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Green policies within the framework of the socio-ecological syste and the Sustainable Development Goals: *an approach from the cement industry*

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Green policies within the framework of the socio-ecological system and the Sustainable Development Goals: an approach from the cement industry

Paola Vera

Resumen

Desde los años 70 ha habido un creciente interés en las políticas de cooperación internacional para el combate del cambio climático y sus efectos sobre el planeta, pero estas no han tenido el efecto esperado. Una de las principales críticas a estas políticas, es que no han abordado la cuestión del desarrollo humano y las diferencias socioeconómicas que existen. Es por esto que la Agenda 2030 de la ONU se ha centrado en las Metas del Desarrollo Sustentable (SDG) que buscan la protección del medio ambiente, a la par con la de las sociedades humanas. Ya que ambas son interdependientes, deben ser abordadas y sus problemas resueltos de manera sustentable teniendo en cuenta todos los factores socioeconómicos que puedan afectar los resultados o acciones a tomar respecto al cambio climático, tanto niveles macro como micro en lo económico y lo social.

Abstract

Since the 1970s there has been a growing interest in international cooperation policies to fight against climate change and its effects on the planet, but these have not had the expected results. One of the main criticisms of these policies is that they have not addressed the issue of human development and the existing socioeconomic differences. This is why the UN 2030 Agenda has focused on the Sustainable Development Goals (SDG) that seek the protection of the environment, on a par with that of human societies. Since both are interdependent, they must be addressed and their problems solved in a sustainable way, taking into account all the socio-economic factors that may affect the results or actions to be taken regarding climate change, both at macro and micro levels in economic and social terms.

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Introduction

Climate change, the loss of biodiversity and the disturbance of the nitrogen cycle are three —fifth— planetary limits whose parameters are, at least for a decade, above the critical values that are supposed to maintain a safe space for life (Rockström *et al.,* 2009). The evidence that we need to carry out serious actions to recover the health of the socio-ecological system —which includes the subsystems of the Earth and the other human subsystems— is unavoidable.

In spite of global agreements and initiatives as well as national and local policies and programs on climate change, CO_2 emissions —and other greenhouse gases— have not been reduced to levels that would avoid exceeding the 1.5°C threshold for global temperature increase (Den Elzen *et al.,* 2017, p. 3). The consequences of climate change not only place us before the threat of human and economic losses associated with floods (Dottori *et al.,* 2018), heat waves or forest fires, but we also face the risk of interruption of water services in ecosystems and impacts on biodiversity (Nolan *et al.,* 2018), that is, in the face of the loss of living conditions that favored our evolution (Rockström *et al.,* 2009).

Neither has it been possible to reduce the rate of biodiversity loss, on the contrary, the pressure on it increases (Butchart *et al*., 2010) to the point that it is indicated that there are indications of the unleashing of the sixth mass extinction (Ceballos *et al.,* 2015). The situation of the loss of biodiversity is aggravated by the deficiency in governmental monitoring —including the absence of it—, the size of the human population, corruption and **threat industries** —those that use natural resources intensively, release pollutants or transport invasive species— (Driscoll *et al.,* 2018).

Additionally, the main root of pollution that affects the nitrogen and phosphorus cycles is caused by the processes of agriculture (Rockström *et al*., 2009) that also emits greenhouse gases that contribute to global warming, in addition to the population growth that pressures the global demand for food (Godfray *et al.,* 2010) and this affects the change of land use and the loss of biodiversity.

As can be seen, these are interrelated problems, whose attention is at both the global and local levels, problems that require the participation of multiple institutions at various levels of organization (Dietz *et al.*, 2003). These problems concern the green or environmental policy, that is, the set of actions implemented with the intention of solving environmental problems, from the public to the private sphere. In addition, this set of green policies needs to be coherent with the other policies of the same level —for example, at the national level, the green policy with economic policy—, in addition to linking the global guidelines with the local reality to guide actions towards common problems.

In this sense, the 2030 Agenda for Sustainable Development promoted by the United Nations represents a set of global guidelines that, through the Sustainable Development Goals (SDG) —unlike other initiatives—, seeks to integrate the economic, social and environmental areas in the public sphere and private of diverse levels of organization —global and local—, in addition, to consider governance and financing objectives as necessary aspects for its implementation (United Nations, 2015).

This orientation of the SDG recognizes the complexity of the environment: the socio-ecological systems (SES) where human activities take place present interdependent relationships between the different subsystems and scales that compose it, in which the result of interactions on a level or scale has consequences in others (Dietz *et al.,* 2003; Walker *et al.,* 2004; Ostrom, 2009; Berkes and Ross, 2016).

From this perspective of interdependence of scales, the green policy requires to be framed in the direction of the SDG and, both, to share the characteristics of the SES with the purpose of creating synergies and approaching the fulfillment of its ultimate objective: to restore the planetary limits. The objective of the work is to identify the characteristics of the socio-ecological system that should be considered for the design of actions tending to solve common environmental problems, such as the design of a green policy in accordance with the Sustainable Development Goals.

The socio-ecological system, resilience, and sustainable development

Human beings, their actions and interactions are contained in the socio-ecological system (SES), which is composed of multiple subsystems and internal variables, at multiple levels of organization; and although the subsystems are relatively separable —for example, in the economic and political subsystems— their interactions are not: the results that occur at one level affect or feedback to other components of the subsystem (Ostrom, 2009, p. 419). That is, it is a system with nested relationships and multilevel interactions (Berkes and Ross, 2016, p. 187).

According to Walker, Holling, Carpenter and Kinzig (2004), SSEs present three attributes, or capacities, that determine their trajectory: resilience, adaptability and transformability (Figure 1). Resilience refers to the ability of a system to absorb disturbances or disturbances without leading to a change in the alternative state of the system, that is, the system reorganizes or recovers maintaining the same functions, structure, identity, and feedback (Scheffer, et al., 2001; Walker et al., 2004). The planetary limits —which Rockström *et al.*, (2009)— refer to the threshold, or critical values, which, when exceeded, put at risk the resilience of the current system, and presumably would lead to the loss of what is considered the safe space for life.

The interaction between different SES scales implies that a certain level can be affected by what happens in other levels of the system, this characteristic of resilience is called panarchy (Walker *et al.,* 2004). For example, although China and the United States[1] are the countries that produce the greatest amount of CO_2 emissions (World Bank, 2019) that contribute to global warming, other countries have been more exposed and are more vulnerable to extreme climate events, such as Puerto Rico, Honduras, Myanmar, Haiti and the Philippines,[2] which, with the exception of Puerto Rico, are considered low and middle income countries (Germanwatch, 2019, p. 4).

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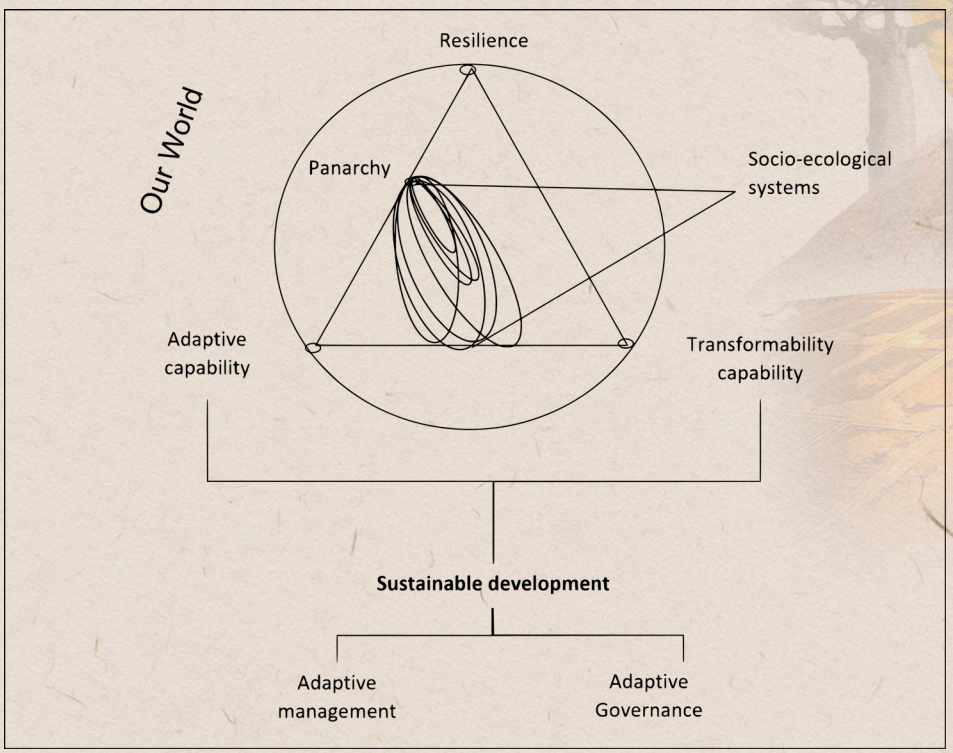
1 It refers to the carbon dioxide emissions that come from the burning of fossil fuels and the manufacture of cement; in the period 1998-2014, China —of medium-high income— and the United States —of high income— produced 21.8% and 18.3%, respectively, of total carbon dioxide emissions. Estimates made with data from the World Bank (2019).

2 Nicaragua, Bangladesh, Pakistan, Vietnam, and the Dominican Republic are also among the countries most exposed and vulnerable to extreme weather events, for the same period (Germanwatch, 2019, p.4).

Figure 1. Socio-ecological systems



Source: Holling (2001); Walker et al., (2004); Smit and Wandel (2006).

The other two attributes of the system, the capacities for adaptation and transformation, are inherent to the human being. Adaptation capacity refers to how the actors influence the resilience of SSE, in particular in its management (Walker *et al*., 2004). For example, it is possible to use forest resources in a way that conserves them —that is, with levels of exploitation rates of the resource that allows them to recover and maintain the functions of the subsystem—, or else it can be overexploited and thus end with the resource. In addition, adaptive capacity is characterized by being specific to the context, both in space and time, by the interdependence between scales and by its dynamics (Smit and Wandel, 2006). This refers to the fact that the endowment, as it was called, of the adaptive capacity is heterogeneous, changing from one region to another, between countries and within them. Whereas, the interdependence between scales means that one level of organization is affected by another; For example, it is feasible that national public policies —the green policy in coherence with economic policy— incentivize private investments in local renewable energy projects and thereby contribute to the mitigation of CO2 emissions, in this case a level higher organization forms opportunities in another lower one; on the contrary, the conflict between public policies could discourage investment of this type.

Whereas the attribute of transformability is the ability to create a new system when some subsystem is unsustainable (Walker *et al.*, 2004). For example, poor socio-economic conditions or corruption and injustice —when they exceed the threshold of social resilience— lead the inhabitants of a country to movements, such as revolutions, and with that to radical changes in the political subsystem. Another example is the recovery of habitat from places that were quarries (Union Européenne des Producteurs de Granulats, 2013).

In the context of SES, sustainable development is "the objective of fostering adaptive capacities and, at the same time, creating opportunities" (Holling, 2001, p. 399). Sustainable development is the convergence of adaptation and transformation capacities oriented to maintain and build —created— the resilience of SES, employing, as means, adaptive management and adaptive governance. Adaptive management promotes long-term goals, considers feedback and learning in its evaluation, so that it incorporates change, as an element, when contemplating the search for new options (Walters, 1986, p. 6). On the other hand, adaptive governance seeks that the mechanisms for the solution that conflicts promote the participation and observation of the rules, despite the differences of power and values among the participants, and that their design allows it to adapt to changes in systems, both biophysical and social; in addition, adaptive governance is geared towards generating information that allows measuring and monitoring results, which are consistent with the scale of events (local / global) and with the needs of decision makers (who can assimilate them) (Dietz *et al.*, 2003).

In this order of ideas, sustainable development —expressed through the SDG— is aimed at restoring the resilience of ecological systems, such as terrestrial and marine systems, in addition to its purpose of building resilience by pursuing the eradication of poverty and poverty, hunger or by promoting decent work. The 2030 Agenda —which contains the SDG— represents the adaptive administration, the challenge is to align the green policy of the national scope —and the green policy of the other organizations, both public and private— with these guidelines in accordance with the reality and interests of the diverse participants and with the urgency of the environmental problem, this coordination to align the green policies in the direction of the adaptive administration falls in the field of the adaptive governance.

Link between actions aimed at maintaining and creating the resilience of the socio-ecological system

The SDG, in contrast to the Millennium Development Goals, seek to be integral, consider the different subsystems and all those who inhabit the planet as participants (United Nations Development Programme, 2016). This approach is close to the concept of panarchy that, despite being considered a central feature of SSE, had had little impact in the area of environmental policies (Berkes and Ross, 2016).

Among the SDG included in the 2030 Agenda are those that are clearly related to environmental aspects, such as climate change, and the conservation and sustainable use of marine and terrestrial ecosystems. Other objectives relate environmental and social aspects, such as guaranteeing the availability of water, its sustainable management and sanitation, and guaranteeing access to affordable, safe, and sustainable energy. Less clear, in appearance, is the relationship between economic and environmental objectives pursued by the 2030 Agenda, such as ensuring sustainable consumption and production patterns, and promoting sustained, inclusive and sustainable economic growth.

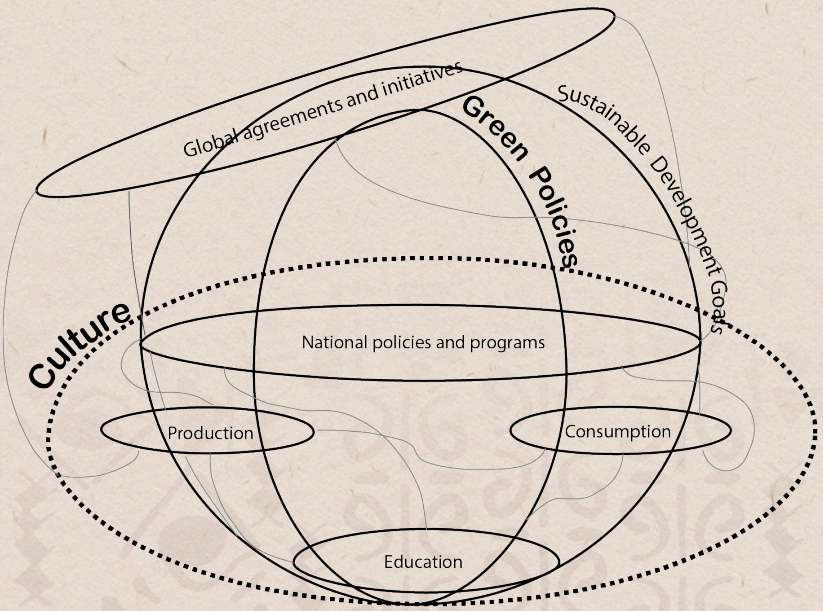
The SDG approach represents an advance; however, Stafford-Smith *et al.,* (2017) warn that for its success it is necessary to pay attention to the links between sectors, actors and countries, in accordance with what others have pointed out: local actions are conformed, or hindered, by higher levels (Ostrom, 2009; Smit and Wandel, 2006; Berkes and Ross, 2016). That is, there is coherence between international guidelines and efforts with their adoption in national and local plans and programs, as Stafford-Smith *et al.,* (2017) when referring to the key elements of implementation of the SDG. This is how the SDG are linked to green policies —and other policies— at different levels of organization.

Commonly, the green policy is related to government policy, i.e. "the course of actions by government actors to provide intentional guidance to solve collective [environmental] problems" (Jiao and Boons, 2014, p. 14). However, these actors are also in the supranational scope which seek to deal with transnational problems through supranational policies, while the national level fits the configuration of subnational policies that align with national policies (Costa *et al.*, 2010, p. 816). Finally, the organizations, as such the company, also develop their policies in this matter.

Costa *et al*., (2010, p. 816) consider that the [green] policy includes: 1) the establishment of objectives, goals [and strategies], and 2) the development of instruments of a regulatory, economic and informative / voluntary nature (Costa, *et al.,* 2010, p. 816). That is, administration and governance are present, the distinction with the SES approach consists of the long-term vision, flexibility, and participation of the various stakeholders. Therefore, the green policy to be fully compatible with the SDG should contain these elements.

In principle, the green policy needs to be considered beyond the regulation and use of environmental instruments and designed from an open systems approach (Figure 2). For example, green policy at the national level requires alignment with economic and educational policy; with the former, because the decision of what type of energy sources will supply industry and households, or what type of agriculture will be promoted, as well as what industries will be encouraged to promote economic growth, all of which will have an impact on the environment through emissions and effluents to the atmosphere, water bodies and land, with effects on both biodiversity and land use change, as well as on human health.

Figure 2. Linkages between Sustainable Development Goals and Green policies



Source: Own elaboration.

Then, the green policy also concerns the educational policy because the educational system is required for promoting of environmentally oriented behavior —and other aspects of sustainability— that is, for its institutionalization, its internalization in culture. In addition, educational policy is required to promote the generation of knowledge, technological development and training of professionals in the disciplines, or the specialties required, to address issues related to climate change, and other environmental problems.

In addition, these public policies need to be in accordance with the orientation of private investment. In the field of business, this systems approach (Glavič and Lukman, 2007) has already been proposed in the management initiatives of sustainable supply chains, industrial ecology, production and sustainable consumption, and others, such as the circular economy (Ghisellini *et al*., 2016). However, the adoption of this type of practices is insufficient to solve the problems of the unsustainability of the economic subsystem because they are not received uniformly among the various sectors; on the one hand, due to business self-regulation, on the other, because it is necessary to coordinate this type of effort, and for the business interest itself. Therefore, for governments to align public policy with guidelines, global policies with the other organizations, it requires both regulation and clear programs, public-private investment, and the promotion of partnerships between different groups of society with the government and the company, among other governance mechanisms.

The green policy has the potential to drive significant changes in the SES. For example, the mitigation of CO_2 emissions has the possibility of creating a trade network capable of reducing food insecurity (Porfirio *et al*., 2018), which would help to neutralize the risk of loss in quality of human nutrition —because CO_2 emissions decrease iron and zinc concentrations of crops— (Smith and Myers, 2018). However, although the reduction of emissions is viable in geophysical terms, it requires a greater political commitment reflected in mitigation actions (Millar *et al*., 2017). Next, another example will be presented, the case of the cement industry, more extensive and considering the context of Mexico.

The cement industry and its path towards sustainable development

The case of cement allows observing how adaptive governance and governance are developed at the level of industrial organization: companies moving from eco-efficiency strategies to strategies with greater integration between sustainable development issues, to the subsequent adoption of the SDG; as well as the formation of alliances between companies focused on the manufacture of cement and its expansion into the construction cycle.

Cement has characteristics that make its study relevant, on the one hand, it is one of the inputs of greater world consumption whose production process is relatively homogeneous and has presented few changes; its manufacture is distributed in a large number of countries because the weight / volume ratio of the product limits its international trade. In addition, economies of scale are generated, which makes it an industry with oligopolistic characteristics. On the other hand, the production of cement is essentially environmentally unsustainable, for two fundamental reasons: the extraction of limestone and the emission of carbon dioxide. The exploitation of the quarries modifies the environment, the extraction of the limestone implies using a non-renewable resource —at least not in the short term— which affects the change of the landscape and the loss of biodiversity. Secondly, the chemical reaction that gives rise to the Clinker —the cement adhesive— releases CO_2, in addition, to produce such a reaction, high temperatures are required, which feedback the release of carbon dioxide, which places cement manufacturing as one of the most polluting activities. Lastly, despite the environmental problems associated with cement production, at a global level, the industry is organized and active in terms of sustainable development (Vera, 2017, pp. 165-6, 187-9).

Due to the high energy consumption required to produce Clinker, the cement industry has been characterized by constant research in the areas of energy efficiency and searching for alternative fuels. So, when it was discussed what was sustainable development for companies, at the Rio Summit in 1992, this industry naturally accepted the vision of sustainable development that identified it with eco-efficiency. In addition, after the Summit and by the United Nations, the two main chambers that represented global industrial groups came together to form the World Business Council for Sustainable Development (WBCSD) in 1995, and within it emerged the Cement Sustainability Initiative (CSI) in 1999 (Vera, 2016).

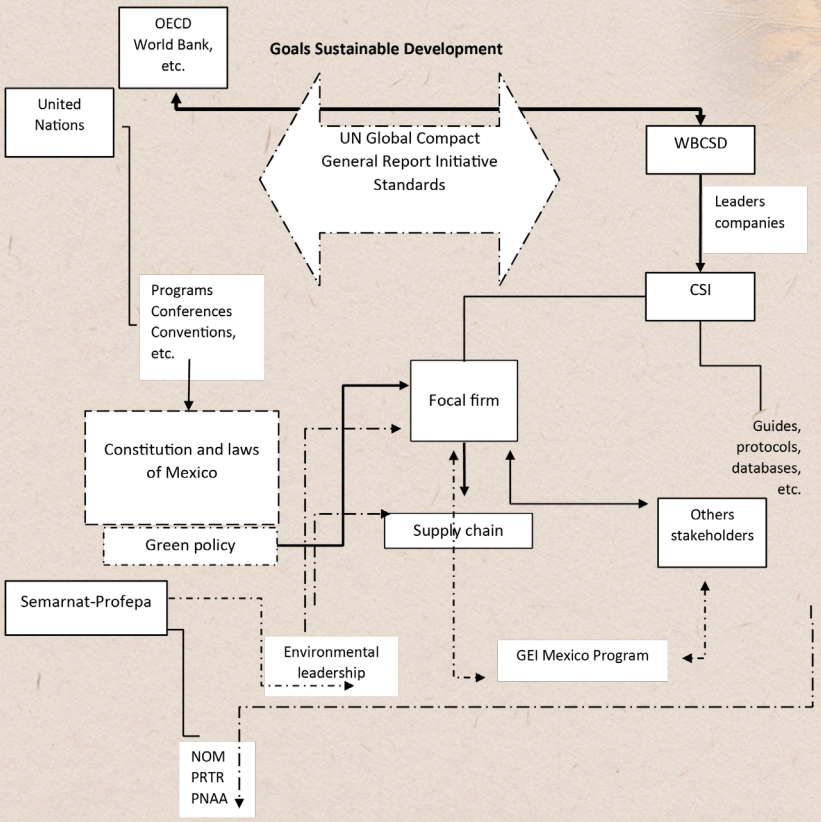
Gray (2010) points out that the power and influence of the corporation must be accompanied by responsibility, and that this is at least the description of the responsibility of the company on sustainability issues. In this regard, one of the first actions carried out by the CSI was the request to the Battelle Institute for a diagnosis of the critical aspects of sustainable development for the industry, and it also requested recommendations in this regard. As a result, the study showed that the cement industry was not on the path of sustainable development whether they were social, environmental, or even economic aspects. The suggestions to the industry were presented in a document called the Agenda for Action, which guided the actions of the companies towards a) climate protection; b) the responsible use of fuels and raw materials; c) occupational health and safety; d) the reduction of emissions; e) local impacts on land and communities; as well as f) the report and communication of progress on the agenda. In addition, they established a series of goals in key aspects, such as the reduction of emissions and use of alternative fuels, to mention (Vera, 2016, p. 17).

In this way, the Batelle diagnosis is the recognition of a situation of unsustainability, and so the Agenda for Action is identified as the element of the adaptive management that guides the actions of the company, those where its responsibility falls on sustainability issues, in so much so that the CSI together with the WBSCD represent the mechanisms of adaptive governance that coordinate the actions of the cement companies.

The Agenda for Action was joined by multiple publications that included CO_2 emission protocols —which standardized the measurement among the companies participating in the CSI—, guides for the evaluation of social impacts, for communication with stakeholders; in short, protocols and guidelines for the aspects indicated in the Agenda, and that allowed companies to align the Agenda with internal green policies. Likewise, the CSI created a database where companies reported CO_2 emissions, the use of alternative fuels, among other indicators, although the data is aggregated, the database has been made available to the general public (Vera, 2016). The above elements are part of other governance mechanisms aimed at measuring, thereby monitoring the goals and compliance with the agreements. Here we see two complementary positions, on the one hand, companies perceive these actions as part of a strategy that will allow them to position themselves in the market generating some type of competitive advantage (Hart, 1995), on the other, that such perception and the alliance as such form the mechanism of isomorphism that leads companies to have similar behavior (Oliver, 1997), in this case that would affect that companies adopt the guidelines of the Agenda.

On the other hand, as there was a collaborative relationship between the WBCSD and the United Nations, the guidelines of the latter were also handled by the CSI, so the cement companies adhered to the Global Compact, adopted the General Report Initiative, then the Objectives of the Sustainable Development (Figure 3). In this way, the CSI[3] has served as a link between the orientations of the global adaptive administration's orientations and the companies' internal green policy, although this alignment has gone beyond the green aspects.

Figure 3. Adaptive management and adaptive governance: the cement industry case



Notes: OECD - Organisation for Economic Co-operation and Development; WBCSD – World Business Council for Sustainable Development; CSI - Cement Sustainability Initiative; Semarnat-Profepa - Ministry of Environment and Natural Resources-Federal Office of Environmental Protection of Mexico; NOM - Official Mexican Standard, PRTR - Pollutant Releases and Transfer Register. PNAA - National Environmental Audit Program.

Source: Adapted from Vera (2016).

[3] In August 2018 it was announced that the CSI would no longer be part of the sectoral projects of the WBCSD —although it continues as a strategic partner — and that now the association between companies would lead to the Global Cement and Concrete Association (GCCA) (WBCSD, 2019). The companies in the cement industry present a high degree of vertical integration forward and backwards of the value chain, the new association makes visible the aspects that had been working in the concrete area within the CSI, as in the construction sector - development of materials and recycling of concrete-, although the focus remains on the cement where the greatest challenge lies.

Concerning the alignment or link between national green policies global policies and what concerns the company, to continue with the case of cement, it will be taken as a reference to Mexico.[4] The Mexican Constitution states that it is up to the State to ensure that national development is comprehensive and sustainable, this constitutional principle emanates various laws that directly affect the regulation of the cement industry, among them are the General Law of Ecological Equilibrium and Environmental Protection and the General Law of Climate Change, from which other regulations arise, among which NOM-040-Semarnat-2002 stands out, which is the Official Mexican Standard (NOM) that establishes the maximum permissible levels of emission into the atmosphere of various contaminants, among other specific aspects of the environmental regulation of cement manufacturing (Rocha *et al.*, 2019).

Regarding the government agencies responsible for environmental matters, there is the Ministry of Environment and Natural Resources (Semarnat), owner of the area, and the Federal Office of Environmental Protection of Mexico (Profepa) responsible for inspection and environmental surveillance. In addition, Profepa has other voluntary instruments under operation, such as the National Environmental Audit Program (PNAA) and the Environmental Leadership Program —which aims to establish collaborative links between the focal companies and their respective supply chains, in particular, the SME—. Likewise, Profepa collaborates with other organizations to implement third-party programs such as the Greenhouse Gases program —GEI Mexico Program— (Rocha, Beristain and Vera, 2019).

Grosso modo, the foregoing are the aspects that stand out from the relationship of the Mexican green policy, which must address the green policies of companies that manufacture cement in Mexico; among them is Cemex, which is one of the founding companies of the CSI. So, in that case, Cemex aligns both the guidelines of the CSI and those of the Mexican green policy to its green policy. However, there are other meeting points with which the alignment between green policies —and of these with global adaptive management— is strengthened at the global, national and local levels, as in the case of companies.

[4] In the cement production, China, India and the United States are the leading countries in their production, while Mexico is among the top 20 main producers (Vera, 2017). On the other hand, it will be remembered that the highest CO_2 emissions come from China and the United States, and that these emissions consider what corresponds to the manufacture of cement; In this regard, Mexico produced 1.5% of global emissions in the period 1998-2014 (estimates made with data from the World Bank, 2019).

Three examples will be presented; the first is observed in the implementation of the PNAA and the definition of the NOM that have a lag between them. When the PNAA began, the pollution caused by the cement industry was such that, according to the authority itself, the closure of operations was warranted; however, this industry —and others such as the electric company that were in equal conditions— is considered strategic for the economy, so it was not feasible to close it. At that time —1992— there was no NOM for which the authority resorted to international best practices, although the CSI as such did not yet exist to establish the criteria that would be considered in the environmental audit (Vera, 2013).

The second example is the alignment between the guidelines of intergovernmental organizations and those of national governments. Among those that can be cited is the Pollutant Release and Transfer Register (PRTR), which is conceived as a market instrument aimed at the prevention of pollution by companies, this record is derived from a recommendation of the Organization for Cooperation and Economic Development (OECD). The third example corresponds to the guidelines issued by the CSI and that influence non-member companies; this is observed in the GEI Mexico Program in which cement companies that are not members of the CSI take as a reference their protocol for measuring CO_2 emissions, in addition, the WBCSD was one of the third parties that supported this program together with the Semarnat (Vera, 2013).

Observing the network of reciprocal relationships between policies, guidelines, or guidelines that delineate adaptive management and adaptive governance mechanisms, one can ask about the results: what would be some indicator of the performance of companies? Eco-efficiency would be an interesting alternative for two reasons, the first is that the business world itself took it as its banner at the beginning of the 1990s. The second has academic implications; Gray (2010) considers that the financial representations of sustainability, in reality, provide little or no evidence, but allow comparison between companies given a selected criterion.

In this sense, Beristain *et al.,* (2016) measure the degree of eco-efficiency presented by the founding companies of the CSI in four moments, 2005, 2007, 2009 and 2014. Beristain *et al.,* (2016) find that, of the ten founding companies, only Lafarge and Holcim remained above the average of the sample, showing a low CO_2 emission related to the invested capital, that is, they were eco-efficient. While Cemex maintained a trend of efficiency in terms of CO_2, but it was not in terms of generating value, so it maintains a good environmental performance but not economic, that is, it does not manage to be eco-efficient.

Finally, the case of the cement industry illustrates the complexity to drive the actions of companies, and other organizations, in the sense of sustainable development. As mentioned, although at present the results are insufficient in relation to their environmental problems, this is one of the industries that has shown to be organized, both in the definition of their common agenda and in the coordination and implementation of governance instruments.

Conclusions

The approach of socio-ecological systems allows addressing its complexity through three basic attributes: resilience, adaptability and transformability. From this perspective, sustainable development is the conjunction of the capacities of adaptation —management— and transformability —creation— with a focus on the resilience of the systems. And the way to lead sustainable development is through adaptive management and adaptive governance.

In this sense, the Sustainable Development Goals, by pretending to be integral in addressing social, economic and environmental problems, approach the notion of panarchy. The recognition and identification of the characteristics of the panarchy needs to be present when designing the specific policies with which the SDG are to be implemented, in general, when addressing common problems, such as environmental ones. Therefore, the green policy, which is carried out from different levels of organization, needs this attribute to align with the others.

In the case of the cement industry, it can be observed that the adaptive management carried out by the industry has evolved over time, and that it has gone from aspects focused on the company, such as the eco-efficiency strategy, towards strategies that have collected a greater number of issues related to sustainable development. Likewise, the level of maturity reached by the adaptive governance developed by this industry is striking. On the one hand, there is the coordination of efforts that manifests itself in the different forms that the alliances of the industry have taken, which has taken them from the attention of the cement problem to the problem of the construction cycle. On the other hand, the development of various governance instruments with what is sought to stimulate cooperation among companies to achieve common goals.

Concerning the cement industry and the Mexican green policy, it is observed that the consideration of these issues is relatively recent —the decade of 1990— and that the relationship with the global industry has been present from that moment, either referencing the best practices or with direct association with representative bodies, such as the CSI. It also shows how the weight of the initiatives has shifted from intergovernmental and governmental organizations to other types of organizations, such as companies.

Finally, the case of the cement industry makes it possible to observe that adaptive governance and governance are necessary to guide sustainable development. This industry has been working together for almost 20 years and is still far from solving its environmental problems, which shows the complexity of the problem and shows that achieving the expected results requires more effort.

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