

# LEARNING IN ORGANIZATIONS AS OUTCOME OF ENVIRONMENTAL ASSESSMENT PROCESSES

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## Introduction

Sustainable development is one of the most widespread ideals of the self-dubbed “Knowledge Society”. However, it is a subjective concept and one that requires deliberative forms of governance and evaluation (KEMP; MARTENS, 2007). In this context, knowledge and learning have taken on a central role in how the duality society – environment is managed (MÜLLER; SIEBENHÜNER, 2007; SINCLAIR *et al.*, 2008). Learning about and in favour of/for the sake of sustainability<sup>i</sup> is seen as a contemporary challenge, even in government, business and civil society circles, because sustainability itself “is a learning process” (VELAZQUEZ *et al.*, 2011, p.41).

Environmental assessments (EA) are a policy tool used by governments to consider the environmental, social and economic sustainability of projects (FITZPATRICK, 2006). Fitzpatrick and Sinclair (2003) classify EAs as “a proactive planning tool that

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allows developers, regulatory authorities, scientists, and the public to identify, evaluate, and mitigate, where possible, the potential changes to an environment from a proposed initiative before development is undertaken” (p.161). There are several EA modalities which differ from each other in terms of methodology and objectives. In Brazil, the most important tools are Environmental Impact Assessment (EIA) – with their operational instrument, Environmental Impact Study (EIS) – and Strategic Environmental Assessment (SEA), this one in consolidation phase in the Brazilian context (PELLIN *et al.*, 2011).

Learning is an important and implicit component of EAs (FITZPATRICK, 2006). Sinclair *et al.* (2008) stress that participation in EA processes gives rise to informal and experiential learning, which can shape values, attitudes, understandings and behaviors. Diduck and Mitchell (2003) observe that EAs create opportunities for sustainability-oriented learning at different organizational and temporal scales. However, there is a dearth of studies on the learning of organizations involved in these processes (SÁNCHEZ; MORRISON-SAUNDERS, 2011). While a large number of studies investigate learning in companies with regard to technological and market-oriented innovation, it has proved difficult to stimulate empirical analysis of environmental and/or sustainability-oriented learning (SIEBENHÜMER; ARNOLD, 2007).

This article examines EAs as a tool for learning in an organization that carries out the EA and in the organizations interested or affected by it, with the aim of obtaining sustainability results. In this work, the term sustainability does not refer to corporate, entrepreneurial or business sustainability, rather to sustainability in its *latu* sense, i.e. as a broad, global concept, as advocated by Agenda 21 and by the Brundtland Report (WCED, 1991).

After this introduction, the article presents a discussion on the definition of organizational learning (OL) in order to lay the conceptual groundwork that will enable further reflection on EAs. The level of analysis in learning is discussed in this section, along with the types of learning as proposed by Argyris and Schön (1996). Having established the concept of OL, the next sections discuss sustainability-oriented OL and learning arising from the EA process. The next section presents the role of organizational memory for retention and future use of learning which stems from participation in EA processes. Subsequently, there is a brief description of the Brazilian situation as regards OL and organizational memory related to EA processes. In the final considerations, the article’s contributions are summarized and an agenda for future research in this area is suggested.

## Learning in organizations

Learning has been considered a relevant factor in the process of gaining competitive advantages and improving organizations’ productive performance, as it is invariably linked to cognitive and/or behavioral changes (KNIGHT, 2002; ANGELONI; STEIL, 2011).

## *Levels of analysis*

In the context of organizations<sup>ii</sup>, learning takes place on different levels: individual (IL), group (GL) and organizational (OL). The relationship between the levels is not necessarily linear, although it is considered that the previous level acts as a basis for the next one (CROSSAN *et al.*, 1999). IL represents the acquisition of knowledge by the individual in the context of the organization. The importance of IL is widely agreed upon in the literature, as knowledge is a process and an ability governed essentially on a human and personal scale (ZARIFIAN, 2001). Therefore, learning without the individual participation is impossible. It is also up to the individual to promote knowledge sharing and dissemination, which will allow learning on other levels (GREEN, 2000).

GL is defined as “a relatively permanent change in the team’s collective level of knowledge and skill produced by the shared experience of the team members” (ELLIS *et al.*, 2003, p.822), or “a change in the group’s repertoire of potential behavior” (WILSON *et al.*, 2007, p.1043). In the latter work, the authors highlight that it is necessary to distinguish GL from “IL in the context of groups”. Individuals can learn surrounded by other people and improve the group’s performance with their learning, but this is still IL in the context of groups in organizations, unless learning is shared with the other members. In the same way, a simple aggregation of ILs does not constitute GL, which should include sharing, storage and the possibility of retrieving the group’s knowledge, routines and behavior (WILSON *et al.*, 2007).

Regarded as more than the sum of the learning of individuals and groups that make up an organization (KNIGHT, 2002), OL is defined as “a process, a social construction which transforms the knowledge created by the individual into institutionalized actions towards organizational objectives” (ANGELONI; STEIL, 2011, p.121). Snyder and Cummings (1998) believe that learning is effectively organizational when three conditions are met: it is done to achieve the organization’s goals; it is shared or distributed among the members of the organization; and when the outcomes of the learning are incorporated in systems, structures and the organizational culture. Complementing this view, Crossan *et al.* (1999) suggest that the three levels of learning are linked to psychological and social processes of intuiting, interpreting, integrating and institutionalizing. The latter – the process which institutionalizes the changes stemming from those processes related to learning in the organization’s structures – represents the organizational breadth of the learning.

The levels of analysis are important because they help to understand the difference between people’s learning processes in organizational contexts, as well to understand learning “of the organization”. However, the boundaries between the levels of analysis are fluid and conceptual and are closely linked in empirical reality.

## *Types of learning*

Taking a cross-sectional look at levels of analysis, Argyris (1977, p.116) regards OL as a “process of detecting and correcting error”. Argyris and Schön (1996) indicate

that learning in organizations can be classified in three types: simple or single-loop learning (SLL), double-loop learning (DLL) and deuterio-learning (DL). SLL is an instrumental or technical learning, which involves identifying alternative strategies and actions to solve specific problems, challenges or questions and/or correct errors, leading to the adjustment of results that have deviated from the intention or pre-existing expectation (ARMITAGE, 2005; HAYWARD *et al.*, 2007; TUINSTRAL *et al.*, 2008). SLL is related to incremental innovation and represents the use of a new method or tactic, focusing on improving organizational performance (FITZPATRICK, 2006).

With DLL, the learning process is not limited to changes in particular questions, but also involves the paradigmatic aspects behind them. There are therefore two cycles: the first, an instrumental one (SLL), enables the correction of the errors. Based on this, there is a second loop, which connects the former to deeper changes in terms of worldviews, objectives, values, norms and beliefs – both personal and institutional (TUINSTRAL *et al.*, 2008). This learning is transformative in nature and can be observed in planning, management or evaluation contexts. It makes individuals and organizations change their attitudes, behaviors, perceptions and routines (ARMITAGE, 2005; FISCHER *et al.*, 2009), and it also changes the organizational culture (SIEBENHÜNER; ARNOLD, 2007).

DL may be summarized by the expression “learning how to learn”, involving both individuals and organizations (ARGYRIS; SCHÖN, 1996, p.29). It is a meta-level of learning that results in improved OL processes through evaluation of experience of past learning (SIEBENHÜNER; ARNOLD, 2007). Tuinstra *et al.* (2008) describe DL by using the expression “third-order learning”.

## Organizational learning focusing on sustainability

The sustainability paradigm is increasingly present in the discourse of organizations. Sustainability is also starting to be included on the agenda, or is even the mission statement itself, of various institutions, particularly in the First Sector and Third Sector. As for private organizations, sustainability has been incorporated through socio-environmental responsibility programs or their equivalents. Having monitored these changes, Müller and Siebenhüner (2007) suggest that progress towards sustainable development will not be consolidated through technological innovation alone, but also through conceptual, social and institutional innovations, making learning an essential factor. In this process of change, OL has been highlighted as a key element (SIEBENHÜNER; ARNOLD, 2007). According to Natrass and Altomare (1999, p.5):

Our research has shown that for those business corporations that make the commitment to sustainable development, the understanding and practice of organizational learning disciplines will be the indispensable prerequisite of a successful transformation to sustainability.

The association between AO and sustainability is a relatively unexplored in the literature and it awaits new discoveries and insights (JAMALI, 2004), but some studies try to explain their interrelationships.

Molnar and Mulvihill (2003) use the term “sustainability-focused organizational learning” to describe the “early experience of companies that are attempting to pursue sustainability or the triple bottom line<sup>iii</sup> while making substantial changes to their organizational cultures” (p.167). Implementing this concept in five companies provided some evidences, including the need for a shared vision of sustainability as the starting point of the process and the positive effect caused by reciprocal support amongst the organizations, suggesting a form of inter-organizational learning (MOLNAR; MULVIHILL, 2003).

In a complementary manner, Siebenhüner and Arnold (2007) use the expression “sustainability-oriented (organizational) learning”, where the term sustainability shows the direction for the processes of learning and change. With this focus, sustainability-oriented organizational learning is understood as “a process where organizations display behavioural changes that are attributable to a change in the knowledge and value base as a result of reflexive processes, and where the concept of sustainability served as a fundamental framework” (p.341). The principles of this approach involve: (a) sustainability knowledge (regarding human impacts on natural and social systems and possible solutions); (b) inter- and transdisciplinarity (integration between bodies of knowledge from different academic disciplines and from different social actors); (c) long-term perspectives (better understanding of the long-term consequences of human action and finding better ways to dealing with uncertainty); (d) moral and ethical development (moral development of social groups and societies to integrate norms of social justice, equity and ecological preservation into the existing systems of social norms); (e) deliberative approach (advancements in societal conflict resolution and discursive capabilities); and (f) capacity building (enhancement of society’s capacity to solve environmental and social problems) (MULLER; SIEBENHÜNER, 2007).

Both Müller and Siebenhüner (2007) and Siebenhüner and Arnold (2007) present and analyze the structural, cultural and personal barriers and facilitators (within an organization) alongside the contextual ones (outside the organization), which affect the outcome of OL oriented to sustainability (Table 1). In an empirical research involving six companies that have invested considerable effort in climate protection, Siebenhüner and Arnold (2007) found evidences of learning processes in all the organizations (SLL or DLL types), as well as incremental or radical changes. Although some factors proved relevant to all companies (such as qualification and training of human resources), it became clear that specific concepts and solutions are needed for each company. The work of Gazzola *et al.* (2011) completes Table 1.

Table 1. Factors affecting organizational learning oriented to sustainability, according to different works.

CATEGORY	MÜLLER AND SIEBENHÜNER (2007)	SIEBENHÜNER AND ARNOLD (2007)	GAZZOLA ET AL. (2011)
<b>Structural</b>	<ul style="list-style-type: none"> <li>• Hierarchy</li> <li>• Processes</li> <li>• Information instruments</li> <li>• Dialogue with stakeholders</li> <li>• Internal and external cooperation</li> </ul>	<ul style="list-style-type: none"> <li>• Company size</li> <li>• Personnel structure</li> <li>• Learning mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>• Organizational set-up (functions, power, responsibilities)</li> <li>• Processes and procedures</li> <li>• Information systems</li> <li>• Stakeholder dialogue, opportunities for participation</li> <li>• Internal and external cooperation</li> </ul>
<b>Cultural</b>	<ul style="list-style-type: none"> <li>• Openness</li> <li>• Aptitude for learning</li> <li>• Dedication to sustainability</li> <li>• Pluralism of values</li> </ul>	<ul style="list-style-type: none"> <li>• Values and norms</li> <li>• Internal networks</li> <li>• Leadership styles</li> <li>• Conflicts</li> </ul>	<ul style="list-style-type: none"> <li>• Values, visions, norms and beliefs</li> <li>• Dedication to the environment and sustainability</li> <li>• Openness to future aspirations</li> <li>• Learning focus</li> </ul>
<b>Personal (behavioral)</b>	<ul style="list-style-type: none"> <li>• Training courses</li> <li>• Openness to experiments</li> </ul>	<ul style="list-style-type: none"> <li>• Change agents</li> </ul>	<ul style="list-style-type: none"> <li>• Encouragement of individual reflection, reflective dialogue</li> <li>• Ability to change and experiment</li> </ul>
<b>Contextual (external)</b>	<ul style="list-style-type: none"> <li>• Policy instruments</li> </ul>	<ul style="list-style-type: none"> <li>• Market pressure</li> <li>• State regulation</li> <li>• Stakeholder demands</li> <li>• Public opinion</li> </ul>	---

Source: compiled by the authors.

Table 1 shows that openness to change and the learning are prerequisites in the transition towards a sustainability-oriented vision, which explains the relevance and usefulness of OL in promoting this objective and achieving the integration into the triple bottom line (JAMALI, 2006). In a complementary fashion, Molnar and Mulvihill (2003) state that combining OL with sustainability creates an interesting synergy and contributes towards a new theory and practice.

It is precisely the need to disseminate sustainability and make sustainable development happen within and through organizations that places EAs in a position where they may act as a source of specialized knowledge and respective learning.

### Learning resulting from environmental assessment processes

The role of EAs is gaining increasing recognition in terms of ensuring that environmental, social and economic aspects are taken into consideration when policy decisions are taken in the name of sustainability (GAZZOLA *et al.*, 2011). Armitage (2005) stresses that EA processes remain technical-oriented, because their main objective is to gauge the potential impacts of the activities under evaluation and to

tailor appropriate mitigation measures. According to the author, it is not easy to introduce principles of collaboration and learning in this context. However, Jha-Thakur *et al.* (2009) point out that along with their function of making policies, plans, programs and projects more environmentally sound, EAs make learning a valuable longer-term element in transforming individual, professional and organizational norms and practices. In this way, EAs are seen as “a learning process” (DEVUYST *et al.*, 2000, p.71; SÁNCHEZ; MORRISON-SAUNDERS, 2011, p.2261) or “an opportunity for learning” (FITZPATRICK, 2006, p.176).

In the context of EAs, learning represents “an increase in the capability for effective action in relation to the subject matter in hand, such as sustainable development, thereby encompassing the acquisition of knowledge and/or skill” (JHA-THAKUR *et al.*, 2009, p.135), leading to, in the long term, the “assimilation of environmental understanding into individual and organisational norms, practices and skills” (p.136). The authors stress that learning may be proactive and deliberate, or reactive and reflexive, but is always associated to change.

EAs operate in three learning areas: social and sustainability; political and strategic; and methodological (TUINSTRAN *et al.*, 2008). Learning resulting from EAs can be described by using two sequential and complementary dimensions: the first is called “learning how to do EAs” or “learning about EA” (JHA-THAKUR *et al.*, 2009), and involves the methodological area and procedures it includes. The EA process is qualified by means of SLL, with adjustments being made to the methods and tools used, with the aim of meeting the needs of the interested parties. The second dimension, “learning through EA”, is a more advanced level (JHA-THAKUR *et al.*, 2009), and includes the three areas described by Tuinstra *et al.* (2008), or in other words, technical-scientific and methodological (operational) knowledge. In this dimension, the learning is both SLL and DLL and results in the actors changing their perceptions, behaviors and values.

Figure 1 shows the interrelationship between learning area, learning dimension and types of organizations affected by respective learning.

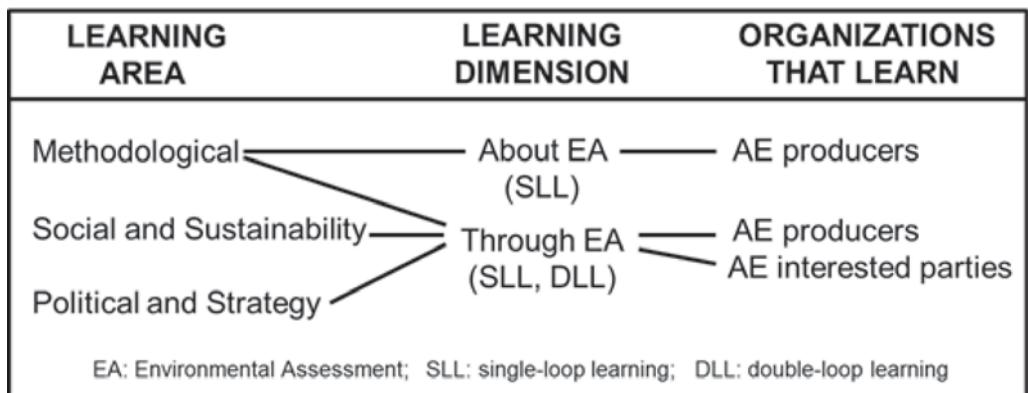


Figure 1. Learning in environmental assessment processes. Source: Compiled by the authors, based on Tuinstra *et al.* (2008) and Jha-Thakur *et al.* (2009).

These learning dimensions (about EA and through EA) can occur at the individual, group and organizational levels.

### *Individual and group learning*

The occurrence of IL in EAs has been identified in various studies (DIDUCK; MITCHELL, 2003, FITZPATRICK; SINCLAIR, 2003, HAYWARD *et al.*, 2007, FISCHER *et al.*, 2009 and JHA-THAKUR *et al.*, 2009). When studying the EA of a pork processing company installation, Diduck and Mitchell (2003) found two types of individual learning – instrumental and communicative. The instrumental learning included the acquisition of technical and scientific knowledge, social and economic knowledge, of legal, administrative and political procedures and about potential risks and impacts. The communicative learning, for its part, involved questions such as insights into their own interests, insights into the interests of others, as well as methods and strategies of communication and social mobilization. Hayward *et al.* (2007) observed that IL improved knowledge and honed skills, but higher levels are only attained if there is a matching between the interests of the individual and those of the organization.

GL emerges as a fundamental part of the process, as EAs are compiled by multidisciplinary teams of technicians. Therefore, the exchange of information, the search for common benchmarks and conceptions, the integration of different know-how and the construction of a coherent and monolithic body of knowledge require a constant process of mutual learning.

### *Organizational learning*

Although EAs may be construed as processes that result in learning, and often bear results at the individual and group levels, consolidating OL is a considerably more complex quest. In this regard, Fitzpatrick (2006, p.160) reiterates that “individuals must learn – acquire knowledge – as a function of participation in EA, but that learning must also be absorbed into an organization”. For this reason, the author believes three “internal structures” are necessary: information sharing, information interpretation and organizational memory (OM).

EA processes normally involve several organizations, which play different roles (GLASSON *et al.*, 2006). In the first place, the public or private developer organization is the proponent of the plan, program or project that is subject to assessment. The regulatory governmental entities play a command and control role based on the legal principles about EA. The producing organizations<sup>iv</sup> execute the EA in practice, i.e. they are responsible for generally studying the issue and all the operational phases of the process, including the drafting of the written report and presenting it to the contracting entity. The fourth group is known as “affected parties”, which include environmental agencies, institutions with economic interest, non-governmental organizations and the general public. Lastly, there are the “facilitators” (GLASSON *et al.*, 2006), which is the name given to technical and professional consultants hired by any of the other parties.



Based on the assumption that compiling an EA, with its inherent responsibilities, is a different activity to monitoring it, analyzing it and/or improving it, for the purposes of this work, the organizations involved in EAs are classified as producers and interested parties, with the second group comprising developer, regulatory, facilitating and affected organizations.

Normally many organizations show an interest in the EA and take part in the process of elaborating it (for example, by attending public hearings and giving opinions on the EA or its object, but without actually doing it themselves) or have direct and voluntary access to a knowledge product that it has generated. In some instances, this rapprochement only occurs when the study has been concluded. The degree of involvement and participation of organizations interested in EA depends on various factors and some organizations only participate with regard to specific topics (FITZPATRICK, 2006). It can be assumed, for example, that the levels and types of learning – particularly OL – experienced by a non-governmental environmental institution strongly interested in EA subject will be different to the outcomes obtained by a commercial company which has a purely “geographical” bond to the EA (i.e. where the subject of the EA concerns the region where the company is established). Special emphasis should be given to the developer organizations, which, as they are directly involved, should display a high level of learning during the process and with the evaluation results.

OL observed in organizations interested in EA does not merely depend on their level of interest, but also, and crucially, on the opening up and stimulus that the process provides for public participation and external interaction. Public participation acts as a bridge in terms of exchanging information between the producer organization and the interested ones, making the possible to include new and different knowledge by combining lay and scientific knowledge. When people are involved in an EA as a deliberative process, where they can give their opinions and/or decide through public consultation, learning occurs (FITZPATRICK *et al.*, 2008). In this way, Fitzpatrick (2006) and Sinclair *et al.* (2008) highlight the relationship that exists between EAs, participation in an EA and the resulting OL. For Fischer *et al.* (2009), one of the aspects that determine if SLL and DLL happen in EAs is the ability to engage and communicate with the interested parties. Sánchez-Triana and Ortolano (2001) and Chávez and Bernal (2008) suggest that the existence (or not) of public participation in EA processes is linked to the OL obtained by the organization that produces the EA.

Some works stress OL elements in EAs, as can be seen in Table 2.

Table 2. Organizational learning (OL) in environmental assessment (EA) processes: EA type and subject, country where based, category of organization doing the learning, type of learning, and textual reference regarding OL.

Source	EA type	EA subject	Country	Learning organization	OL
		Textual reference to learning			
Sánchez-Triana and Ortolano (2001)	EIA	Sulphuric acid plant	Colombia	Producer of EA	NS
		"The Corporation learned by doing [...] that involving the public could restrict its autonomy" (p.230).			
Fitzpatrick (2006)	EIA	Hydroelectric	Colombia	Producer of EA	NS
		"Learning by doing is also reflected in the modification of [Organization] EIA program in 1990" (p.237).			
Fitzpatrick (2006)	NS	Two cases: Hydroelectric and diamond mine	Canada	Interested in EAs	S; D
		"Organizational learning was evident in both case studies. All organizations who participated in this research experienced single-loop learning outcomes" (p.177).			
Hayward et al. (2007)	NS	Floodway	Canada	Interested in EAs	S; D
		"The double-loop learning experienced by the [Organization] contributed to the development of its organizational goals and objectives" (p.248).			
Chávez and Bernal (2008)	EIA	Hydroelectric	Mexico	Producer of EA	S
		"The project has resulted more in an instrumental learning, changes in strategies of action and some assumptions underlying strategies" (p.175).			
Fitzpatrick et al. (2008)	EIA	Diamond mine	Canada	Interested in EA	NS
		"Learning outcomes associated with the EA addressed: [...] Organizational skills [...], including how to use the process to further organizational objectives; [...] interaction among different organizations [...]" (p.14).			
Fischer et al. (2009)	SEA	Land use planning	Germany	Producer of EA	S; D
		"Through SEA, attitudes and possibly values of individuals as well as occasionally organisations appear to have changed" (p.428).			
Jha-Thakur et al. (2009)	SEA	Land use planning	Germany England Italy	Producers of EAs	S; D
		"It provided appropriate spaces and moments for interaction, opening up opportunities for single- and double-loop learning" (p.141).			
Gazzola et al. (2011)	SEA	Land use planning	Italy	Producer of EA	NS
		"Organisational learning was then seen as a positive driver in the [Organization] ability to change and experiment, and to remain responsive and flexible to new knowledge and innovation [...]" (p.198-9).			

EA: Environmental Assessment; EIA: Environmental Impact Assessment; SEA: Strategic Environmental Assessment; NS: not specified in the work; OL: type of organizational learning – single-loop (S), double-loop (D).

The OL stemming from participation in EA processes also produces different effects in terms of their scope and nature. Some of the effects are more evident in organizations producing the EA, while others appear both in these and in organizations interested in the EA. The effects as a whole enable to gauge the potential change that EAs, through OL, can cause in the organizations involved and thus create a new reality to them.

Table 3. Main kinds of learning at the organizational level arising from organizations' participation in environmental assessment processes.

**Effects observable in all organizations (producing and/or interested in the EA)**

- Enlargement of the organization's knowledge base and repertory, through (i) technical knowledge related to the undertaking subjected to the EA and its biophysical, economic and social aspects, as well as notions of its possible impacts and the way to minimize them, and (ii) information of a general nature that may be relevant for the organization, notably those regarding legislation (FITZPATRICK *et al.*, 2008; SINCLAIR *et al.*, 2008);
- Modification of organizational values, beliefs, objectives, norms and missions, oriented around more sustainable visions and practices (HAYWARD *et al.*, 2007; FISCHER *et al.*, 2009; GAZZOLA *et al.*, 2011);
- Change in attitudes, perceptions, routines and behaviors of and in the organization (FISCHER *et al.*, 2009; GAZZOLA *et al.*, 2011);
- Greater environmental awareness of the organization and its members (GAZZOLA *et al.*, 2011);
- Expansion of the organization's network of external relations, both with political actors and other organizations, extending the opportunities for cooperation and mutual collaboration (FITZPATRICK, 2006; HAYWARD *et al.*, 2007; FITZPATRICK *et al.*, 2008; SINCLAIR *et al.*, 2008);
- Improvement in the way in which the organizations participate in and contribute to EA processes, as well as their influence on decision-making (FITZPATRICK, 2006; HAYWARD *et al.*, 2007; SINCLAIR *et al.*, 2008);
- Improvement in the communication processes and techniques used to disseminate ideas and opinions (way in which they are presented publicly), and in contacts with the media (FITZPATRICK, 2006; HAYWARD *et al.*, 2007).

**Effects particularly observable in organization(s) producing EAs**

- Enhancement of process for carrying out EA, for example, in terms of public participation, enabling higher quality in achieved outcomes (SÁNCHEZ-TRIANA; ORTOLANO, 2001; FITZPATRICK, 2006; CHÁVEZ; BERNAL, 2008);
- Strengthening of the dialogue and cooperation between parties aimed at solving problems and preventing or overcoming conflicts (FITZPATRICK, 2006; CHÁVEZ; BERNAL, 2008);
- Formation of an "information bank" stored in the organization's memory which will serve as a basis and support for other EAs and/or organizations (FITZPATRICK, 2006; JHA-THAKUR *et al.*, 2009).

In addition to the effects outlined in Table 3, a further two effects can occur both for producing and interested organizations: using the incorporated knowledge, an “organizational memory of sustainability” can be formed, which can steer the organization’s procedures and future decisions; and knowledge acquisition, which can be transformed into valuable elements for the organization, and can even guide new strategies and help it (re)position itself on the market.

### Organizational memory from environmental assessments

One of the effects arising from EA-related OL (Table 3) is the formation of OM<sup>v</sup> from information and knowledge assimilated by both producing and interested organizations. OL and OM are very closely linked constructs, as they mutually feed into each other (SPENDER, 1996). Olivera (2000) stresses that storing new knowledge and using stored knowledge are key components of OL, while for Fitzpatrick (2006), the existence of OM is a critical factor in terms of achieving OL.

There is a dearth of literature dealing with employment and the importance of OM as an outcome of EA processes. On the issue of technical staff rotation, Jha-Thakur *et al.* (2009) state that the creation of mechanisms for learning retention can be crucial in terms of avoiding constantly “reinventing the wheel”, in a direct reference to OM. Focusing on SEA, Gachechiladze (2010) believes that a memory system would help preserve people’s data, experiences, skills and know-how, enabling the effective use of the information collected/generated through monitoring the assessment over time. Hayward *et al.* (2007) note that the development of OM in two organizations interested in EA was made easier through dialogue between their members. In these cases, OM was formed through images and mental maps, recordings of group meetings, and digital archives, among other methods.

Fitzpatrick (2006) states that OM is simultaneously stored and recovered for use in preparing future interventions (assessments). In the two EAs, the author observed the use of human and non-human repositories. Among the former, in addition to individual memory itself, the OM was preserved through the organizational culture (shared histories, dialogues), the memory of inter-organizational teams and external people (such as former employees). The non-human systems, such as the documentation created in the EA, also contributed to the OM. Of particular emphasis were the reports of the assessment activities, articles in scientific journals, conference presentations and websites. Fitzpatrick (2006) also points out that non-human repositories ensure that with each subsequent EA process, members of the organization had access to material, processes and learning outcomes associated with previous experiences.

Sánchez and Morrison-Saunders (2011) describe the OM system maintained by the central EIA agency operating in Western Australia. Some of the system’s repositories can be accessed by the general public and are used for consultation purposes and for the acquisition of specialized knowledge by those producing new EAs. The materials that portray real cases or solutions are more frequently used than those based on

generic guidelines. The article also indicates that members of the agency prefer to obtain information from official sources and documents than from people directly. One of the OM's biggest problems is that the information presented is outdated.

### **Brief description of the Brazilian reality**

In Brazil, the prospects for OL from EAs are limited by a number of factors, of which three must be stressed in particular: the qualitative, informative and "communicative" shortcomings of the final reports; the inadequate public dissemination thereof; and the precarious nature of the OM systems used.

On the first aspect, Resolution CONAMA No 1/96 (Article 9, single paragraph) stipulates that the EIS shall produce an Environmental Impact Report – RIMA, which "should be presented objectively and in an understandable fashion, (...) in accessible language, (...) so that the advantages and disadvantages of the project can be understood, as well as the environmental consequences of its implementation" (CONAMA, 2012, p.925). However, many EIS contain RIMAs that are incomplete, distorted of reality and/or employ language that is inappropriate in terms of being understandable to the general public (ESMPU, 2004), or else they are also too long, which puts people off from reading and analyzing them, and prevents them from being understood properly. Therefore, there are clearly factors that can harm the learning which may emerge from the EA process. The effect is even greater on non-technical stakeholders, as is the case with the major part of the general public (lay people) and interested organizations.

Confirming the effect of the quality of EA reports on resulting learning, an audit made by the Brazilian Federal Court of Auditors (TCU) of IBAMA<sup>vi</sup> (Case n<sup>o</sup> TC 009.362/2009-4; Judgment n<sup>o</sup> 2212/2009 – TCU) highlights:

As the systematic monitoring of environmental impacts is deficient, a great deal of important information is no longer collected and assessed, which renders organizational learning more difficult. In this way, the institutionalization of best management practices and the ongoing improvement actions – due to problems from earlier stages – are hampered in Ibama's EIA process. (TCU, 2009, p.19).

The second question to consider regards publicizing or disseminating the results and conclusions of the EAs, whose content is reflected in the respective RIMAs. The Brazilian Constitution stipulates that preliminary environmental impact studies "will be publicized" (Article 223, paragraph 1, indent IV). This publicity should be taken to mean a public announcement before a study is carried out, along with effective dissemination once it has been concluded. CONAMA Resolution No 1/96 stipulates that "the RIMA will be accessible to the general public" and that "copies of it shall remain available to interested parties in the documentation centers or libraries of the (now-defunct) SEMA [Special Environment Office] and in the state environment body" (Article 11, heading).

However, Machado (2013, p.170) stresses that

Therefore, by using the expression “will be publicized” the Constitution itself is saying that there is nothing secret in this [*Environmental Impact Study*], as all its content – and not just a part – is accessible to the general public. There is no such thing as a half-confidential/half public EPIA [*Preliminary Environmental Impact Study*].

*Publicizing* the Study transcends the simple concept of allowing the general public to read the Study, as it makes it the public authorities’ duty to ensure the content of the Study becomes public knowledge. Making the Study available to the public does not fulfill the constitutional precept, as – to the best of my knowledge – the expression “will be publicized” means publishing – albeit in summarized form – the Impact Study in an appropriate media outlet. (emphasis in the original).

Contact with the knowledge laid out in the final reports is crucial to achieving the learning resulting from EAs, at least for non-participants. Therefore, the reports need to be widely publicized and disseminated using media that make them easily available to interested parties, such as electronic/digital format and by posting them on the Internet. It is unreasonable that access be limited to the physical copies and/or specific locations for consultation.

The aforementioned judgment bears out this view, stipulating to IBAMA that

[...] it should make available on Ibama’s environmental licensing site the documents regarding the conclusive technical opinions on the environmental viability of undertakings, previous, installation and operating licenses, the Environmental Impact Studies and Environmental Impact Reports, and other documents relevant to the environmental licensing process for undertakings under its responsibility. (TCU, 2009, Report, p.51, and Judgment, p.1).

In the same way, after analyzing eighty EIAs for projects nationwide, a group of more than thirty expert analysts from different departments of the Federal Prosecutor’s Office suggested the “creation and/or consolidation, by environmental bodies, of a database of Studies, enabling the knowledge produced to be recorded and accessed, and also reducing the time and costs of producing new Studies” (ESMPU, 2004, p.35).

The third aspect described refers to the OM that is or should be the result of EA processes carried out nationwide. By studying eight producing organizations, Costanzo and Sánchez (2012) observed that the most relevant knowledge repository in all cases are the people involved (collaborators). However, in just one organization the knowledge is primarily accessed through technical products (reports), whereas in the others the most commonly used process is that of socialization (work meetings, conferences and in-house meetings). The audit of IBAMA bears out this picture – OM focused on human repositories – by stating that “[...] the absence of a computerized database with the licensing information [...] causes a loss of memory of this process by

the institution, as the knowledge remains with the analyst and not with the institution” (TCU, 2009, p.36).

Another audit of IBAMA (Case TC 025.829/2010-6) reinforces this observation even more emphatically:

67. By carrying out inspections, analyzing reports and preparing opinions and technical notes, the Ibama analyst uses his professional knowledge and experience and shares them with the other team members. Each case under analysis offers some kind of learning to each analyst, which can be reused in subsequent inspections, analyses and opinions. However, analysts often stay at Dilic [IBAMA's Environmental Licensing Office] less than five years (this detail was mentioned in interviews and did not come from the information provided officially) and there are no established mechanisms that enable a part of the knowledge acquired on an individual basis to be transformed into organizational learning.

68. When asked about the issue of knowledge retention, some of the following answers were obtained during the interviews:

“learning is in your head, not on paper”

“if the technician gets amnesia, the whole thing's over [...]”

“we lose a lot of institutional memory”

69. Nevertheless, given the high level of staff rotation, training programs for individuals are broadly insufficient, despite definitely being necessary. There is no doubt that individual learning takes place while technical staff stay at Dilic, but there is practically no organizational learning or institutional mechanisms that make it possible. This observation was already made during audit TC 009.362/2009-4. (TCU, 2011: 759).

Although IBAMA and the consultancy firms studied by Costanzo and Sánchez (2012) may well not constitute a representative sample of all Brazilian organizations working in the EA field, it is possible to state that the picture of OM observed in them is repeated in a large number of other similar entities. This scenario suggests that Brazilian EA producing organizations need to adopt OM systems that retain knowledge and make this knowledge more easily and permanently available to members of the corporation. Olivera (2000) stresses that OM is not defined merely by its content, but also by its underlying structure and by the processes that make it possible. In this way, according to the author, OM should be made up of both knowledge – which is spread out (for example, knowledge retained by people and in documents) – and mechanisms that enable it to be accessed. The current reality, where OM is highly focused on individuals, represents a great risk of losing organizational knowledge, as reflected in lower levels of OL. A paradigm shift is therefore needed as regards the stance and culture of Brazilian organizations, which must “learn” (double-loop) to valorize, adopt and institutionalize a system of OM – content, structure, processes – that can prove itself efficient and effective.

However, thought must be given to the fact that creating OM systems that are restricted to the in-house set-up of the producing organizations (intra-organizational) tends to have little impact on OL in interested organizations. A measure of this kind needs to be linked to the implementation of a “public memory” system (supra-organizational level), which would act as a mechanism for storing, indexing and making EAs publicly available at a regional or national scale. By guaranteeing full access to the documentation of the different EAs carried out in that jurisdiction through an interactive virtual interface, the system could produce learning (on an individual, group and/or organizational basis) both in producing and interested organizations, as well as reaching average citizens (social learning).

The “public memory” system can be set up in the form of a “knowledge center” (KC), which is described as “an interesting example of how technology and people can effectively combine to collect, store and provide access to experiential knowledge” (OLIVERA, 2000, p.827). Van Gent (2011, p.536) broaches KCs directly for SEA (EA-type) and defines them as “a focal point for the collection and dissemination of knowledge”, which can cover a local, organizational, country, regional or wider perspective. Olivera (2000) indicates that, in terms of content, KCs include the personal expertise of their members, documents generated in projects, best practice, solutions to specific problems, methodologies, background information relevant to specific domain and directories of experts in the domain area. In the case of an EA-oriented KC, the documents to be made available include the legislation, guides and manuals, copies of EA reports, case studies and lessons learned, among others (VAN GENT, 2011). In Brazil, KCs frequently adopt the name and/or the format of knowledge “observatories”.

Analysis of the current situation leads to believe that the implementation of KCs to serve as “public memories” could represent the opening of a new scenario for EAs in Brazil, with positive effects on the level of learning that the process offers those involved. This progress should be driven by solutions, artifacts and knowledge engineering and management techniques.

## Final considerations

The literature analyzed and summarized in this article would suggest that EAs act as catalysts for sustainability- and sustainable development-oriented processes (triple bottom line). Direct participation in or monitoring of the scientific activities comprising the assessment, or merely contact with some of its information products, can lead to cognitive and/or behavioral changes, both at individual and group level, as well as at organizational level. Tuinstra *et al.* (2008) state that many EAs stimulate single-loop learning and some also enable double-loop learning, which has been observed in the works discussed here. Several factors act as barriers to or stimuli for learning, but special importance is given to the degree of openness and encouragement that EA attaches to public participation and, therefore, to merging and exchanging knowledge.

Faced with these aspects, Bond *et al.* (2010), Gazzola *et al.* (2011) and Sánchez and Morrison-Saunders (2011) mention that, in order to intensify their ability to create,



incorporate, use and store knowledge, it is recommended that organizations producing EAs adopt a “learning organization” approach. Instead of being limited to the pages of the reports, pro-sustainability knowledge produced by EAs would circulate through the minds of the people and cultures of the organizations so as to become established in them, to mold perceptions, values, behaviors, consciences, attitudes and worldviews. In this scenario, EAs would cease to be a merely informative process, and, in fact, become a formative, knowledge- and learning-based process.

Given EA results, both producing and interested organizations have the potential to act as “sustainable learning organizations”, or, in other words, “organization with enough sustainability knowledge, would act according to, and would be considered as a role model to prevent, eliminate and/or reduce the environmental and occupational risks associated with its operations while enhancing and strengthening its profitability” (VELAZQUEZ *et al.*, 2011, p.36).

However, EA-related learning must not be seen as having powers that it does not possess, and it is necessary to understand its limits in terms of transformative ability. Sinclair *et al.* (2008) believe that due to the learning that takes place during EAs, some organizations boost their profiles, including a more holistic vision, and individuals can change their personal behavior towards more sustainable practices. Nevertheless, policy decision-making, based on the evaluations, still confirms the dominance of growth-oriented conventional thinking from a strictly developmental stance. In the same way, Sánchez-Triana and Ortolano (2001) stress that the OL observed in the context of EAs can help organizations achieve their objectives but does not necessarily lead to improvements in environmental quality. New studies, particularly empirical ones, are crucial in terms of understanding, measuring and enhancing the learning resulting from EA processes, notably OL, as well as to maximize their effects in the search for better overall sustainability standards. Of further note is the importance of studies that focus on the reality in Brazil, particularly in terms of projecting and evaluating “public memory” systems for EAs and the potential role of knowledge observatories in this context.

## Notes

<sup>i</sup> A certain amount of confusion and interchanging use of the words sustainability and sustainable development - as if they were synonymous - can be observed in the literature (BELL; MORSE, 2003). It is well known that the issue is a complex one and given this, these terms are used as they appear in the original cited articles. In the specific ambit of this study, the term “sustainability” (i.e. learning about and/or for sustainability) has been used. The explanation for this is that, in some situations, learning in organizations takes place in terms of sustainability *per se*, as an attribute (for example, by modifying individual conceptions and values), and not in relation to (sustainable) development, as an objective.

<sup>ii</sup> This article adopts the view of Etzioni (1989), who considers organizations as social entities (or human groupings) deliberately constructed and reconstructed in order to achieve specific goals. This definition has been widely used in various fields, including the environmental one (GAZZOLA *et al.*, 2011).

<sup>iii</sup> Expression originally employed by Elkington (1997) and now widely used, which portrays the celebrated triple dimension of sustainability: environmental, economic and social.

<sup>iv</sup> There are cases where EAs are not produced by an organization in the strict sense of the word, but by ad hoc committees of specialists. Brazilian legislation, for example, stipulates that “the [environmental] studies necessary for the licensing process should be carried out by legally qualified professionals at the expense of the entrepreneur” (CONAMA Resolution No 237/97, Article 11) (CONAMA, 2012, p.933). No mention is made on the obligation to formal organizations realize this work.

<sup>v</sup> Organizational memory “has been defined as the means by which organizations store knowledge for future use” (OLIVERA, 2000, p.813). According the author, “organizational memory systems are sets of knowledge retention devices, such as people and documents, that collect, store and provide access to the organization’s experience” (p.815).

<sup>vi</sup> The Brazilian Institute of Environment and Renewable Natural Resources – IBAMA is the body responsible for carrying out federal environmental impact assessment actions (Article 2, indent III of IBAMA’s governance structure, approved by Decree No 6.099 of 26 April 2007).

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# LEARNING IN ORGANIZATIONS AS OUTCOME OF ENVIRONMENTAL ASSESSMENT PROCESSES

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**Resumo:** As avaliações ambientais (AAs) são ferramentas empregadas na busca pela sustentabilidade das intervenções humanas que oferecem riscos ecológicos. Por envolver pessoas e conhecimentos, as AAs podem resultar em aprendizagem. A partir de revisão de literatura e análise documental, este trabalho visa investigar a AA como fator de aprendizagem, tanto no contexto da organização que a elabora quanto em organizações interessadas ou afetadas pela AA. A participação em AAs e/ou o acesso aos seus produtos informacionais podem promover aprendizagens em diferentes dimensões, níveis e tipos, com inúmeros efeitos potencialmente positivos às organizações. O grau de abertura e incentivo que uma AA concede à participação pública é um elemento que afeta o intercâmbio de conhecimento entre cientistas e atores sociais e, portanto, a intensidade de aprendizagem. Repositórios da memória associada às AAs podem apoiar a aprendizagem nas organizações e possibilitar a elaboração de novas AAs com o emprego de conhecimentos obtidos em experiências anteriores.

**Palavras-chave:** Aprendizagem organizacional. Avaliação ambiental. Conhecimento. Desenvolvimento sustentável. Sustentabilidade.

**Abstract:** This study aims to investigate environmental assessments (EAs) as a factor in the learning process, both within organizations that elaborate the EAs and those interested in or affected by them. Environmental assessments are tools used in the search for sustainability of human interventions that provoke ecological risks. By involving people and knowledge, EAs can result in learning outcome gains. Participation in EAs and/or access to their information products can promote learning in different dimensions, levels and types, with many potentially positive effects for organizations. The openness and encouragement that EAs can grant to public participation is one element that affects the exchange of knowledge between scientists and social actors and, therefore, the intensity of learning. The creation of memory repositories associated with EAs can support learning in organizations and enable the development of new EAs with the use of knowledge obtained from previous experiments.

**Keywords:** Environmental assessment. Knowledge. Organizational learning. Sustainability. Sustainable development.

**Resumen:** Las evaluaciones ambientales (EAs) son herramientas empleadas en la busca por la sostenibilidad de las intervenciones humanas que ofrecen riesgos ecológicos. Al envolver personas y conocimientos, las EAs pueden resultar en aprendizaje. A partir de una revisión de la literatura y análisis documental, el presente trabajo pretende investigar la EA como un factor de aprendizaje, tanto en el contexto de la organización que la elabora cuanto en organizaciones interesadas o afectadas por la EA. La participación en EAs y/o el acceso a sus productos informativos pueden promover aprendizajes en diferentes dimensiones, niveles y tipos, con innúmeros efectos potencialmente positivos a las organizaciones. El grado de abertura y incentivo que la EA concede a la participación pública es un elemento que afecta el intercambio de conocimiento entre científicos y actores sociales, y por lo tanto, la intensidad de aprendizaje. La formación de repositorios de la memoria asociada a las EAs puede apoyar el aprendizaje en las organizaciones y posibilitar la elaboración de nuevas EAs, con el empleo de conocimientos obtenidos en experiencias anteriores.

**Palabras-clave:** Aprendizaje organizacional. Conocimiento. Desarrollo sustentable. Evaluación ambiental. Sostenibilidad.

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