should be on local autonomy spaces, which are both its starting point and the place every political movement should necessarily stop by in order to conduct this new concept of development. This proposition would displease both state dirigisme and free enterprise supporters. The latter because of the emphasis of the proposition on endogenous, community-based development and its criticism of imitative economic growth, which seeks to reproduce the consumption standards and social processes of industrialized countries (SACHS, 1986, p. 53). Thus attacked by powerful actors in the international scenario, eco-development-pertaining ideas were put aside. It would not be long before the phrase sustainable development emerged, bringing other concepts and becoming a worldwide success.

THE INSTITUTIONALIZATION OF SUSTAINABLE DEVELOPMENT

Criticisms of sustainable development are not few either. Economic growth as a necessary condition for eradicating poverty, a goal of sustainable development that was included in the UNCED report (1991, p.53), meets many objections, since a view exists that economic growth is the source of the severe environmental and social problems found in contemporary world. Daly (1991) is among those who criticize the report for this reason. While many see new business aspirations behind the sustainability agenda, others see the continuation of old aspirations for controlling and dominating the world's resources (HOLLAND, 2003, p. 392). Economic growth is something always desired and pursued by businesspersons and politicians, which would explain their wide adherence to the sustainability movement. Some consider sustainable development-related concepts confusing and contradictory, like Faber and others (2006), who examined this matter in a business perspective. Difficulties to put sustainable development-associated concepts into practice in face of the magnitude of its goals generate skepticism of all kinds. Norgaard (1994) finds it impossible to define development in a way that is operational, detailed, and controllable, while based on the dominant premises of modernity, such as atomism, mechanism, and universalism. Porrit (2003, p. 111) proposes for it to be called a "marginally less unsustainable development". It is worth remembering that in the French-speaking countries, the phrase used is lasting or durable development (développement durable). It is not only a matter of changing a name in order to please national whims. "Lasting" is a more suitable word than "sustainable" when it comes to describing a project for transforming global society, because since sustainable does not specify a temporal dimension, it can refer to any future term, including political terms subordinated to election schedules and business planning horizons, seldom longer than five to ten years.

Despite all criticism to propositions concerning sustainable development, such as the examples above, the fact is that these propositions have become the foundations of one of the most important social movements in current times, and such a feat did not take more than two decades, considering the 1992 UNCED as the starting point of this concept's institutionalization. The subject was not much talked about outside restrict circles prior to the UNCED and its preparatory works. Among these, we should highlight the works of the WCED, created by the UN General Assembly in 1983 and finished in 1987, when the report 'Our Common Future' was delivered, containing the famous definition of sustainable development: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1991, p. 46).

As Nobre (2002) affirms, the concept of sustainable

development "emerged not only as notion destined to produce consensus, but also as a riddle to be criticized for its vagueness, impreciseness, and contradictory character" (p. 25). To him, the power of this concept initially lay in its very vagueness and impreciseness, and the exploitation of its contradictions and weaknesses was a path already walked which did not bring significant results. Nobre believes that this concept is "a vehicle for a minimum political agreement around the terms under which it would institutionalize the environmental issue on a global level and as a starting point for the political dispute to be fought within the limits it draws" (p. 26). The institutionalization which this author refers to occurs in the sphere of intergovernmental organizations, such as UNEP, UNDP, World Bank, IMF, national governments, and NGOs operating internationally, such as UINC, WWF and WBCSD.

In the sphere of organizations in general, and businesses in particular, this institutionalization process is unprecedented, whether in geographic terms or in terms of the speed at which this concept became popular in this sphere. What winds have been blowing so favorably as to cause this to happen? A plausible explanation may be found in institutional theory, which shows that when new values are institutionalized in society, becoming "myths" to be followed in a given sector, organizations will respond to these pressures by adopting these models and practices considered the best ones in a given social system. Thus, organizations seek symbolic efficiency and technical efficiency (MEYER and ROWAN, 1991). Symbolic efficiency is achieved by adopting the models institutionalized in a sector and in society in general which are considered the ideal ones. The adoption of these models by organizations brings them social legitimacy and resources.

In current society, the values connected both to sustainable development and respect for environmental policies have been institutionalized, to a greater or lesser degree, in various countries by the media, social and environmentalist movements, and governments. In response to these institutional pressures, new organizational models emerge which are viewed as more suitable to the new cycle, such as sustainable innovative organizations.

Institutional sectors are social sectors where a set of rules and norms prevail which organizations must comply with if they are to survive, receive support, and obtain legitimacy from other organizations and the society. Institutions control human conduct by means of standards which determine social order (SCOTT; MEYER, 1991). According to Powell and DiMaggio (1991), the adoption of normative and structural models occurs through four forms of institutionalization: coercion, normalization, induction, and organizational mimetism. These institutional mechanisms interrelate to either maintain or change cultural practices and values. Such process of incorporating, and conforming to, dominant characteristics is called "structural isomorphism", a tendency among organizations to have similar structures, norms, cognitive models, and technologies. According to Meyer and Rowan, the isomorphism of an organization in relation to the environment surrounding it causes this organization to incorporate elements externally legitimated, rather than due to the efficiency they might provide. Relying on such institutional elements reduces uncertainties and turbulences from the environment, a fact that promotes the organization's success and survival.

Organizational coercion is the process of institutionalization through the imposition of organizational structures by a legitimate authority or by force; it is a guarantee of stability and quick concretization. By force of law, social groups adopt the imposition of criteria which regulate organizational and social activities (POWELL; DIMAGGIO, 1991). Therefore, given the action of the media, opinion leaders, environmentalist movements, government agencies, etc., institutional pressures have increased and induced organizations to adopt means that are more compatible with the new social demands associated with the concept of sustainable development. Therefore, it can be affirmed that the model of sustainable innovative organizations is an organizational response to those institutional pressures.

SUSTAINABLE INNOVATIVE ORGANIZATIONS

An innovative organization "is one that introduces novelties of any kind on a systematic basis and reaps the expected results" (BARBIERI, 2007, p.88). The phrase "systematic basis" means the conduction of innovations with autonomy, intentionality, and proactivity. Therefore, innovation is an essential element of the modus operandi of such an organization, which assumes that it will continuously develop both tangible and intangible results in order to innovate permanently. A sustainable organization is one that seeks to be economically efficient while respecting the support capacity of the environment, as well as being an instrument of social justice, thus promoting social inclusion, protection for minorities and vulnerable groups, gender balance, etc. (BARBIERI, 2007, p. 98-99). These two concepts of organization can engage in contradiction, since innovating on a systematic basis can become a synonym of systematic environmental and

social degradation. Therefore, a sustainable innovative organization "is not one that introduces novelties of just any kind, but novelties that meet the multiple dimensions of sustainability on a systematic basis, and reaps positive results for itself, society, and the environment" (BARBIERI, 2007, p. 105). It is not enough for companies simply to innovate constantly, but to innovate considering the three dimensions of sustainability, namely:

social dimension – a concern for the social impacts of innovations on human communities within and out of the organization (unemployment; social exclusion; poverty; organizational diversity; etc.);

environmental dimension – a concern for environmental impacts caused by the use of natural resources and the emission of pollutants;

economic dimension – a concern for economic efficiency, without which they would not perpetuate themselves. On companies' side, this dimension means making profits and generating competitive advantages in the markets they operate in.

Meeting these dimensions makes the innovation process more sophisticated and demanding, which requires a greater effort from organizations in order to technically meet this condition. This brings new perspectives to the management of innovation.

INNOVATION AND SUSTAINABILITY

The sustainability of a business can be understood in a conventional way, i.e., as the ability to generate revenue to pay for production factors, replace the assets used, and invest in order to continue competing. Therefore, there is nothing new about innovations, whether technology ones in products/services and processes, or relating to management or business models. This has been long understood, and derives from the idea that an organization should have its continuation extended indefinitely as its association articles usually suggest. However, if business sustainability can be understood as an actual contribution for sustainable development, then innovations start to have other evaluation criteria than the conventional ones. There is no other reason why this subject is in the core of the concept of sustainable development. In fact, in the origin of the movement for sustainable development there was some serious criticism about certain successful innovations, as Rachel Carson did in relation to DDT (CARSON, 2002).

According to the concepts of sustainability of this movement, innovations should generate positive economic, social, and environmental results at the same time, which is not easily done, given the uncertainties that innovations bring, particularly when they are radical or with a high degree of novelty in relation to the state of the art. Economic effects are relatively easy to predict, since there is a huge amount of instruments designed for this purpose, and innovative companies know how to use them. Social and environmental effects are more difficult to evaluate in advance as they involve many other variables, uncertainties and interactions. Therefore, what is most often observed is the continuation of conventional understanding combined with a discourse that incorporates sustainable development themes as a mere display of good intentions, if not as a means for appropriating an idea that is gaining importance for the population and opinion leaders. Sustainable development requires a combination of technical and social changes, since both are deeply related (SCHOT; GEELS, 2008).

Several legitimate initiatives seek to consider all three dimensions of sustainability in their innovation processes, such as Native, a company that produces organic food in a profitable way by using agricultural and industrial processes compatible with sustainable development goals, as Carvalho and Barbieri (2009) observed. This company contradicts the affirmations of Norman Borlaug, the father of the green revolution and a Piece Nobel Prize winner, that organic agriculture is less suitable to the environment because of its lower productivity, thus requiring more crop areas to meet the same demand for food (THE ECONOMIST, 2006). This company's high productivity, which guarantees its economic sustainability, was achieved through an intensive innovation effort applied to products, processes, management, and business model, such as eliminating the fire-clearing of lands for sugar cane crops, using biological plague control, organic fertilization, new devices in agriculture machinery and apparel to avoid soil compaction and preserve biodiversity, among others. These innovations provide environmental benefits, such as reducing the emissions of greenhouse gases, increasing biodiversity, and reducing the need for mineral fertilizers, which would have to be extracted from nature and transported through long distances, thus consuming fossil fuels. Moreover, they have brought a better quality of life for workers and local residents by not contributing to the prevalence of breathing conditions that occur where sugar cane is grown in the conventional way (CARVALHO; BARBIERI, 2009).

According to the Oslo Manual, innovation is the implementation of a new or significantly improved product (a good or service), or a process, or a new marketing me-

thod, or a new organizational method in business practices, in workplace organizations or in external relations (OECD, 1997, p. 55). Based on this definition, Kemp and Pearson (2008) defined "eco-innovation" as "the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organization (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives" (KEMP; PEARSON, 2008, p. 7). Due to the negative impacts that generally accompany innovations, such as pollutant emissions and natural resource exhaustion, the definition emphasizes the reduction of problems, based on the assumption that the economic benefits will somehow be perceived.

It is noted that "eco-innovation" refers to "eco-efficiency", a way of operating that results in the overlapping of two dimensions of sustainability, namely, the economic and social dimensions, as shown in Figure 1. Figure 1a represents the three dimensions of sustainability in general terms as it is widely known today; Figure 1b is a representation specifically about companies, in which the economic dimension is represented by profit, a necessary condition for their continuation over time. Figure 1c is the representation of John Elkington's triple bottom line model. This model emphasizes the need to undertake a management oriented towards positive economic, social, and environmental results, which Elkington calls pillars of sustainability. Eco-efficiency is a practice that occurs within the lines of the economic and environmental pillars. This implies developing goods and services that meet human needs at competitive prices while progressively reducing environmental impacts to a level that is bearable to Earth (ELKINGTON, 2001, p. 82). Eco-efficient innovations are, for instance, those which reduce the material and energy amounts per unit produced, eliminate toxic substances, and increase products' life cycle. However, they can generate unemployment, destroy competences, harm communities or segments of society, among other social issues. Therefore, the social dimension has to be conspicuously present so that an eco-efficient innovation can also be a sustainable innovation.

Following a similar line to that of the authors cited, "sustainable innovation" is the introduction (production, assimilation or exploitation) of a product, production process, service, or management or business method that is novel or significantly improved to the organization and which brings economic, social, and environmental benefits compared to relevant alternatives. It is worth noticing that it is not only a matter of reducing negative impacts, but also advancing in net benefits. The highlighted condition "compared to relevant alternatives" is essential to the concept of sustainable innovation, since the benefits expected should be significant, or non-neglectable, in the three dimensions of sustainability. As Barbieri (2007) describes, the evaluation of socio-environmental consequences should be part of innovation processes, rather than only the economic evaluation. It is common to read in innovation-related texts that the expectation of a negative or bellow expected economic result interrupts or re-directs a specific innovation process. The interruption or redirectioning of the project should also occur with regard to negative or below expected social and environmental results.

As Hall and Vredenburg (2003, p. 64) noted, traditional approaches to innovation usually focus on a reduced group of interested parties (stakeholders), such as suppliers, customers, investors, and regulatory agencies, and consider the impacts of innovation on these parties. Sustainable innovations consider a long list of secondary interested parties, such as local communities and activist groups of various causes, such as environmentalism, anti-globalization, animal rights, etc. The difficulty becomes much greater as it is a matter of innovations conducted on an ongoing basis, which is what characterizes an innovative organization. Interested parties, which the authors call secondary, are not limited to the ones operating near the organization; they can be anywhere, and are not limited to the ones affected by the innovation either. This is one of the reasons for the growth of business social responsibility movement, stimulated by business organizations themselves, in order to respond to the challenge of having to deal with countless interested parties. Among the propositions that are typical of this movement is that of keeping open channels for a constant dialogue with those who declare themselves interested in what the company does or intends to do, and for transparently divulging its activities and the economic, social, and environmental impacts they cause.

Innovating according to the three dimensions of sustainability is still not the rule, also because the inclusion of social and environmental dimensions requires new instruments and management models which only recently began to be more intensively developed. This is not a task only of companies intending to innovate. Education and research institutions, government agencies, normalization institutions, civil society organizations, in other words, the national system of innovation also plays an important role in this question.

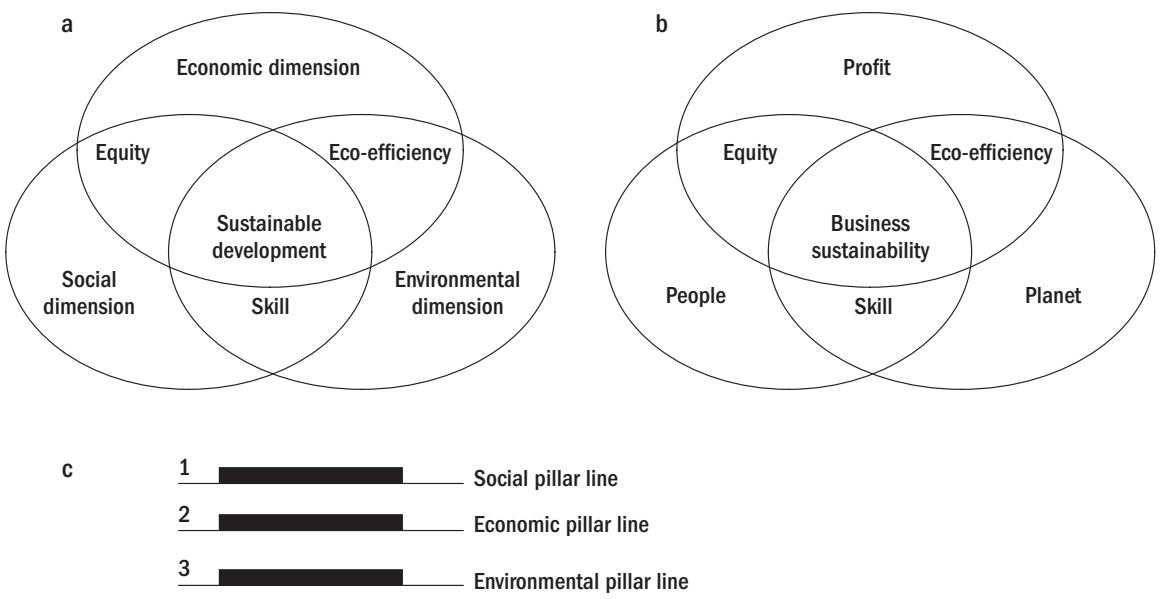
In the late 1980's, the economists Richard Nelson and Christopher Freeman developed the concept of National System of Innovation (NSI), understood as "an institutional construction, the product of a planned, conscious action, or the product of a sum of unplanned, disarticulated decisions that impels the technological progress in complex capitalist economies (ALBUQUERQUE, 1995, p. 4). Such a construction involves universities, government agencies, technology institutes, companies, associations of scientists and engineers, all of whom articulate with the educational, industrial, and business systems, as well as with financial institutions, thus completing the circuit of agents responsible for generating, implementing, and diffusing technological innovations. One of the tasks of an NSI is identifying both the country's opportunities and its ability to use them, based on scientific and technological knowledge.

In order for sustainability to be actually incorporated in the development of innovations, it is fundamental that the national system of innovation be mobilized to this end – and it has to adequate to this new order. Particularly in the business field, Dorman and Holliday (2002) indicate four questions that companies should formulate as they develop their innovative processes, in order to make sure to incorporate sustainability-related issues. These are the questions:

- How can we make sure that sustainability is part of our creative process?
- How can we make sure that sustainability is part of the business management process?
- When and how an external view can be incorporated to the creative process of development?
- What processes are more suitable for increasing the value of the company's intellectual capital?

Finally, it is important to highlight the new Strategic Niche Management (SNM) approach (CANIELSA; ROMIJNB, 2008; SCHOT; GEELS, 2008), designed to facilitate the introduction and diffusion of sustainable technologies by means of technological niches, i.e., protected spaces which allow a series of experiments related to technology evolution, utilization practices, and regulatory structures. Examples of sectors that could fit into this approach: energy, biogas, public transportation systems, and the production of eco-friendly foods. The premise is that, if such niches are suitably constructed, they could act as a basis for wider changes in society in terms of sustainable development. One example is the introduction of an innovative technology product in small cities, before actually releasing it in the market.

Figure 1 – **Sustainable development: representations**



Source: Figure 1a - Adapted from French norm SD 21000; Figure 1b - Inspired in this norm and in Marrewijk, 2003; Figure 1c – Extracted from Elkington, 2001.

FINAL CONSIDERATIONS

The sustainable innovative organization model is a response to institutional pressures demanding organizations capable of innovating efficiently in economic terms, yet in a socially and environmentally responsible way. This type of organization seeks a competitive edge by developing new or modified products, services, processes, and businesses, based on the social, environmental, and economic dimensions. It combines two essential features, i.e., being innovative and sustainability-oriented. These goals are feasible, as shown in the example mentioned earlier. Therefore, a new production logic becomes institutionalized in which sustainability and innovation go hand in hand.

In view of the phenomenon of institutional isomorphism (the concentration of organizational forms in the various production sectors), the sustainable innovative organization model has been increasing its presence in leading companies. Based on these facts, we can affirm that the sustainable development movement is one of the most important of our time, and, judging from the vitality of the institutional factors present in virtually the whole world, we can infer that it will continue to propagate for many decades.

Therefore, the enhancement of sustainable organization models, the various forms of its institutionalization on a global level, the development of sustainable technologies, the management of innovation for sustainable development, all these subjects will be increasingly relevant in future studies. One aspect that is usually neglected in sustainable organization models refers to consumption. Because production operational systems, as well as innovations in products and processes, by meeting the three dimensions of sustainability, are likely to generate gains for the environment in terms of resource use and pollutant emission reduction, a production increase driven by the demand for new products could neutralize, or even surpass those gains. Taking this possibility into account and giving it a suitable treatment is one major challenge for companies' alignment to the sustainable innovative organization model.

NOTE

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