

Biodiversity and intellectual property law: the stake of a theory of reflexive governance

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Introduction

Bioprospection practices have proliferated as biotechnological and pharmaceutical companies engage in the collection and genetic screening of biological and genetic resources throughout the world. Under the Convention on Biological Diversity (CBD), agreed upon at the 1992 Earth Summit in Rio de Janeiro, bioprospecting is regulated through “Access and Benefit-Sharing Agreements”, which are bilateral contractual arrangements between ecologically-rich states or communities and private corporations. Such agreements are based on the principles of “prior informed consent” and “equitable sharing of the benefits”. Numerous benefit-sharing agreements have already been signed,² and some of them are currently under review by the CBD Secretariat in Montreal³. One of the oldest of these contracts is the Merck-INBio agreement in Costa Rica signed in 1991. Under the terms of the agreement, Merck, a major US pharmaceutical firm, offered a payment to be invested in nature conservation, equipment and training. In exchange, Merck received access to a “limited number of plant, fungal and environmental samples from Costa Rica’s protected areas for scientific evaluation” (Mulligan, 1999, p. 40). Merck also agreed to pay a specified royalty if any commercial products resulted from the company’s bioprospection activities.

The purpose of this article is to examine the competing proposals for the institutional framing of bioprospection based on the provisions of access and benefit-sharing embodied in the Convention on Biological Diversity. This debate constitutes the foundation of an emerging regime on access and benefit-sharing that is currently under negotiation at various international fora, including the World Intellectual Property Organisation⁴ (WIPO) and the United Nations Environmental Program’s Secretariat of the Convention on Biological Diversity (CBD)⁵. This regime is also on the agenda of the implementation plan agreed upon in Johannesburg in September 2002⁶. The aim of this article, however, is not to investigate the

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² For an overview of most important benefit-sharing agreements, see Mulligan, 2002; Peña-Neira 2002; Svarstad and Dhillon, 2000.

³ An overview can be found on the CBD’s website at <http://www.biodiv.org/programmes/socio-eco/benefit/case-studies.asp>.

⁴ These questions are debated in the Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore of the WIPO, which first met in April 30, 2001; cf. <http://www.wipo.org/fre/meetings/2001/igc>.

⁵ Cf. articles 15-19 of the Convention of Rio on Biological Diversity of 1992 and the Bonn Directives on Access and Benefit Sharing, adopted at the sixth conference of parties in The Hague in April 2002; <http://www.biodiv.org/programmes/socio-eco/benefit/bonn.asp#>.

⁶ Cf. Bridges Monthly Review, September 2003, p. 23; <http://www.ictsd.org/monthly>

formal negotiation process. Rather, through the example of bioprospection, this article analyzes the institutional conditions which guarantee collective learning processes in the governance of biodiversity in a context of globalisation.

The origin of this reflection is the insufficiency of current mechanisms for the regulation of bioprospection activities and the proposition of alternative mechanisms in terms of users' measures within different stages of negotiations (Barber, Johnston & Tobin, 2003). Current mechanisms of regulation perform through a double mechanism which proceeds on the two poles of a bilateral contractual relationship: on one hand, an incentive for innovation through the intellectual property right mechanism on the finished product at the end of the production line and, on the other hand, the insertion of *Prior Informed Consent* and *Access and Benefit Sharing* clauses in the contract in order to protect of the provider's rights. With regard to this current conception of regulation of bioprospection, users' measures propose a broad set of mechanisms, ranging from an action on actors' self-regulation through the development of codes of conduct or certification schemes to institutional framing through the creation of specific organizations for the monitoring of genetic resources transfer. Users' measures can be characterized by a double innovation: (a) first, such measures seek to develop an action on the innovation potential of the whole production line, and not only at the end of the line, and (b) they want to develop an action on the maximization of future options of development, beyond the question of existing resources allocation.

Commentaire [NZ1]: Perhaps self-regulation instead of autoregulation ?

However, to demonstrate that the shift towards these new modes of regulation actually improves the effectiveness of the regime, the advantages of a policy centered on users' measures must also be demonstrated. How do users' measures improve the effectiveness of the provisions on access and benefit sharing in the Convention on Biological Diversity, both in terms of economic efficiency and social legitimacy?

This questioning joins discussions in the social sciences, which have analyzed the insufficiency of new forms of governance which emerged in the nineties as being linked to a overly simplified conception of the path of norms' application⁷, both in economic theory and in theory of legal regulation.

First, evolutionist criticisms in economic analysis of law emphasize the consideration of criteria of operational efficiency of legal rules within a context consisting of a plurality of actors' logics (Driesden, 2003). Indeed, the neo-classical conception of efficiency mobilized by the economic analysis of law, linked to a conception of innovation centered on the sole logic of economic efficiency of the investor, proves to provide sub-optimal equilibriums (Nelson & Winter, 1982; Dosi, 1988). It is only by taking into account a plurality of social logics, beyond the sole logic of the investor, that one can hope to improve the operational efficiency of rules and therefore the effectiveness of the innovation regime.

Second, in the evaluation of the legitimacy of our modes of legal regulation in social legal and political theory, one can observe an evolution towards theories of network governance (Teubner, 2002; Scharpf, 1993). These new modes of governance aim to overtake the insufficiencies of command-and-control type governance modes (of a global regulation type authority), which do not take into account an action of the cooperative resources mobilized in the adjustment between the different social sub-systems that intervene in the implementation of norms. In order to better take into account the autonomy and the auto-organized

⁷ For a synopsis of these insufficiencies from the point of view of environmental international governance problems, cf. Maljean-Dubois, 2003.

characteristic of the different social sub-systems, deliberative criticisms propose a recourse to more reflexive modes of governance in the composition of different social logics.

In order to evaluate the contribution of this double criticism to the elaboration of an ABS regime, we propose in this article to apply the reconstruction of the debates surrounding the question of norm effectiveness to the propositions of users' measures. Our hypothesis is that the stake of the double criticism is to overcome the division between the normative ambition of new modes of economic and legal governance on one hand, and the practical acceptance of these measures from the users' point of view of these new norms on the other hand. Throughout this application, our objective is also to specify the issue that can present a reference to the notion of reflexivity in these criticisms for the elaboration of a theory of biodiversity governance. To this end, we will also have to verify how the double criticism takes into consideration the reflexivity of actors or institutions on the newly proposed rules, and even the conditions for capacitating this reflexivity.

1. The evolutionist criticism of economic analysis of law

First of all, from the point of view of the literature on the economic efficiency of our modes of regulation, the conception of efficiency at work in the regime of access and benefit sharing has been criticized by the evolutionist streams in economics (Driesden: 6-8). Expanding on the theoretical insights afforded by neo-institutional economics, evolutionist theories propose a broader vision on the economic rationality governing the decisions of both governmental agencies and businesses by showing how institutional objectives and routines always have to cope with partial information in order to determine institutional decisions.

In such a perspective, the conception of economic efficiency will be modified, from a static conception to a dynamic one. On one hand, the static conception of efficiency, which still characterizes the classical economic analyzes of law, aims for an optimal allocation of existing resources under ideal conditions of perfect rationality. This static conception of efficiency, based on conditions of perfect rationality characterized environmental policy in the 80's and the 90's, resulting in the intensive use of the methods of cost-benefit analysis in the determination of the objectives of environmental regulation (*Ibid.* :3) and the recourse to techniques of economic incentives as the means to achieve these objectives, essentially through the creation of markets of environmental goods or environmental titles (*Ibid.* :2). A dynamic conception of efficiency, on the other hand, incorporates the conditions of bounded rationality and a broader vision of economic rationality which takes also into account the dynamics of economic changes outside a static situation of equilibrium. In such a dynamic perspective, the criteria of efficiency will focus on the acquisition of new knowledge and new competences in order to maximize the future choices of development.

In the field of biodiversity governance, one observes an increasing recourse to such dynamic tools of regulation, believed to be better adapted to the specificity of biogenetic resources which are characterized by the uncertainty of the value of economic options of the exchanged goods (Swanson, 2000) and a constant need for new innovations to thwart the dynamics of natural evolution of genetic resources themselves (Swanson & Goeschl, 1999). This dynamic approach intends to meet the insufficiencies of the mechanisms of economic incentives at the core of the Rio convention, still too tied to a conception of efficiency as the static allocation of resources in a model of perfect rationality. In order to analyze how the new conception of efficiency allows an improvement in the proposed mechanisms, we focus on two particularly important mechanisms: the incentive for innovation through intellectual property rights

mechanisms and the protection of the rights of the providers of the resources through bilateral contracts for bioprospection.

1.1 The sub-optimal character of investment in innovation

One of the main contributions of the dynamic approaches to efficiency is to show the sub-optimal character of investment in innovation in a classical conception of ABS, which is based on incentives to innovation through intellectual property rights at the end of the production line on one hand, and the respect of PIC (Prior Informed Consent) and ABS (Access and Benefit Sharing) clauses within a bilateral contract relationship allowing to protect the rights of resources providers on the other hand.

One reason for the sub-optimal character of investment in bio-genetic resources through the intellectual property right mechanism considered in the access and benefit sharing regime is related to the inadequacy of the mechanism with regard to a resource that is itself evolutive (Swanson & Goesch, 1999). In the agricultural field, for instance, the introduction of a productive, competitive seed (i.e. resistant) with regard to pathogens induces an adaptation in the population of pathogens in a way to make them more aggressive (Goeschl & Swanson, 2001; 100-103). As a result, the resistance of productive seeds decreases with time, and one must permanently adapt the seeds and/or the means of production in reaction to the adaptation of the population of pathogens in the environment. Similar mechanisms operate in the pharmacological field, where one observes for example a decrease in the effectiveness of antibiotics and anti-malarial products (*Ibid.* : 103-107). However, the intellectual property rights mechanism creates an artificial monopoly on a productive seed, in the present, but it does not stimulate the investment with regard to potentially-productive populations able to cope with new populations of pathogens in the future. Thus, in order to maintain the innovation process over the long term, one must also establish an incentive for the maintenance of a population of biogenetic resources that are potentially productive in the future, in order to be able to respond to the constant need for new innovations which may thwart the dynamics of natural evolution of resources.

Moreover, even with regard to the process of bioprospection related to products that are *currently* interesting, the bilateral contract mechanisms considered in the ABS regime do not take into account the specificity of economic transactions involving biogenetic resources. Indeed, due to the uncertainty of the option value of bioprospection, the decision process leading towards investment in the resource is incremental throughout the production process, but the mechanism of benefit sharing only acts on the final stage of the innovation process (Swanson, 2000). For instance, by adopting the scheme of a four-step vertical industry as proposed in the analysis of Timothy Swanson (*Ibid.*), the decision to continue or abandon investment in the resource may intervene at the level (1) of ecosystems which produce diversity; (2) of communities of local users (traditional farmers, healers, etc.); (3) of the research of new products; or (4) of trading. Following this scheme, one can see that the sharing of benefits only acts on the last two steps and therefore does not generate an economic incentive for sustainable investment in the other steps of value creation throughout the whole process.

This double inadequacy of the current incentive mechanism leads to a sub-optimal investment in biodiversity as a source of innovation. By following the synthesis of Timothy Goeschl and Timothy Swanson (Goeschl and Swanson, 2002), one can underline three kinds of

insufficiencies that results from Access and Benefit Sharing agreement, bases on incentive mechanism through intellectual property rights:

- (a) First, the IPR mechanism is insufficient for investment in products of short life duration. It creates then a sub-investment in genetic resources whose adaptability degree is high.
- (b) Second, the IPR mechanism creates a trend to monopolies and is therefore not compatible with the requirements of an innovation process based on diversity.
- (c) Third, the IPR mechanism acts at the level of individual companies and does not create an incentive to invest in the other levels of value creation whose benefits are diffuse throughout the whole industry. It produces a sub-investment in the other levels of value creation, particularly at the level of the ecosystem and its users.

The interest of demonstrating this triple insufficiency from the point of view of a dynamic approach is to show the necessity of abandoning a conception of efficiency based on a static allocation of resources, in order to progress towards a conception that better accounts for questions of scale (collective character of the innovation process) and the relationship between economic growth and the carrying capacity of terrestrial ecosystems.

1.2 The reaction of the law

The diagnosis on the necessity of taking into account a dynamic conception of economic efficiency in the definition of intellectual property rights joins the analyses of authors such as Reichman or Swanson, for whom the necessity for new tools of regulation is not only due to the adaptation of the existing regime of intellectual property rights to a new situation, but also reveals a change in the underlying beliefs of the classical paradigm of intellectual property rights (Reichman, 1994; Swanson, 1997).

In this way, these authors distance themselves from the position that only sees the difficulties posed by intellectual property rights on genetic resources as a simple technical legal issue. According to Reichman, such simple technical adjustment can only produce a multiplication of hybrid regimes not particularly well adapted to the real new needs for regulation (Reichman, 1994: 242-244). For instance, in the field of genetic resources regulation, one sees a tendency to multiply the creation of new laws by each sector of activity. This has resulted in the emergence of many specific legal regimes for the protection of intellectual property rights: patent for processes of synthesis relying on genetic manipulation, plant breeder's rights for plant varieties resulting of genetic selection, farmers' rights for traditional farmers, and national sovereignty rights governing the rights to access and use of ecosystems producing biological diversity. Nonetheless, the multiplication of different sectorial laws still falls in a static conception of efficiency and does not really meet the need for an integrated approach to the value creation process through the whole production process.

In order to capture the originality of the new legal tools that are required, another reading of current changes is necessary—a reading which does not reduce them to a simple technical adjustment by sector of activity. Thus, Swanson shows how some new legal tools already comply with the need of a more dynamic approach of efficiency. Indeed the current propositions of systems of certificates of origin, the creation of collection societies or conservation funds (Swanson, 1997: 151-161), aim to create diffuse incentives on the whole production process, allowing to maximize the future choices of development (Ibid. : 162-171). In order to characterize this new step in the conception of intellectual property rights,

Reichman talks about an evolution from a paradigm that functions by hybridization of existing tools, based essentially on patent and copyright, to a paradigm in terms of a liability regime (Reichman, 2000: 1776-1796). The emphasis of this new regime is no longer focused on the creation of an artificial monopoly of exploitation through intellectual property, but on the creation of an incentive for a multitude of potential and effective innovations, allowing the ex post compensation of the prior link in the innovation chain.

Also in the ABS regime, the insufficiencies of existing legal means plead for such a more dynamic re-interpretation of intellectual property rights system. Thus, as Brendan Tobin shows from a case study on Peru, the implementation tools of the ABS regime already tend to take into account the requirements of a more dynamic approach (Tobin, 2001). In the particular case of an agreement between Monsanto and the Aguarunas, he identifies three zones of tension between a classical conception and a more dynamic conception of efficiency.

One area of tension is located at the level of the identification of the source of innovation. In the classical ABS conception, the benefits secured by an individual community for the use of their traditional knowledge in bioprospection activities are negotiated without the agreement of other communities. Such a system is opposed to the collective character of traditional innovation systems and in particular, does not allow verification that the knowledge has been developed by that particular community. In order to respond to this deficit, a revised proposition of the agreement in August 2000 included a clause requiring the community that negotiates the contract to inform other communities on ongoing negotiations and to take into consideration their points of view within the negotiation.

A second tension is located at the level of the legal protection of traditional knowledge. In order to allow the protection of traditional knowledge, the agreement creates a distinction between knowledge that has not yet been diffused outside the community and knowledge that belongs to the public domain. Even if the proposition of access and benefit sharing applies in an equal manner to these two types of knowledge, it does not provide for measures that allow communities to carry on an effective monitoring on knowledge that is in the public domain. In the classical conception, the knowledge is considered as being public when it has been published, distributed throughout media, or has been the subject of important commercial transactions. So, this conception does not take into account either the intentions of indigenous communities in sharing this knowledge and making it public or the conscience that they may have that their knowledge can be used to commercial purposes. This is where the system of remuneration proposed by Reichman would be able to restore an effective monitoring of the knowledge that is already in the public domain, but which has been taken without prior consent, by redefining the notion of public domain in order to integrate criteria such as the communities' intention or their knowledge of the further use of this knowledge.

Finally, a third tension that emerged within the negotiation process is located at the level of the interests at stake. Indeed, the agreement that resulted from the negotiations creates a regime that focuses attention on the means to regulate and facilitate the trading of traditional knowledge, and only considers in a lower extent the consolidation of traditional innovation systems to the advantage of the needs of indigenous communities. Some aspects of revitalization of traditional innovation systems have been considered in the agreement between Monsanto and the Aguarunas through the creation of a system of traditional knowledge registries, but these systems do not consider either oral knowledge which plays an important role within communities or the means to integrate the community registries within

national registries that may serve as an evidence of prior art in intellectual property law conflicts.

Throughout these three tensions, we rediscover the different elements of the dynamic conception of efficiency as analyzed by Goeschl and Swanson: the taking into account of the collective character of innovation within communities, the dynamic conception of efficiency through liability rules and the incentives allowing the maximization of the future choices of development through the creation of traditional knowledge registries.

2. The contribution of the systemic sociology of law

The evolutionist criticism of the economic analysis of law indicates the need for an evolution of legal rules in reaction to the means of evolution of the production in the field of biotechnologies. As we saw in the particular case of the access and benefit-sharing regime, the classical approach, based on intellectual property rights and bilateral contractual relations, leads to sub-optimal investment in the innovation. This is why the evolutionist approaches aim at supplementing this static approach by emphasizing the need for incentives which act on the multitude of the innovations allowing the maximization of future options, on one hand, and on the whole process of value creation with the current resources, on the other hand.

However, to concretely implement these new measures for legal regulation in the various social subsystems that play a role in the bioprospection activities, the rationality of the legal rule must still be combined with the rationality of the other systems (economic, political, cultural) with their own normative orders (Teubner, 1989). From this point of view, their effects on the socio-economic reality will also depend on the translation of new means of regulation with regard to the autonomous normative logics of these. The effectiveness of the rule will therefore depend on the conditions of agreement between these different normative orders.

It is the contribution both of sociological theories of the law in the systemic transition (Teubner, 1984) and procedural theories of law based on the pragmatic theory of language (Habermas, 1981) to have articulated the specific rationality of resources of cooperation between social subsystem as a communicational logic. Indeed, unlike instrumental rationality, the effectiveness of cooperative interaction between social systems does not depend on the optimal adequacy of ends and means, as in the considerations of economic efficiency, but on its capacity to extend its action on the whole language community, composed of a plurality of systems with their own normative orders (Teubner, 1994: 185-189).

The perspectives opened by these reflections on the limits of legal regulation capacities sheds new light on the emergence of new modes of governance in the access and benefit-sharing regime, which aim at supplementing the legal measures proposed in the evolutionist approach of economic efficiency. Indeed, one can observe in the ongoing discussions on the access and benefit-sharing regime, the emergence of modes of network governance, mobilized for their potential of action on the increase in reflexivity of subsystems with regard to the transformation of our modes of legal regulation. In this respect, Teubner's recent work offers an interesting perspective on the mode of communication within networks allowing us to take into account the limits of the capacity of legal regulation of social institutions with regard the autonomy and the resistance of social subsystems (Teubner, 1994; Teubner, 2002). This is why we will begin below from the work of Teubner in our evaluation of the interest that may

present the modes of governance networks and their reflexive improvement for the governance of biodiversity.

2.1 The systemic limits to the implementation of the dynamic tools of regulation

In order to illustrate the possible actions on the systemic limits in the ABS regime, it is useful to start from an analogy with the case of collective liability in the field of ecological risks. Indeed, the empirical research on the effect of collective liability law has much to teach us regarding the complex relations that exist between the new measures of legal regulation in the ABS regime on one hand and the effects on socio-economic reality on the other. In fact, these two fields are characterized by the elaboration of tools of collective liability which do not rely on the attribution of liability to pre-existing collective organization, but which instead create themselves the appropriate collective organizations in order to implement tools of collective liability.

Moreover, in both fields one can observe the emergence of new problems of collective action, to which actors are able to answer with opportunism. An individual actor, for example, may decide not to contribute to the reduction of risks in the network of actors to which the law has given the liability (e.g. actors involved in the management of a contaminated site, in a market producing some important environmental externalities, etc.).

With regard to this effect on the social result, Teubner proposes an action in a double direction (Teubner, 1972 : 323-324): first of all, on the side of actors' self-regulation, Teubner proposes to develop an action both on the organization of self-regulated actors and on the opportunist behaviors, through the re-individualization of the legal action even at the core of the rules of collective liability. Thus, in order to fight opportunism, the law may try to compensate the negative effects by re-individualization within the collective management device, whether through dissuasive measures or loss distribution according to the effective behavior of the partners within the network. Then, from the institutional side, he proposes the creation of new modes of regulation to establish a cooperative interaction between the subsystems. For example he considers the creation of institutions of joint management of risks, which are responsible for the internal distribution of loss and which could even have assumed broader responsibilities. These joint institutions of management allow avoidance of the disadvantages of the solutions through legal liability (e.g. ineffectiveness, problems of collective action) and the solutions through public regulation (e.g. high costs of transaction). For instance, both the professional associations recommending industrial self-regulation under governmental monitoring and, in a more proactive manner, the creation of joint ventures of risk management by a group of companies, are based on this model.

The originality of Teubner's recent reflection on governance networks lies in a reflection on the condition of an increase in reflexivity of the regulated subsystems themselves and a reflection on the conditions of the cooperative interaction between the subsystems. In this perspective, conceiving a mode of regulation that takes into account both the relations of interaction between the components of the networks and the autonomy of the components is of fundamental importance (Teubner, 1984: 389-396).

2.2 Application to the ABS regime

In the field of the legal regulation of access and benefit-sharing, one may also argue for the need of such reflexive action in the application of new measures. In the field of ABS, the law also aims at creating some new collective entities adapted to the need of a dynamic regulation of the innovation process involving biogenetic resources⁸. At the same time, several authors emphasize the ambivalence of these measures which produce both negative and positive effects on the different social subsystems (Tobin, 2001; Barber *et al.*, 2003). Thus, in the case of the bioprospection contract between Monsanto and the Aguaruna, the legal regime also creates some problems of collective action and therefore allows certain actors to develop an opportunist behavior. One may think in this context about the problem of some communities that do not respect the agreements and therefore do not participate in the creation of registries or the exchange of information between the communities. Another problem that has been raised concerns the difficulty of the cooperative construction of registries at the national scale, or at the international scale with such a very important number of actors.

In the ABS field, one also observes the creation of collective norms of management by self-regulation, in reaction to the lack of effectiveness of classical modes of regulation in their capacity to cope with these problems of collective action (Ten Kate & Laird: 300-309). For example, in the field of the exchange of biogenetic resources, one can observe an increasing tendency of certain companies to work with intermediaries (away from governmental control) in order to escape the necessity to abide by international regulations. In reaction to this possibility of opportunist behavior in the existing international regime, one can observe the emergence of associations of resource users creating ethical codes of conduct or some voluntary mechanisms of benefit sharing. This evolution was especially important in sectors of greater homogeneity, as in the case of the creation of an international code of conduct MOSAIC for the *ex situ* collections of microbial cultures⁹ or the declaration of common principles on access and benefit-sharing of the network of botanical gardens around the *Royal Kew Garden* in London¹⁰. In addition to these common initiatives, some companies have also created ethical codes on an isolated basis¹¹, with the belief of improving their reputation as reliable supplier of genetic material (*Ibid.*: 302).

In reaction to the problems of collective action, users' measures also propose to introduce into the regime some means of supplementary control with respect to the initiatives of self-regulation allowing a re-individualization of the responsibilities within the mechanisms of collective management (Barber *et al.*). Among these measures, one can quote the propositions of mentioning the name of the country of origin in patent filings, the use of import controls in order to check the compliance to the legislation of the country of origin of the resource or also the creation of a mediation office increasing cooperation between different countries.

Then, following the second direction of action proposed by Teubner, it would be also necessary to consider an action on the conditions of cooperative interaction between the subsystems. The propositions of reform of the system of certificate of origin towards an

⁸ One can refer to the propositions of Reichman and Swanson we analyzed in the first section aiming at developing such a dynamic approach, for example through their propositions for the creation of traditional knowledge registries, conservation funds or the design of *ex post* compensation of knowledge that is already in the public domain

⁹ Microorganism Sustainable Use and Access Regulation

¹⁰ Common Policy Guidelines for Participating Gardens on Access to Genetic Resources and Benefit-Sharing (www.rbg.ca/cbcn/cpg_index.html).

¹¹ These are Glaxo Wellcome, Novo Nordisk, Xenova, Shaman Pharmaceuticals et Bristol-Myers Squibb (Ten Kate : 303-309).

international system of monitoring of the flow of genetic resources are already an attempt in this direction. As the UNU document on users' measures indicates, such a system could considerably facilitate the voluntary and mandated measures discussed above (Barber *et al.* :33). Indeed, the evaluation of compliance with the procedures of prior informed consent of the different initiatives of business self-regulation depends only on the mechanisms of reputation between the members of a network of institutions or professionals of certain sectors. Even if these mechanisms effectively increase the contract reliance for member organizations, it remains difficult to compare effectiveness among different initiatives or capacity of such institutional arrangements to guarantee a level of compliance for more heterogeneous sectors. The creation of a standardized system at the international level would allow the harmonization of procedures of identification, prior informed consent, and mutually agreed terms and may therefore serve as the basis for common evaluation. Other possible effects of the facilitation of actors' self-regulation which could result from such a system include an increased protection of contracts' confidentiality, a reduction of transaction costs and incentives for countries to develop more flexible procedures and rules of ABS (*Ibid.*)

Another proposition for regulating activities of self-regulation, which develops an action on the cooperation between the different sectors of self-regulated activity, is the creation of the Global Bio-Collecting Society (GBS) (Drahos, 2000)¹². Collecting Societies already exist in the field of copyright, aiming at defending the interests of property right owners through the creation of registries of existing copyright and existing users' licenses. However, as compared to such a Collection Society in the field of copyright, the GBS would be organized in a way to allow the different parties to satisfy the objectives specified in the Convention on Biological Diversity and perhaps also in the International Undertaking on Plant Genetic Resources (*Ibid.* : 248). More precisely, such a Society would act as an office for the notification of community registries of traditional knowledge, facilitating the creation of a dialogue between the communities and third parties, each time a third party consults the GBS concerning the notification of such as registry. As Peter Drahos argues in his note on the GBS, the Collection Society would be attractive both for the industry and for local communities. The incentives for the industry would be the reduction of transaction costs, legal stability at the level of an increased protection against other claims of property right, and the reduction in the necessity of supplementary evaluation of compliance procedures which hinder contractual liberty (*Ibid.* : 249). For local communities, the GBS may offer assistance to negotiation, in order to balance the asymmetry in the parties' legal resources, and play a role in alternative dispute resolution in the discussions on the standardization through a tripartite process involving representatives from the industry, the indigenous communities and the governments.

3. Conclusion

Both from the point of view of both economic efficiency and of social legitimacy of the means of legal regulation, the user measures suggested in the emergent regime of ABS constitute a complete turn as compared to the presuppositions which governed the ABS discussion in the nineties. Indeed, in the recent literature, as much related to the economic analysis of law questioning the regime's efficiency as the one related to the systemic sociology of law questioning the effectiveness of the new rules of collective liability, the

¹² In fact, the interest of this proposition is to allow an increase in reflexivity with regard to the new rules both on the organizational level by an action on the procedures of decision, and on the level of distribution of resources by an action on the costs of legal actions. Teubner also argues for the importance of intervention on these two level, in his seminal article of 1984 (Teubner, 1984 : 392-393).

importance of an action at the level of all the users who intervene in the exchange of biogenetic resources is emphasized.

In order to show the benefit that one could draw from this double criticism for the reflection on the effectiveness of the legal regime on access and benefit-sharing, we have focused in a first step on the evolutionist criticism of the economic analysis of law. This criticism puts the emphasis on the bounded rationality of decision-makers and the adaptive efficiency of innovation processes. In the field of biodiversity governance, which is characterized by the uncertainty of the option value of biodiversity, the rule's effectiveness will depend on its capacity to create incentives for value creation throughout the whole production process. Moreover, because of the dynamics of autonomous natural evolution of genetic resources, efficient means of regulation should aim to maximizing the future choices of development. This is why user measures tend to develop dynamic tools of regulation, such as through the rule of ex post compensation or the creation of traditional knowledge registries.

However, this first approach does not consider the supplementary conditions of effective implementation of norms, which relate to the autonomous reaction of the different social subsystems regarding the newly proposed measures. This is why, on the basis of Teubner's reflections, we have specified the conditions of a more reflexive approach towards biodiversity governance which also develops an action on the increase of reflexivity of subsystems with regard to the legal rule. Whether it is about the propositions of regulation in terms of a monitoring system of genetic resources flow, or in terms on the creation of an international institution of bio-collection, the stake is indeed to strengthen the cooperatives resources which govern the self-adjustment between the different subsystems.

Nevertheless, this "reflexive correction" still remains incomplete. Indeed, by focusing on the ideal potential of governance resulting from the reflexive interaction between the different subsystems, Teubner presupposes that these systems can produce their own reflexive capacities, without thinking about the empirical conditions of an effective cooperative interaction between the subsystems. In this respect, it seems to us that a better articulation is needed between the systemic perspectives on the reflexive cooperation between the subsystems on the one hand and the dynamic conception of economic efficiency on the other. Rather than trying to strengthen in an independent way the background of cooperative beliefs that operate in the interaction between the subsystems on one hand and the foreground of self-adjustment capacities of actors in a dynamic conception of efficiency on the other hand, one could articulate them in trying to develop some specific tests of cooperative competences according to the selection of dynamic regulation strategies. Such a perspective, that one finds also with Elinor Ostrom (Ostrom, 1998) in her reformulation of the work of Reinhard Selten (Selten, 1991) or with Olivier Godard by his re-appropriation of the theories of complexity (Godard, 1998) would aim at integrating the hypothesis of bounded rationality also in the systemic perspectives on the self-regulation of subsystems and their cooperative interaction. In this way, the belief in the ideal potential of governance of interacting subsystems would be also likely to be partially fulfilled by some decisional process. These processes would allow to determine a specific level of stabilization of the cooperative interaction, selecting dynamic strategies of regulation in the specific context of a particular organization of a particular community victim of the consequences of environmental degradation.

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